Galileo Was Wrong
The Church Was Right

Volume II

The Historical Case

For Geocentrism

Robert A. Sungenis, Ph.D.

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About the Author

Robert A. Sungenis, Ph.D., is the founder and president of Catholic Apologetics International Publishing, a non-profit corporation. He holds advanced degrees in Theology and Religious Studies from George Washington University, Westminster Theological Seminary, and Calamus International University. His 700-page doctoral dissertation defended geocentric cosmology. He is the author of many books and articles on religion, politics, science and culture, including: *The Catholic Apologetics Study Bible, Vol. 5, The First Epistle to the Corinthians* (CAI Publishing, Inc., 2008); *The Catholic Apologetics Study Bible, Vol. 4, The Book of Genesis, Chapters 1-11* (CAI Publishing, Inc., 2008); *The Catholic Apologetics Study Bible, Vol. 3, The Epistles of Romans and James* (CAI Publishing, Inc., 2008); *The Catholic Apologetics Study Bible, Vol. 2, The Apocalypse of St. John* (Queenship Publishing, 2007); *The Catholic Apologetics Study Bible, Vol. 1, The Gospel According to St. Matthew* (Queenship Publishing, 2003); *Not By Bread Alone: The Biblical and Historical Evidence for the Eucharistic Sacrifice* (Queenship Publishing, 2000); *How Can I Get to Heaven: The Bible's Teaching on Salvation Made Easy to Understand* (Queenship Publishing, 1998); *Not By Faith Alone: The Biblical Evidence for the Catholic Doctrine of Justification* (Queenship Publishing, 1997); *Not By Scripture Alone: A Catholic Critique of the Protestant Doctrine of Sola Scriptura* (Queenship Publishing, 1997); *Shockwave 2000* (New Leaf Press, 1994). He has appeared on radio and television, including programs on CNN, the BBC and EWTN.

Scriptural Abbreviations

New Testament

Mt	Matthew
Mk	Mark
Lk	Luke
Jn	John
Ac	Acts
Rm	Romans
1Co	1 Corinthians
2Co	2 Corinthians
Gl	Galatians
Ep	Ephesians
Ph	Philippians
Cl	Colossians
1Th	1 Thessalonians
2Th	2 Thessalonians
1Tm	1 Timothy
2Tm	2 Timothy
Ti	Titus
Pm	Philemon
Hb	Hebrews
Jm	James
1Pt	1 Peter
2Pt	2 Peter
1Jn	1 John
2Jn	2 John
3Jn	3 John
Jd	Jude
Ap	Apocalypse (Revelation)

Old Testament

Gn	Genesis
Ex	Exodus
Lv	Leviticus
Nm	Numbers
Dt	Deuteronomy
Js	Joshua
Jg	Judges
Rt	Ruth
1Sm	1 Samuel
2Sm	2 Samuel
1Kg	1 Kings
2Kg	2 Kings
1Ch	1 Chronicles
2Ch	2 Chronicles
Er	Ezra
Nh	Nehemiah
Tb	Tobit
Jt	Judith
Et	Esther
1Mc	1 Maccabees
2Mc	2 Maccabees
Jb	Job
Ps	Psalms
Pr	Proverbs
Ec	Ecclesiastes
Sg	Song of Solomon
Ws	Wisdom
Es	Ecclesiasticus (Sirach)
Is	Isaiah
Jr	Jeremiah
Lm	Lamentations
Br	Baruch
Ez	Ezekiel
Dn	Daniel
Hs	Hosea
Jl	Joel
Am	Amos
Ob	Obadiah
Jh	Jonah
Mc	Micah
Na	Nahum
Hk	Habakkuk
Zp	Zephaniah
Hg	Haggai
Zc	Zechariah
Ml	Malachi

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This book is dedicated to:

St. Robert Cardinal Bellarmine

For his courage and foresight in standing up
to the unproven theories
of Galileo Galilei

But God chose what is foolish in the world to shame the wise,
God chose what is weak in the world to shame the strong,

God chose what is low and despised in the world, even things that are not, to bring to nothing things that are,

so that no human being might boast in the presence of God.

1 Corinthians 1:27-29

For the wrath of God is revealed from heaven against all ungodliness and wickedness of men who by their wickedness suppress the truth.

For what can be known about God is plain to them,
because God has shown it to them.

Ever since the creation of the world his invisible nature,
namely, his eternal power and deity, has been clearly
perceived in the things that have been made.
So they are without excuse;

for although they knew God they did not honor him as God
or give thanks to him, but they became futile in their
thinking and their senseless minds were darkened.

Romans 1:18-21

"We wouldn't know truth if it jumped up and bit us in the ass. We're probably fairly good at recognizing what's false, and that's what science does on a day-to-day basis, but we can't claim to identify truth."

Steven M. Holland[1]

"…the tail is just as capable of wagging the dog in science as anywhere else."

Robert Laughlin[2]

The common idea that scientists reject a theory as soon as it leads to a contradiction is just not so. When they get something that works at all they plunge ahead with it and ignore its weak spots…scientists are just as bad as the rest of the public in following fads and being influenced by mass enthusiasm."

Vannevar Bush[3]

"It is not uncommon for engineers to accept the reality of phenomena that are not yet understood, as it is very common for physicists to disbelieve the reality of phenomena that seem to contradict contemporary beliefs in physics."

Henry H. Bauer[4]

"Hypothesis…establishes itself by a cumulative process…if you make the same guess often enough it ceases to be a guess and becomes a scientific fact."

C. S. Lewis[5]

"Next in line are the scientists…they feel that they are the only men with any wisdom, and all other men float about as shadows….They can never explain why they always disagree with each other on every subject…knowing nothing in general they profess to know everything in particular."

Desiderius Erasmus[6]

"Scientists…are used to dealing with doubt and uncertainty. All scientific knowledge is uncertain…. "Science alone of all the subjects contains within itself the lesson of the danger of belief in the infallibility of the greatest teachers in the preceeding generation…. "Learn from science that you *must* doubt the experts…Science is the belief in the ignorance of experts."

Richard Feynman[7]

"How would this Marxist revolutionary emotion and vision be expressed…in the mind of a young 'revolutionary genius' in physics? The emotions that gave rise to sociological relativity might then seek to express themselves in a physical relativity; transposed and projected upon the study of the physical world, they would issue in an overthrow of absolute space and time, and in a conception of the relativity of length and time measurements to the observer's state of motion."

Lewis Samuel Feuer[8]

"…by the reading of David Hume's and Ernst Mach's philosophical writings….It is very well possible that without these philosophical studies I would not have arrived at the special theory of relativity."

Albert Einstein[9]

---

[1] Professor of Geology at University of Georgia to colleague Bruce Railsback. Quote personally verified by phone from Dr. Holland on Aug 8, 2007.

[2] Robert Laughlin, *A Different Universe, Reinventing Physics from the Bottom Down*, 2005, p. 100.

[3] Vannevar Bush, MIT Dean of Engineering (d. 1974), attributed, not verified.

[4] Henry H. Bauer, professor at Virginia Polytechnic, in "The So-Called Scientific Method," in *Scientific Literacy and the Myth of the Scientific Method*, 1992.

[5] C. S. Lewis, *The Pilgrim's Regress*, 1958, p. 37.

[6] Erasmus' *The Praise of Folly*, trans., J. P. Dolan, p. 142.

[7] Richard, Feynman, *The Meaning of it All: Thoughts of a Citizen Scientist*, 1998, p. 26; Feynman, *The Pleasure of Finding Things Out*, 1999, p. 188; *ibid*., p. 187.

[8] L. S. Feuer, "The Social Roots of Einstein's Theory of Relativity," *Annals of Science* 27 (1971), as cited by Max Jammer in *Einstein and Religion*, p. 30.

[9] Letter to Carl Seelig, as cited in *Albert Einstein—A Documentary Bibliography*, p. 67, cited in Max Jammer's *Einstein and Religion*, pp. 40-41.

"But more dangerous is the error of certain weak brethren who faint away when they hear these irreligious critics learnedly and eloquently discoursing on the theories of astronomy or on any of the questions relating to the elements of this universe. With a sigh, they esteem these teachers as superior to themselves, looking upon them as great men; and they return with disdain to the books which were written for the good of their souls; and, although they ought to drink from these books with relish, they can scarcely bear to take them up."

St. Augustine[10]

[10] *The Literal Meaning of Genesis*, Book 1, Chapter 20, Para. 41, *Ancient Christian Writers*, *ibid*., p. 44.

Chapter 11

Science and its Persistent Problems

Critical Remarks from its Own Ranks

Today, science lives in the aura of being a monolithic consensus of truth and impartiality. Unfortunately, this is at best an exaggeration, and often it is simply untrue. Science, like any other endeavor of man, is subject to the weal or woe of human participation and its common foibles. As science walks in the precarious halls of trial and error, it is, contrary to popular opinion, particularly prone to mistaken notions. As scientist Lewis Thomas (d. 1993) recently confided:

> Science is founded on uncertainty…. We are always, as it turns out, fundamentally wrong.…The only solid piece of scientific truth about which I feel totally confident is that we are profoundly ignorant about nature....It is this sudden confrontation with the depth and scope of ignorance that represents the most significant contribution of twentieth-century science to the human intellect.[11]

> The principle discoveries in this [20th] century, taking all in all, are the glimpses of the depth of our ignorance about nature. Things that used to seem clear and rational, matters of absolute certainty – Newtonian mechanics for example – have slipped through our fingers, and we are left with a new set of gigantic puzzles, cosmic uncertainties, ambiguities. Some of the laws of physics require footnotes every few years, some are cancelled outright, some undergo revised versions of legislative intent like acts of Congress.[12]

Karl Popper, one of the more respected secular philosophers, issued major critiques throughout his life on the industry of science. He writes:

> For us therefore, science has nothing to do with the quest for certainty or probability or reliability. We are not interested in establishing scientific theories as secure or certain, or probable….It can even be shown that all theories, including the best, have the same probability, namely zero….the realization that our attempts to see and to find the truth are not final, but open to improvement; that our knowledge, our doctrine, is conjectural; that it consists of guesses, of hypotheses rather than of final and certain truths. [13]

Since most people are not familiar with the intricacies of research and discovery, the doctrines concerning the mechanical workings of the universe are inevitably left to what modern society has come to know as "the scientist." Today, those with credentials in theology, or even philosophy, are invariably ignored when the crucial decisions are made regarding what will be taught in the universities. The sad truth is, however, that an inordinate number of scientists are employed for their own selfish interests, and never consider, let alone seek, an authority above themselves. Statistics reveal just how bad it has become. *Scientific American* carried an article a few years ago on the work of James H. Leuba, a statistician who both in 1914 and 1933 surveyed the religious beliefs of American biological and physical scientists of their views on two fundamental beliefs in Christianity: (1) the worship of God and (2) the existence of an afterlife. This study was important to Leuba since, as he said, "scientists enjoy great influence in the

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[11] Lewis Thomas, "On Science and Certainty," *Discover Magazine*, 1980, p. 58. Lewis also quips: "On any Tuesday morning, if asked, a good working scientist will tell you with some self-satisfaction that the affairs of his field are nicely in order, that things are finally looking clear and making sense, and all is well. But come back again on another Tuesday, and the roof may have just fallen in on his life's work"; "In real life, every field of science is incomplete, and most of them – whatever the record of accomplishment during the last 200 years – are still in their very earliest stages."

[12] Lewis Thomas, "Making Science Work," *Discover*, March 1981, p. 88.

[13] Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, 1963, 1965, pp. 229, 192, 151. Popper opens with: "The title of this lecture is likely, I fear, to offend some critical ears. For although 'Sources of Knowledge' is in order, and 'Sources of Error' would have been in order too…" (*ibid*., p. 3).

modern world, even in matters religious."[14] At first glance, Leuba's results seem somewhat reassuring. Among a general cross section of scientists, he found that 40% believed in God. But then he concentrated on the more elite scientists, those whose names are in the newspapers, who write the major books and articles, and who have the most influence on what the public believes. He found that an astonishing "80 percent of top natural scientists rejected both cardinal beliefs of traditional Christianity." *Scientific American* then did its own study and found even worse results. Using the 1,800 members of the 1998 *National Academy of Sciences* as its measure of who comprised the "elite scientists" of the day, the editors found that:

> Disbelief among NAS members responding to our survey exceeded 90 percent….NAS biologists are the most skeptical, with 95 percent of our respondents evincing atheism and agnosticism. Mathematicians in the NAS are more accepting: one in every six of them [17%] expressed belief in a personal God.[15]

Commenting further, the article shows that atheism is encouraged in academic circles, and those who have any Christian beliefs are quietly suppressed:

> University of Washington sociologist Rodney Stark…points out, "There's been 200 years of marketing that if you want to be a scientific person you've got to keep your mind free of the fetters of religion."….higher education on the whole winnows out the idea of God or people who hold it. In research universities, "the religious people keep their mouths shut," Stark says. "And the irreligious people discriminate. There's a reward system to being irreligious in the upper echelons."[16]

The reasons for this rampant atheism are then discovered:

> Legendary evolutionary biologist Ernst Mayr, an NAS member since 1954, made a study of disbelief among his Harvard University colleagues in the academy. "It turned out we were all atheists," he recalls. "I found that there were two sources." One Mayr typified as, "Oh, I became an atheist very early. I just couldn't believe all that supernatural stuff." But others told him, "I just couldn't believe that there could be a God with all this evil in the world." Mayr adds, "Most atheists combine the two. This combination makes it impossible to believe in God."[17]

How ironic is it that atheistic men are using religious and moral principles to judge whether God exists. With the audacity of a woman of the night, they dare blame God for the evil in the world.[18] Scripture has quite a different scenario, of course. It solemnly testifies that God blames man for the evil in the world. As Genesis 6:5-6 laments before the Great Flood:

> The Lord saw that the wickedness of man was great in the earth, and that every imagination of the thoughts of his heart was only evil continually. And the Lord was sorry that he had made man on the earth, and it grieved him to his heart.

Thus, we would ask, rhetorically: who is right about the cause of the world's evil? Is it the scientist or is it God who cannot lie and declares in Romans 3:10-18:

> There is none righteous, no, not one; no one understands, no one seeks for God. All have turned aside, together they have gone wrong; no one does good, not even one. Their throat is an open grave, they use their tongues to deceive. The venom of asps is under their lips. Their mouth is full of curses and bitterness. Their feet are swift to shed blood, in their paths are ruin and misery, and the way of peace they do

[14] "Scientists and Religion in America," Edward J. Larson and Larry Witham, *Scientific American*, Sept. 1999, p. 89.

[15] *Ibid*., p. 90.

[16] *Ibid*., p. 91.

[17] *Ibid*., p. 91.

[18] Proverbs 30:20: "Such is the way of an adulterous woman: she eats, wipes her mouth, and says, 'I have done no wrong.'"

> not know. There is no fear of God before their eyes.

Although there are many examples of atheist-driven scientific agendas in the halls of modern science today, one person who particularly fills that description in the field of cosmology is the late Carl Sagan. One of the first exposures a novice has to the godless world of Sagan is this sad statement ascribed to one of his characters in his novel, *Contact*:

> "If God is omnipotent and omniscient, why didn't he start the universe out in the first place so it would come out the way he wants? Why's he constantly repairing and complaining? No, there's one thing the Bible makes clear: The biblical God is a sloppy manufacturer. He's not good at design, he's not good at execution. He'd be out of business if there was any competition"[19]

Autonomy was Sagan's gospel. As he himself stated: "First: there are no sacred truths…arguments from authority are worthless,"[20] and in the context Sagan is referring to religious authority. In other places he creates fear and resentment against religious authority, portraying it as vicious ogre who is not interested in truth or even discussion. He writes:

> It took the Church until 1832 to remove Galileo's work from its list of books which Catholics were forbidden to read….The high water mark in recent history is the 1864 *Syllabus of Errors* of Pius IX, the pope who also convened the Vatican Council at which the doctrine of papal infallibility was, at his insistence, first proclaimed….But surely the Inquisition ushering in the elderly and infirm Galileo in to inspect the instruments of torture in the dungeons of the Church not only admits but requires just such an interpretation. This was not mere scientific caution and restraint, a reluctance to shift a paradigm until compelling evidence, such as the annual parallax, was available. This was fear of discussion and debate. Censoring alternative views and threatening to torture their proponents betray a lack of faith in the very doctrine and parishioners that are ostensibly being protected.[21]

In place of traditional religion, science has become a religion in its own right. In essence, it has been turned from science to *Scientism*. Its advocates preach its subjective beliefs just as strongly as any modern gospel evangelist. Whereas in the past the Church was the supreme authority, *Scientism* has no peer today. As it seeks converts it presents as its foundation stone the Copernican revolution. In the words of Gunther Stent, a biologist at Berkeley:

> In the wake of the publication of Darwin's *On the Origin of Species*, the idea of progress was raised to the level of a scientific religion….This optimistic view came to be so widely embraced in the industrialized nations…that the claim that progress could presently come to an end is now widely regarded as outlandish a notion as was in earlier times the claim that the Earth moves around the sun.[22]

The public, who is pacified by such things as cell phones, antibiotics, jet planes, and computers, will rarely challenge the claims of modern science or attempt to upset the *status quo*, since whatever problems science may have, still, it makes our lives more comfortable than those who lived in the medieval era. But the sad fact is, except for a few basic ideas, today's science is very confused and it is at a loss to explain most of what it observes in nature, especially in the areas of cosmology and cosmogony. In most cases it is completely on the wrong track. As John Horgan notes:

> …sometimes the clearest science writing is the most dishonest…Much of modern cosmology, particularly those aspects

[19] Spoken by the character Sol Hadden in Carl Sagan's *Contact*, 1985, 1997, p. 285. The prior sentences state: "All this speaks of incompetence. If God didn't want Lot's wife to look back, why didn't he make her obedient, so she'd do what her husband told her? Of if he [God] hadn't made Lot such a s---head [expletive deleted], maybe she would've listened to him more."

[20] Carl Sagan, *Cosmos*, 1980, p. 333, and *Broca's Brain*, 1979, p. 62.

[21] *Pale Blue Dot*, pp. 40-41.

[22] G. Stent, *The Paradoxes of Progress*, 1978, p. 27.

> inspired by unified theories of particle physics and other esoteric ideas, *is* preposterous. Or, rather, it is ironic science, science that is not experimentally testable or resolvable even in principle and therefore is not science in the strict sense at all. Its primary function is to keep us awestruck before the mystery of the cosmos.[23]

The universe is so complex and so bewildering that honest scientists are only too willing to admit that the more data that scientific instruments attain, the more difficult becomes the task to make sense of it all. As astronomer Fred Hoyle summed it up: "The whole history of science shows that each generation finds the universe to be stranger than the preceding generation ever conceived it to be."[24] Biologist J. B. S. Haldane quipped: "The universe is not only queerer than we supposed, but queerer than we can suppose."[25] In brief, knowledge is abundant; but proper interpretation of the knowledge is severely lacking. Astronomer Halton Arp reminds us: "Really all we have for data in astronomy is photons as a function of x and y and frequency. The challenging puzzle is then to try to reason out how nature works,"[26] and that, indeed, is a very difficult task without the proper guidance.

The Guardians at the Gate of Knowledge

Unfortunately, as scientists placate the populace with creature comforts they, in turn, have enjoyed the god-like status they have attained in the eyes of the adoring public. But the real truth is that today's gods of science fight amongst themselves just like the mythical gods of ancient Greece or Rome because, when all is said and done, they are certain of very little of what is going on in the universe. They have lots of information but in the main they are at a loss to make sense of it all. Everyone has an assortment of facts. But correct interpretation is the key to truth, and most scientists fail at this point. The universe is simply too complex for their tiny theories.

Nevertheless, since almost everyone has been convinced that the Earth revolves around the sun, anyone who even attempts to espouse the opposite view is immediately classified in the fringe category; someone, perhaps, who still believes in a flat Earth and spends his day donning an aluminum foil hat waiting for messages from outer space. Whatever their reasons, most scientists and laymen will simply not consider the possibility of a motionless Earth in the center of the universe, no matter what the scientific evidence shows them. If one should dare to persist and challenge them, they will not hesitate to become abusive. Thomas Kuhn observes:

> During the century and a half following Galileo's death in 1642, a belief in the Earth–centered universe was gradually transformed from an essential sign of sanity to an index, first, of inflexible conservatism, then of excessive parochialism, and finally of complete fanaticism. By the middle of the seventeenth century it is difficult to find an important astronomer who is not Copernican; by the end of the century it is impossible…[27]

Or as Lakatos notes:

> The Ptolamaists did their thing and the Copernicans did theirs and at the end the Copernicans scored a propaganda victory….Therefore the acceptance of the Copernican theory becomes a matter of metaphysical belief.[28]

But it still remains true that people are set free by truth. Falsehoods keep them in darkness and force them to live in an illusion, under oppression, ultimately destroying them. Fortunately, man is blessed with an innate desire to find the truth, put there by his Creator. Often this desire is difficult to

[23] John Horgan, *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age*, 1997, pp. 93-94.

[24] Fred Hoyle, *Astronomy and Cosmology*, San Francisco, 1975, p. 48. Interestingly enough, Hoyle makes the comment in a context concerning whether the heliocentric or geocentric system is the correct model.

[25] Attributed, not verified.

[26] Halton Arp, *Seeing Red: Redshifts, Cosmology and Academic Science*, 1998, p. 208.

[27] Kuhn, *The Copernican Revolution*, 1959, p. 227.

[28] Imre Lakatos and Elie Zahar, "Why Did Copernicus' Research Program Supersede Ptolemy's," *The Copernican Achievement*, ed. Robert S. Westman, 1975, p. 367.

satisfy because various ideologues of the world have a vested interest in keeping the rest of the human race in ignorance in order to advance their own agnostic or atheistic agenda, while casting aspersions on those who reject their godless worldview. As we have seen, however, the evidence for a central and immobile Earth is so abundant that one might find himself asking that haunting question: who, in fact, are the real fringe cases? Are they people who have put their trust in divine revelation and the corroborating evidence from science, or are they people like Carl Sagan who espouse such celestial gods as:

> We are the local embodiment of a Cosmos grown to self-awareness. We have begun to contemplate our origins. We are star-stuff pondering the stars! Our ancestors worshipped the Sun, and they were not that foolish. It makes sense to revere the Sun and the stars, for we are their children.[29]

Indeed, the same thing happened among Sagan's "ancestors." As the Old Testament records:

> All men are vain, in whom there is not the knowledge of God: and who by these good things that are seen, could not understand Him that is, neither by attending to the works have acknowledged who was the workman: But have imagined either the fire, or the wind, or the swift air, or the circle of the stars, or the great water, or the sun and moon, to be the gods that rule the world. With whose beauty, if they, being delighted, took them to be gods: let them know how much the Lord of them is more beautiful than they: for the first author of beauty made all those things. Or if they admired their power, and their effects, let them understand by them, that He that made them, is mightier than they: For by the greatness of the beauty, and of the creature, the Creator of them may be seen, so as to be known thereby.[30]

Coming from the same atheistic background, former cabinet member of the Clinton administration, Robert Reich, knows who the real combatants are. In a recent article he stated:

> The great conflict of the 21st century will not be between the West and terrorism. Terrorism is a tactic, not a belief. The true battle will be between modern civilization and anti-modernists; between those who believe in the primacy of the individual and those who believe that human beings owe their allegiance and identity to a higher authority; between those who give priority to life in this world and those who believe that human life is mere preparation for an existence beyond life; between those who believe in science, reason, and logic and those who believe that truth is revealed through Scripture and religious dogma.[31]

Reich, of course, is on the side of the modernists, the individualists, and the here-and-now autonomous logicians. In short, those who believe in God are Reich's enemies.

Why do men succumb to such alternatives when they know the path of truth and goodness? Scripture calls it "the *mystery* of iniquity," and, seeing how many terrible consequences men suffer because of their evil, to witness their continual denial of God is, indeed, a great mystery. Modern man seems to do whatever he can to make himself god-like so as to push the true God off the stage. In no better place is this evident than in modern man's cosmological theories. With a whisk of his mathematical wand, he, like God, can create any universe of his choosing. As physicist J. J. Thomson once noted:

[29] Carl Sagan, *Cosmos*, 1980, p. 243. As the rock icon Joni Mitchell sang: "I came upon a child of God / He was walking along the road / And I asked him, where are you going / And this he told me… / We are stardust, billion year old carbon. / We are golden. / And we've got to get ourselves back to the garden" (Woodstock, 1969). The Vatican's liberal-minded astronomer, Fr. George V. Coyne, S.J., said much the same in a recent interview: "There is no other way…to have the abundance of carbon necessary to make a toenail than through the thermonuclear processes in stars. We are all literally born of stardust" (*The Catholic Review*, 8-18-2005, p. A32). Suffice it to say, stellar "thermonuclear process" is an unproven science, and is now facing considerable contradictions from Plasma cosmology.

[30] Wisdom 13:1-5 (RSV).

[31] Robert Reich, "The Last Word," *The American Prospect*, July 1, 2004.

> "We have Einstein's space, de Sitter's space, expanding universes, contracting universes, vibrating universes, mysterious universes. In fact the pure mathematician may create universes just by writing down an equation, and indeed if he is an individualist he can have a universe of his own."[32]

As astrophysicist Gerard de Vaucouleurs put it:

> Less than 50 years after the birth of what we are pleased to call "modern cosmology," when so few empirical facts are passably well established, when so many different over-simplified models of the universe are still competing for attention, is it, may we ask, really credible to claim, or even reasonable to hope, that we are presently close to a definitive solution of the cosmological problem?…. Unfortunately, a study of the history of cosmology reveals disturbing parallelisms between modern cosmology and medieval scholasticism; often the borderline between sophistication and sophistry, between numeration and numerology, seems very precarious indeed. Above all I am concerned by an apparent loss of contact with empirical evidence and observational facts, and, worse, by a deliberate refusal on the part of some theorists to accept such results when they appear to be in conflict with some of the present oversimplified and therefore intellectually appealing theories of the universe…doctrines that frequently seem to be more concerned with the fictitious properties of ideal (and therefore nonexistent) universes than with the actual world revealed by observations.

He adds:

> With few exceptions modern theories of cosmology have come to be variations on the homogeneous, isotropic models of general relativity. Other theories are usually referred to as 'unorthodox,' probably as a warning to students against heresy. When inhomogeneities [NB: theories that can lead to an Earth-centered universe] are considered (if at all), they are treated as unimportant fluctuations amenable to first-order variational treatment….But if nature refuses to cooperate, or for a time remains silent, there is a serious danger that the constant repetition of what is in truth merely a set of *a priori* assumptions (however rational, plausible, or otherwise commendable) will in time become accepted dogma that the unwary may uncritically accept as established fact or as an unescapable logical requirement. There is also the danger inherent in all established dogmas that the surfacing of contrary opinion and evidence will be resisted in every way.[33]

Much of today's confusion is due to the spooky world of Quantum Mechanics, which hasn't fared any better than Einstein's Relativity in making sense of it all. Faced with atomic particles that seem to have a mind of their own and don't obey the laws that the experimenters demand from them, today's scientists have left us with some of the wildest and most fantastic speculations and theories ever concocted by grown men. As **Stephen Weinberg** notes, "The techniques by which we decide on the acceptance of physical theories are extremely subjective."[34] Or as Robert Matthews reviews it:

[32] *Einstein: Life and Times*, p. 301. Misner, Thorne and Wheeler list seven distinct universes that can come from changing the mathematical variables of General Relativity (*Gravitation*, p. 747), let alone the numerous variations of other models, *e.g.*, Steady State and Plasma universes.

[33] Gerard de Vaucouleurs, "The Case for a Hierarchial Cosmology," *Science*, v. 167, No. 3922, 1970, pp. 1203-1204.

[34] As quoted in an interview with John Horgan and cited in John Horgan, *The End of Science*, 1996, p.74. In the interview Horgan notes: "Weinberg retorted, in effect, that he does not see why we should be interested in a God

> Take quantum theory…Over the past century it has passed every single test with flying colours, with some predictions vindicated to 10 places of decimals. Not surprisingly, physicists claim quantum theory as one of their greatest triumphs. But behind their boasts lies a guilty secret: they haven't the slightest idea why the laws work, or where they come from. All their vaunted equations are just mathematical lash-ups, made out of bits and pieces from other parts of physics whose main justification is that they seem to work.[35]

The newest twist for Quantum Mechanics is the "anthropic principle" wherein man becomes the creator of the universe because, it is claimed, his mere existence and observation brings it into being. Such self-deification, to create matter *ex nihilo* like God, is the ultimate quest of modern science.[36]

As Einstein made a wrong turn when he interpreted the Michelson-Morley experiment, so Quantum scientists took a dangerous detour when, after Paul Dirac's prediction and Carl Anderson's discovery of the positron, they concluded that matter and energy could be created and destroyed. Since this interpretation, even though it produced absurd results,[37] helped save the reigning paradigm, it was all kept very quiet. The inventor of this methodology was physicist **Richard Feynman**, but he was honest enough to admit that it was:

> The shell game that we play…called 'renormalization.' But no matter how clever the word, it is what I would call a dippy process! Having to resort to such hocus pocus….I suspect that renormalization is not mathematically legitimate.[38]

Asked, then, why he was awarded the Nobel Prize, Feynman replied, "We have designed a method for sweeping them under the rug."[39]

D. L. Hotson shows just how much "hocus pocus" is involved in these schemes:

> His professors taught that conservation of mass-energy is the never-violated, rock-

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who seems so little interested in us, however good he is at geometry" (*ibid*., p. 77). At the 2006 Salk Institute forum, Weinberg stated: "Anything that we scientists can do to weaken the hold of religion should be done and may in the end be our greatest contribution to civilization" (*New York Times*, Nov. 21, 2006)

[35] Robert Matthews, *New Scientist*, Jan. 30, 1999, p. 24.

[36] John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological Principle*, 1986, pp. 677f. Nick Herbert, *Quantum Reality: Beyond the New Physics: An Excursion into Metaphysics and the Meaning of Reality*, 1987, pp. 16-29. John A. Wheeler, "Bohr, Einstein, and the Strange Lesson of the Quantum," *Mind and Nature*, ed., Richard Q. Elvee, 1981, pp. 18-20. George Greenstein, *The Symbiotic Universe: Life and Mind in the Cosmos*, 1988, pp. 222-224.

[37] The mathematics of the so-called "Standard Model" of the atom has the unfortunate anomaly of producing an electron with infinite rest mass. Since by other means science has determined the rest mass to be 0.511 MeV, it requires a "renormalization" of the Standard Model's mathematics, namely, the 0.511 value is added in by hand, and no one is the wiser. This procedure is justified on the basis that "positive infinity divided by negative infinity" is an indeterminate value, and thus 0.511 is just as good as any other figure to add in (see D. L. Hotson "Dirac's Equation and the Sea of Negative Energy" *Infinite Energy*, Issue 43, 2002, p. 3).

[38] Feynman in *The Strange Theory of Light and Matter*, 1985, p. 128.

[39] James Gleick, *Genius: The Life and Science of Richard Feynman*, 1992, p. 378. Feynman's remark was not said in jest. Gleick prefaces it with: "He did make a serious remark – and repeated it all day – that reflected his inner feeling about renormalization. The problem had been to eliminate infinities in calculations, he said, and 'We have designed a method for sweeping them under the rug." Concerning physics' newest brainchild, String Theory, Feynman states: "I am an old man now, and these are new ideas, and they look crazy to me, and they look like they're on the wrong track.…I do feel very strongly that this is nonsense" (P. C. W. Davies and J. Brown, *Superstrings – A Theory of Everything*, Cambridge Univ. Press, 1998, pp. 193-194).

solid foundation of all physics. In "pair-production," a photon of at least 1.022 MeV "creates" an electron-positron pair, each with 0.511 MeV of rest energy, with any excess being the momentum of the "created" pair. So supposedly the conservation books balance. But the "created" electron and positron both have spin (angular momentum) energy of $\hbar/4\pi$. By any assumption as to the size of electron or positron, this is far more energy than that supplied by the photon at "creation." "Isn't angular momentum energy?" he asked a professor. "Of course it is. This half-integer spin angular momentum is the energy needed by the electron to set up a stable standing wave around the proton. Thus it is responsible for the Pauli Exclusion principle, hence for the extension and stability of all matter. You could say it is the sole cause of the periodic table of elements." "Then where does all this energy come from? How can the 'created' electron have something like sixteen times more energy than the photon that supposedly 'created' it? Isn't this a huge violation of your never-violated rock-solid foundation of physics?" "We regard spin angular momentum as an 'inherent property' of electron and positron, not as a violation of conservation." "But if it's real energy, where does it come from?" "'Inherent property' means we don't talk about it, and you won't either if you want to pass this course." Later, Mr. Hotson was taken aside and told that his "attitude" was disrupting the class, and that further, with his "attitude," there was no chance in hell of his completing a graduate program in physics, so "save your money." He ended up at the Sorbonne studying French literature and later became a professional land surveyor.[40]

Irrespective of the exploits of the Quantum world, in the macro-world Copernican cosmology is the *sine qua non* of the science establishment. It goes by one of two names in today's scientific literature: *The Copernican Principle* (for those who are bold enough to admit the basis for their agenda), or *The Cosmological Principle* (for those who believe Copernicus is the foundation for modern science but choose labels that are less obvious). Whatever the name, it is a fact that no other scientific hypothesis comes close to the effect that removing the Earth from the center of the universe has had upon the thinking and aspirations of mankind. As we noted in Volume I, Stephen Gould claimed that the common feature of all science is the removal of Earth from the center of the universe, and Stephen Hawking added that this removal has divested mankind of certainty, eternity, and absolutes. This is the wonderful life, a world they have created for themselves, a world in which they can be judged by nothing bigger than themselves.

Diametrically opposed to Gould's and Hawking's doctrine, of course, is the God of Scripture. The fact that man was placed in the center of the universe is apparently a very important piece of information to reveal to us, since the opening words of Genesis begin not with a detailed description about God, but about the Earth that God created before anything else, and which was furbished several days before the other celestial bodies were placed as its surrounding adornment.[41] Unfortunately, men have long since forgotten Genesis, relegating it to the dustbin of myths and legends. In fact, with the coming and going of about a dozen or so cosmological theories since the time of Galileo, we will see that each one has systematically tried to eliminate the need for the Genesis Creator. In their pursuit, however, they soon found that each cosmology proposed by their best and brightest was seriously flawed, and, by their own calculations, men were stuck with the reality that the universe had a beginning, whether they liked it or not.

Still, they try to escape the inevitable and, like Stephen Hawking, ask silly questions such as: "What place, then, for a creator?"[42] Or, they seek to

[40] D. L. Hotson, "Dirac's Equation and the Sea of Negative Energy," *Infinite Energy*, 8, 43, 2001, p. 37.

[41] "In the beginning God created the heavens and the earth. The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters. And God said, 'Let there be light'; and there was light."

[42] Stephen Hawking, *A Brief History of Time: From the Big Bang to Black Holes*, 1988, p. 141. In his second book Hawking expands on the idea, treating the universe as being god-like, without beginning or end: "The universe would be completely self-contained and not affected by anything outside of itself. It would neither be created nor destroyed. It would just BE. As long as we believed the universe had a beginning, the role of a

convince the public with absurd tautologies like those of Carl Sagan: "A universe that is infinitely old requires no Creator."[43] In essence, infinity has become science's god – a cold, impersonal, and unfathomable entity that mankind can neither comprehend nor repay. Through these false gods man attempts to dethrone the true God of heaven and Earth. This quest is nothing new, of course. It was the very lie with which the devil tempted our first parents, saying: "God knows in the day you eat of it *you shall become as gods*, knowing good and evil."[44]

The innate desire to imitate our Creator, which God has instilled in man as a worthy goal to attain, took a terrible detour with our first parents. Failing, however, to learn from this tragic lesson, modern man, including the ecclesiastics who have bowed themselves to science's whims through the abracadabra of "biblical criticism," do everything they can to erase the relevance or even existence of Adam and Eve from our collective consciences, preferring instead to believe that monkeys are our uncles. Instead of bowing before Him in respect of St. Paul's admonition that "…ever since the creation of the world, His invisible attributes of eternal power and divinity have been able to be understood and perceived in what He has made,"[45] they make silly caricatures of God and, as St. Paul forewarns us, they "worship the creation rather than the Creator,"[46] as Carl Sagan proves for us:

> The idea that God is an oversized white male with a flowing beard who sits in the sky and tallies the fall of every sparrow is ludicrous. But if by God one means the set of physical laws that govern the universe, then clearly there is such a God. This God is emotionally unsatisfying. It does not make much sense to pray to the law of gravity.[47]

There is probably no better example of the dilemma of modern man than Carl Sagan. God

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creator seemed clear. But if the universe is really completely self-contained, having no boundary or edge, having neither beginning nor end, then the answer is not so obvious: what is the role of a creator?" (*A Briefer History of Time*, 2005, p. 103); later adding the naïve remarks: "Or does it need a creator, and if so, does He have any other effect on the universe? And who created Him?" (*ibid*., p. 142). According to John Horgan: "There is no place, was his reply; a final theory would exclude God from the universe, and with him all mystery. Like Stephen Weinberg, Hawking hoped to rout mysticism, vitalism, creationism from one of their last refuges, the origin of the universe. According to one biographer, Hawking and his wife, Jane, separated in 1990 in part because she, as a devout Christian, had become increasingly offended by his atheism" (*The End of Science*, pp. 94-95). In another place Hawking wrote: "What I have done is to show that it is possible for the way the universe began to be determined by the laws of science. In that case, it would not be necessary to appeal to God to decide how the universe began. This doesn't prove that there is no God, only that God is not necessary." Sometimes Hawking seems to deify the universe, or attribute things to it that religion attributes to God alone. He writes: "Yet in another kind of time, the universe has no boundary. It is neither created nor destroyed. It just is….The inflation was a good thing in that it produced all the content of the universe quite literally out of nothing. When the universe was a single point, like the North Pole, it contained nothing" (*Black Holes and Baby Universes*, pp. 68, 97).

[43] Carl Sagan, *Cosmos*, 1980, p. 249. See also Sagan's contemptuous books against religion, *e.g.*, *Broca's Brain*, 1979, and *Dragons of Eden*, 1977.

[44] Genesis 3:5.

[45] Romans 1:20. As Immanuel Kant once noted: "Two things fill the mind with ever new and increasing wonder and awe…the starry heaven above me, and the moral law within me."

[46] Romans 1:25.

[47] Sagan, as quoted in *U.S. News and World Report*, December 23, 1991, p. 61. Similar quotes from Sagan include: "A naïve Western view of God is an outsize, light-skinned male with a long white beard, who sits on a very large throne in the sky and tallies the fall of every sparrow" (*The Varieties of Scientific Experience*, p. 149); "If we long to believe that the stars rise and set for us, that we are the reason there is a Universe, does science do us a disservice in deflating our conceits?....For me, it is far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring" (Carl Sagan, *The Demon-Haunted World: Science As a Candle in the Dark*, 1996, p. 12). "In many cultures it is customary to answer that God created the universe out of nothing. But this is mere temporizing. If we wish courageously to pursue the question, we must, of course ask next where God comes from? And if we decide this to be unanswerable, why not save a step and decide that the origin of the universe is an unanswerable question? Or, if we say that God has always existed, why not save a step and conclude that the universe has always existed?" (Carl Sagan, *Cosmos*, p. 257).

doesn't take kindly to such remarks, however. As Scripture declares, He is never mocked.[48] Anyone with a proper understanding of God, which he can quickly glean from even a cursory reading of the narratives of Scripture, will realize that He often gives man the godless world that he wants – as punishment for ignoring Him.[49] In turn, He will laugh from heaven when their calamities strike.[50] Dr. Gould, Dr. Sagan, and Dr. Einstein, all of them now deceased, should have known these Scriptures very well, since at least those coming from the Old Testament were part of their formative years.[51]

The bare truth is: if one acts like an animal (which is the case when men pretend God doesn't exist), then God will allow one to believe one is descended from an animal. Stephen Gould reflects this very fact when he states that we have become "large reasoning animals" and we owe this to "our lucky stars."[52] Ironically, like pigs wallowing in the mud or dogs eating their own vomit, modern man seems all too comfortable with such demotion and degradation. He'll accept any harebrain idea as long as it allows him to escape bowing down to an Almighty Being. Alan Rauch shows us why, and, not surprisingly, it all goes back to the disdain for an Earth-centered cosmos:

> Darwin's theory neatly summed up a view of the natural world that did not privilege any living thing over another. Instead, all organisms (including, by implication, humans) were subject to the physical forces of nature and, of course, to each other. Combined with new perspectives on space, time, and matter, *this view removed man from centrality in the universe*. The age-old idea that man was a creature revered by nature and favored by God could no longer be professed without serious misgivings.[53]

Although some scientists pay lip service to "searching for God," in reality the quest of modern man has been a continual effort to remove God from the stage of human history. Ever since the time of Galileo, man has tried to become a god by relying on his own knowledge and effort. Unfortunately, the more he does so, the more detached he becomes and the further away he remains from becoming like God. This is the secret of life. Those who discover it are blessed, indeed. Those who refuse it will be forever mired in futility and frustration. Even DNA discoverer James D. Watson admitted:

> One could not be a successful scientist without realizing that, in contrast to the popular conception supported by newspapers and mothers of scientists, a goodly number of scientists are not only narrow-minded and dull, but also just stupid.[54]

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[48] Galatians 6:7 ("Make no mistake: God is not mocked, for a person will reap only what he sows").

[49] *Cf.* 2 Thess. 2:11; Rom. 1:24-31; Num. 11:18-20.

[50] Psalm 37:13; Psalm 59:9; Proverbs 1:26; Habakkuk 1:10; Wisdom 4:18.

[51] Sagan writes: "…as is plainly stated at every Rosh Hashonhan and every Jewish wedding ceremony, the Universe is less than 6,000 years old" (Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark*, p. 325). Sagan would also be familiar with the following teaching in Deuteronomy 4:19: "And *beware* not to lift up your eyes to heaven and see the sun and the moon and the stars, all the host of heaven, and be drawn away and worship them and serve them, those which the Lord your God has allotted to all the peoples under the whole heaven."

[52] Stephen Gould, *Wonderful Life*, 1989, p. 318.

[53] Alan Rauch, *Useful Knowledge: The Victorians, Morality And The March of Intellect*, 2001, p. 12, emphasis added.

[54] Unfortunately, Watson was a religious skeptic. At the age of 74 he stated that religious explanations are "myths from the past....Every time you understand something, religion becomes less likely. Only with the discovery of the double helix and the ensuing genetic revolution have we had grounds for thinking that the powers held traditionally to be the exclusive property of the gods might one day be ours." Crick and Watson boasted that their chief goal was to "discredit the existence of God." Francis Crick (d. 2004), recently stated: "The God hypothesis is rather discredited....Archbishop Ussher claimed the world was created in 4004 BC. Now we *know* it is 4.5 billion old. It's astonishing to me that people continue to accept religious claims. People like myself get along perfectly well with no religious views" (*London Daily Telegraph*, cited in *The Washington Times*, 3-24-2003). But in his more somber moments Crick admitted: "The origin of life appears almost a miracle, so many are the conditions which would have had to be satisfied to get it going….Every time I write a paper on the origin of life, I swear I will never write another one, because there is too much speculation running after too few facts."

In spite of this, science has become the weapon of choice for modern man in order to make himself the god of this world, answerable to no one but himself. But he only deceives himself. Although he fights to suppress it, inside each man God has instilled the knowledge that he will one day face judgment for his beliefs and actions. As Sirach assures us:

> Much labor was created for every man, and a heavy yoke is upon the sons of Adam, from the day they come forth from their mother's womb till the day they return to the mother of all. Their perplexities and fear of heart – their anxious thought is the day of death, from the man who sits on a splendid throne to the one who is humbled in dust and ashes, from the man who wears purple and a crown to the one who is clothed in burlap; there is anger and envy and trouble and unrest, and fear of death, and fury and strife. And when one rests upon his bed, his sleep at night confuses his mind. He gets little or no rest, and afterward in his sleep, as though he were on watch, he is troubled by the visions of his mind like one who has escaped from the battlefront; at the moment of his rescue he wakes up, and wonders that his fear came to nothing.[55]

There have been three major attempts in the last five hundred years to make man's dream of removing God from the stage come true. The first was Copernicus' heliocentrism, the second was Darwin's evolution, and the third was Einstein's relativity. Modern scientists instinctively know that all three are immediately falsified if the Earth is motionless in the center of the universe. But if they are successful in dismissing that proposition as "unthinkable," these three theories will continue to rule the hearts of men like no other before them, each propped up by a pseudo-science that purports to know the real truth when in fact it knows very little. Each in its own right is a direct assault on what men previous to them believed to be true based upon a face value reading of the Old and New Testaments. As the modern scientific icon Paul Davies confirms for us:

> Could this have happened without any supernatural input? Quantum physics seems to provide a loophole to the age-old assumption that "you can't get something for nothing." Physicists are now talking about "the self-creating universe": a cosmos that erupts into existence spontaneously... The question of whether the details of this theory are right or wrong are not so very important. It is now possible to conceive of a scientific explanation for all creation…Has modern physics abolished God altogether?[56]

The implication of Davies' statement is that modern physics has, indeed, abolished the need for God. But Davies is not alone. As we saw with Stephen Hawking's "what place, then, for a creator?" this convenient '*sine Deo et ex nihilo*' universe is a common belief among today's cosmologists.[57] Being a little more honest about modern cosmology's naked emperor, astrophysicist Andrei Linde revealed why many have been forced to the absurd "something from nothing" position:

> The first, and main, problem is the very existence of the Big Bang. One may wonder, What came before? If space-time did not exist then, how could everything appear from nothing? What arose first: the universe or the laws determining its evolution? Explaining this initial

[55] Sirach (Ecclesiasticus) 40:1-7.

[56] Paul Davies, *God and the New Physics*, 1983, p. viii. In two letters sent to me, dated August 8-9, 2004, Davies confirmed my assessment of his views, stating: "In a nutshell, I have always argued against invoking any sort of God to create the universe in the big bang. I think physics can explain the big bang without supernatural input. The correct place to locate God-questions is in the laws of physics, not the initial conditions….I have long argued against the notion of any sort of God who resides within time, and who preceded the universe…The classical Christian doctrine of creation "ex nihilo" does NOT mean that God created the world at some moment in time as a temporal act. This is a mis-reading of classical theology" (Letters on file). Ralph Estling states that he also contacted Davies about this question. Estling writes: "I've had correspondence with Paul Davies on cosmological theory…I asked him what he meant by 'Nothing.' He wrote back that he had asked Alexander Vilenkin…and Vilenkin had replied, 'By Nothing I mean Nothing'" (*Skeptical Inquirer*, January/February, 1995, pp. 69-70).

[57] Meaning: "Without God and out of nothing."

> singularity – where and when it all began – still remains the most intractable problem of modern cosmology.[58]

A few physicists tried to answer the question. In 1973 Edward P. Tryon fired the first shot: "I proposed that our Universe had been created spontaneously from nothing, as a result of the established principles of physics."[59] Alan Guth of M.I.T. and Paul Steinhardt of Princeton followed in 1984 with an article stating:

> The inflationary model of the universe provides a possible mechanism by which the observed universe could have evolved from an infinitesimal region. It is then tempting to go one step further and speculate that the entire universe evolved from literally nothing.[60]

More Big Bang theorists jumped on the bandwagon. Physicist John Gribbin followed two years later with these words: "the new models are based on the concept that particles can be created out of nothing at all…matter might suddenly appear in large quantities."[61] Victor Stenger adds: "What caused it? Not everything requires a cause. It could have just happened spontaneously…"[62] which led scientific satirist Terry Pratchett to conclude: "The current state of knowledge can be summarized thus: In the beginning, there was nothing, which exploded."[63] Or as Lynda Williams, professional entertainer and physics teacher at San Francisco State University, sang in her latest "Cosmic Cabaret": "In the beginning, there was nothing" she whispers, and then "BIG BANG!" she screams.[64] The *New York Times* concluded: "The only thing

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[58] Andrei Linde, "The Self-Producing Inflationary Universe," *Scientific American*, Magnificent Cosmos, 1998, p. 99. Linde then reveals five other problems with the traditional Big Bang theory. To overcome these, Linde posits that "energy in the scalar field" and "quantum fluctuations" produce all the proper ingredients in a super expansion. He writes: "Our universe appears smooth and uniform because all inhomogeneities were stretched $10^{10^{\wedge}12}$ – that is, a 1 followed by a trillion zeros….This tremendous spurt immediately solves most of the problems of the old cosmological theory" (*ibid*. p. 101). But, he realizes this "may seem too good to be true. Indeed, if all inhomogeneities were stretched away, how did galaxies form? The answer is that while removing previously existing inhomogeneities, inflation at the same time made new ones….The evolution of inflationary theory has given rise to a completely new cosmological paradigm, which differs considerably from the old Big Bang theory and even from the first versions of the inflationary scenario. In it the universe appears to be both chaotic and homogeneous, expanding and stationary. Our cosmic home grows, fluctuates and eternally reproduces itself in all possible forms, as if adjusting itself for all possible types of life" (*ibid*., p. 102).

[59] Edward P. Tryon, "What Made the World?" *New Scientist*, March 1984, p. 15. In another work he stated: "Our universe is simply one of those things which happen from time to time" ("Is the Universe a Vacuum Fluctuation?" *Nature*, 246, December 1973, pp. 396-397).

[60] Alan Guth and Paul Steinhardt, "The Inflationary Universe," *Scientific American*, May 1984, p. 128. To Guth, David Berlinski replied: "Thus, Alan Guth writes in pleased astonishment that the universe really did arise from 'essentially nothing at all'…It would appear, then, that 'essentially nothing' has both spatial extension and mass. While these facts may strike Guth as inconspicuous, others may suspect that nothingness, like death, is not a matter that admits of degrees" (Was There a Big Bang?" *Commentary*, February 1998, p. 37). Berlinski is a member of the Discovery Institute and a Ph.D. in philosophy from Princeton.

[61] John Gribbin, "Cosmologists Move Beyond the Big Bang," *New Scientist*, 110, No. 1511, 1986, p. 30.

[62] Victor Stenger, "Was the Universe Created," *Free Inquiry* 7, 3, Summer, 1987, p. 26. Stenger was a physicist at the University of Hawaii. In a later publication, Stenger added: "The Universe revealed by science shows humanity as an infinitesimal speck in space and time with random chance as an important factor affecting events" (*Free Inquiry* 23, September 2003, p. 40)

[63] Terry Prachett, *Lords and Ladies*, 1996, p. 7.

[64] Philip and Phylis Morrison, "The Big Bang: Wit or Wisdom?" *Scientific American*, February 2001, p. 93. After giving a short history of the repertoire of cosmological theories that have all been overturned, the Morrison's add: "We simply do not know our cosmic origins; intriguing alternatives abound, but none yet compel. We do not know the details of inflation, nor what came before, nor the nature of the dark, unseen material, nor the nature of the repulsive forces that dilute gravity. The book of the cosmos is still open. Note carefully: we no longer see a Big Bang as a direct solution. Inflation erases evidence of past space, time and matter. The beginning – if any – is still unread. It is deceptive to maintain so long the very term that stood for a beginning out of nothing. The chanteuse will compose a clever new song once the case is clear" (*ibid*., p. 95).

that all the experts agree on is that no idea works – yet."[65]

Finally, Linde answered his own question by positing that the universe "grows, fluctuates and eternally reproduces itself in all possible forms, as if adjusting itself for all possible types of life."[66] Assertions such as these prove to us once again how cosmologists can create any universe they wish just by the stroke of a pen. Linde's universe apparently has a mind of its own, in addition to being eternal. In his logic, one deals with the problem of the origin of the Big Bang by simply claiming that the Big Bang itself is eternal; that one Big Bang produces another Big Bang, *ad infinitum*. In short, the Big Bang becomes man's god. That grown men would actually come to the point in which they speak of something coming from nothing, or matter having its own eternity, all in an effort to eliminate the biblical God as the miraculous *ex nihilo* Creator of the universe, is one of the surest signs of modern man's insanity. But this is the religion of *Scientism*, and its believers hold to it just as tenaciously as a Christian holds to Christianity.

For over a thousand years, beginning from the time of Constantine in the early fourth century to the birth of Copernicus in the late fifteenth century, all men of godly heritage believed that the sun and stars revolved around the Earth; that all we see was created directly by God, and that the universe was limited and ordered. Ironically, modern man often calls this period of time (circa 400-1400 AD) the "Dark Ages" because of what they deem as "superstitious" beliefs, but, in reality, a more ominous Dark Ages began about 1400 AD with the advent of Copernicus, since man, spiritually speaking, has been on a steady decline ever since. True, man has invented many material things during this latter period that give the illusion of progress, but Scripture foresaw all of it and wasn't impressed. As God predicted to Daniel concerning our age:

> Many shall run to and fro, and knowledge shall increase…. when the shattering of the power of the holy people comes to an end all these things would be accomplished…. the wicked shall do wickedly; and none of the wicked shall understand; but those who are wise shall understand.[67]

As the context reveals, however, this increased knowledge has only led man to accelerate and to magnify the evil residing in him, an evil that he has never conquered, but merely camouflaged or ignored. There are still barbarians today, only they use pens and computers rather than clubs and swords. When all is said and done, modern technology has only prompted man to do evil more quickly and efficiently, while he ignores God more boldly and pridefully than he ever did before, and *Scientism* has been his blind guide.

Solomon, the wisest of all men, put the attainment of knowledge into proper perspective:

> He has put eternity into man's mind, yet so that he cannot find out what God has done from the beginning to the end….And I saw every work of God, I concluded that man cannot discover the work which has been done under the sun. Even though man should seek laboriously, he will not discover it; and though the wise man should say, "I know," he cannot discover it.[68]

Fortunately, however, science is a two-edged sword. True science will never oppose God or His revelation to us, but today's scientists desperately want us to believe otherwise. Separating science from God is the ultimate quest of modern man.

Is Modern Science Corrupt?

Does modern man possess true science? The answer, in most cases, is no, especially in the field of cosmology. As the Russian Nobel Prize-winning physicist Lev Landau put it: "Cosmologists are often wrong, but never in doubt."[69] Or as Halton Arp noted:

> …the problem is pervasive throughout astronomy and, contrary to its projected

[65] "Before the Big Bang There Was…What?" *The New York Times*, May 22, 2001.

[66] Andrei Linde, "The Self-Producing Inflationary Universe," *Scientific American*, Magnificent Cosmos edition, 1998, p. 102.

[67] Daniel 12:4, 7, 10 (RSV).

[68] Ecclesiastes 3:11; 8:17.

[69] As quoted from Dennis Overbye's article in the *New York Times*, "In the Beginning," July 23, 2002.

> image, endemic throughout most of current science. Scientists, particularly at the most prestigious institutions, regularly suppress and ridicule findings which contradict their current theories and assumptions.[70]

And a bit later:

> After a ridiculously long time it has finally dawned on me that establishment scientists actually proceed on the belief that theories tell you what is true and what is not true.[71]

Modern man has only made it appear as if he possesses the truth, since he has learned quite handily that only by giving such impressions can he rule the hearts of men. And that's what it is all about – power over the people.

Most people are under the illusion that science is a monolithic consensus of truth and certainty. The reality is that science is subject to the same forces of fame, fortune, pride, position, politics, ignorance and bias as is any other venture of life. These human frailties often dictate the direction science will take, whether the course turns out to be right or wrong. M.I.T. professor Thomas Kuhn has shaken up quite a few of his scientific colleagues by pointing out these unpleasant realities. In his book *The Structure of Scientific Revolutions*[72] he notes that personalities and politics play a large role in science and its theories. He concludes that scientists can never truly understand the real world, and they understand each other even less. Kuhn, the first to coin the word *paradigm* to describe scientific myopia, reveals that scientists are molded in their thinking by the reigning models of the day, solving problems only within the accepted constraints, and rarely, if ever, challenging those constraints. He shows that the reigning paradigm at first appears to reconcile all experimental results. With time, anomalies begin to appear, which then give way to a new paradigm, but not without a long and arduous fight. As Fred Hoyle notes:

> Science today is locked into paradigms. Every avenue is blocked by beliefs that are wrong, and if you try to get anything published in a journal today, you will run up against a paradigm, and the editors will turn you down.[73]

Kuhn adds that anomalies in scientific experiments are often ignored, at least until so many of them accumulate that scientists are forced to find a new paradigm. Changes occur when someone young and not fully indoctrinated makes a successful bid to overcome past failures. Still, many adopt a new paradigm simply because it is supported by other scientists with strong reputations.

Physicist Chet Raymo of Stonehill College says much the same in his critique:

> Science has evolved an elaborate system of social organization, communication, and peer review to ensure a high degree of conformity with existing orthodoxy.…In a recent article titled "When Do Anomalies Begin?" (*Science*, February 7th, 1992), Alan Lightman of MIT and Owen Gingerich of the Harvard-Smithsonian Center for Astrophysics describe the conservation of science. They acknowledge that scientists may be reluctant to face change for the purely psychological reason that the familiar is more comfortable than the unfamiliar.…Usually, say Lightman and Gingerich, such anomalies are recognized only in retrospect. Only when a new theory gives a compelling explanation of previously unexplained facts does it become "safe" to recognize anomalies for what they are. In the meantime scientist often simply ignore what doesn't fit.…For some people outside mainstream science, the path toward truth seems frustratingly strewn with obstacles. Like everyone else,

[70] *Seeing Red: Redshifts, Cosmology and Academic Science*, 1998, p. 12.

[71] *Ibid*., p. 239.

[72] Thomas Kuhn, *The Structure of Scientific Revolutions*, 3rd ed., 1962, 1996. Since 1962, Kuhn's book has sold over a million copies in 16 languages.

[73] *Scientific American*, "Profile: Fred Hoyle: The Return of the Maverick," by John Horgan, March 1995, p. 47. In the same article, Horgan notes that, even though Hoyle had some "bizarre ideas," *Nature* dubbed him "one of this century's leading scientists." Horgan begins his article with "…a special fear may creep into the hearts of scientists: What if Fred Hoyle is right? Then astronomy is a sham, biology a house of cards and modern medicine an illusion" (*ibid*., p. 46).

> scientist can be arrogant and closed-minded.[74]

In a *Newsweek* article, Brian Martin reveals what a cut-throat business science is today:

> Textbooks present science as a noble search for truth, in which progress depends on questioning established ideas. But for many scientists, this is a cruel myth. They know from bitter experience that disagreeing with the dominant view is dangerous – especially when that view is backed by powerful interest groups. Call it suppression of intellectual dissent. The usual pattern is that someone does research or speaks out in a way that threatens a powerful interest group, typically a government, Industry or professional body. As a result, representatives of that group attack the critic's ideas or the critic personally-by censoring writing, blocking publications, denying appointments or promotions, with-drawing research grants, taking legal actions, harassing, blacklisting, spreading rumors.[75]

In the new book on the myth of the objectivity of the modern scientist, Derek Hodson reveals the astonishing results from several studies:

> It is commonly asserted that particular personal characteristics and attitudes are essential for the successful pursuit of science, and that scientists themselves all possess a particular cluster of attitudes and attributes, including superior intelligence, objectivity, rationality, open-mindedness, willingness to suspend judgment, intellectual integrity and communiality…. More than 30 years ago, Roe (1961) suggested that scientists themselves do not possess these so-called 'scientific attitudes,' although they think that they do. They, too, subscribe to the myths about the emotionally-detached, disinterested impartiality of the scientist. Or they continue to promote a false image because they perceive it to be in their interests….Roe concludes: "The creative scientist, whatever his field, is very deeply involved emotionally and personally in his work." More recent work by Mahoney (1979) examined the extent to which scientists possess each of the characteristics so frequently ascribed to them. His conclusions are as follows.

- Superior intelligence is neither a prerequisite nor a correlate of high scientific achievement.
- Scientists are often illogical in their work, particularly when defending a preferred view or attacking a rival one.
- In experimental research, scientists are often selective, expedient and not immune to distorting the data.
- Scientists are probably the most passionate of professionals. Their theoretical and personal biases often colour their alleged openness to the data.
- Scientists are often dogmatically tenacious in their opinions, even when contradictory evidence is overwhelming.
- Scientists are not paragons of humility or disinterest. Rather,

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[74] Chet Raymo, *Sky and Telescope*, 84 (4), 364 (1992). Lightman and Gingerich wrote: "An anomaly in science is an observed fact that is difficult to explain in terms of the existing conceptual framework. Anomalies often point to the inadequacy of the current theory and herald a new one. It is argued here that certain scientific anomalies are recognized as anomalies only after they are given compelling explanations within a new conceptual framework. Before this recognition, the peculiar facts are taken as given or are ignored in the old framework. Such a 'retrorecognition' phenomenon reveals not only a significant feature of the process of scientific discovery but also an important aspect of human psychology….Science is a conservative activity, and scientist are reluctant to change their explanatory frameworks. As discussed by sociologist Bernard Barber, there are a variety of social and cultural factors that lead to conservatism in science, including commitment to particular physical concepts, commitment to particular methodological conceptions, professional standing, and investment in particular scientific organizations" ("When Do Anomalies Begin?" *Science*, 255, 690-695, (1992).

[75] "Stamping Out Dissent," *Newsweek*, April 26, 1993, pp. 49-50.

they are often selfish, ambitious and petulant defenders of personal recognition and territoriality.
- Scientists often behave in ways which are diametrically opposite to communal sharing of knowledge. They are frequently secretive and occasionally suppress data for personal reasons.
- Far from being a 'suspender of judgment,' the scientist is often an impetuous truth-spinner who rushes to hypotheses and theories long before the data would warrant.

Mitroff and Mason (1974) distinguish two kinds of scientist: the extreme speculative scientists, who "wouldn't hesitate to build a whole theory of the solar system based on no data at all," and the databound scientists, who "wouldn't be able to save their own hide if a fire was burning next to them because they'd never have enough data to prove the fire was really there." What this and several other studies show is that, contrary to the textbook stereotype, the greater the scientist, the more likely she or he is to belie the myth of the disinterested, uncommitted individual, the "depersonalized and idealized seeker after truth, painstakingly pushing back the curtains which obscure objective reality" (Cawthron and Rowell, 1978).[76]

John E. Chappell, Jr., with whom I had many phone conversations before his recent death, related how in the 1920's when Einstein's theory of General Relativity won the day with what many scientists have come to realize were bogus photographs of starlight bending near the sun (See Vol. 1, Appendix 3), outright censorship began to reign supreme in the halls of many universities. He writes:

> One of the most recent comes from a new NPA member who, when doing graduate work in physics around 1960, heard the following story from his advisor: While working for his Ph.D. in physics at the University of California in Berkeley in the late 1920s, this advisor had learned that all physics departments in the U.C. system were being purged of all critics of Einsteinian relativity. Those who refused to change their minds were ordered to resign, and those who would not were fired, on slanderous charges of anti-Semitism. The main cited motivation for this unspeakably unethical procedure was to present a united front before grant-giving agencies, the better to obtain maximal funds. This story does not surprise me. There has been a particularly vicious attitude towards critics of Einsteinian relativity at U.C. Berkeley ever since. I ran into it in 1985, when I read a paper arguing for absolute simultaneity at that year's International Congress on the History of Science. After I finished, the Danish chairman made some courteous remarks about dissidents he had learned about in Scandinavia, and then turned to the audience for questions. The first speaker was one of a group of about 4 young physics students in the back. He launched immediately into a horrible tirade of verbal abuse, accusing me of being entirely wrong in my analysis, a simplification of the Melbourne Evans analysis – "Evans is wrong; you are wrong," he shouted. He accused me of being way out of line to present my "faulty" arguments on his prestigious campus. When I started to ask him, "Then how would you explain...," he loudly interrupted me with "I don't have to explain anything." The rest of the audience felt so disturbed by all this, that the

[76] Derek Hodson, "Science fiction: the continuing misrepresentation of science in the school curriculum," 1998, in *Pedagogy, Culture and Society*, 6:2, pp. 205-206, Routledge, 2006. Hodson's references include: A. Roe, (1961) "The Psychology of the Scientist," *Science*, 134, pp. 456-459; P. J. Gaskell, (1992) "Authentic Science and School Science," *International Journal of Science Education*, 14, pp. 265-272; M. J. Mahoney, (1979) "Psychology of the Scientist," *Social Studies of Science*, 9, pp. 349-375; I. Mitroff and R. Mason, "On evaluating the scientific contribution of the Apollo missions via information theory: a study of the scientist-scientist relationship," *Management Science: Applications*, 20, pp. 1501-1513; E. Cawthron and J. Rowell, (1978) Epistemology and science education," *Studies in Science Education*, 5, pp. 31-59.

question session was essentially destroyed.[77]

Others have experienced what, for lack of a better term, amounts to a cult of Einstein that has been engineered by very high-placed sympathizers of Einstein's world view. Ruggero M. Santilli writes of his own experience:

> This book is, in essence, a report on the rather extreme hostility I have encountered in U.S. academic circles in the conduction, organization and promotion of quantitative, theoretical, mathematical, and experimental studies on the apparent insufficiencies of Einstein's ideas in face of an ever-growing scientific knowledge. In 1977, I was visiting the Department of Physics at Harvard University for the purpose of studying precisely non- Galilean systems. My task was to attempt the generalization of the analytic, algebraic and geometric methods of the Galilean systems into forms suitable for the non-Galilean ones. The studies began under the best possible auspices. In fact, I had a (signed) contract with one of the world's leading editorial houses in physics, Springer-Verlag of Heidelberg West Germany, to write a series of monographs in the field that were later published in refs. [R. M. Santilli, *Foundations on Theoretical Mechanics*, I: The Inverse Problem in Newtonian Mechanics, Springer-Verlag, NY, 1978] and [R. M. Santilli, *Foundations of Theoretical Mechanics*, II: Birkhoffian Generalization of Hamiltonian Mechanics, Springer-Verlag, NY, 1982]. Furthermore, I was the recipient of a research contract with the U.S. Department of Energy, contract number ER-78-S-02- 4720.A000, for the conduction of these studies. Sidney Coleman, Shelly Glashow, Steven Weinberg, and other senior physicists at Harvard opposed my studies to such a point of preventing my drawing a salary from my own grant for almost one academic year. This prohibition to draw my salary from my grant was perpetrated with full awareness of the fact that it would have created hardship on my children and on my family. In fact, I had communicated to them (in writing) that I had no other income, and that I had two children in tender age and my wife (then a graduate student in social work) to feed and shelter. After almost one academic year of delaying my salary authorization, when the case was just about to explode in law suits, I finally received authorization to draw my salary from my own grant as a member of the Department of Mathematics of Harvard University. But, Sidney Coleman, Shelly Glashow and Steven Weinberg and possibly others had declared to the Department of Mathematics that my studies "had no physical value." This created predictable problems in the mathematics department which lead to the subsequent, apparently intended, impossibility of continuing my research at Harvard. Even after my leaving Harvard, their claim of "no physical value" of my studies persisted, affected a number of other scientists, and finally rendered unavoidable the writing of IL GRANDE GRIDO.[78]

Reflecting on the views of Michael Polanyi, Catholic historian Philip Sherrard writes:

> Other philosophers of science like Michael Polanyi have spoken of how impossible it is for the scientist not to be influenced by purely subjective factors such as what he expects to see, what other people have persuaded him that he should see, and so on – factors which mean that measurements of temporal and spatial intervals are not just given to the mind but are given to a particular mind deeply and inextricably involved with its own subjective personal prejudices and requirements.
>
> In short, it could be argued that scientists themselves now admit that the best of their theories are but hypotheses, and that these, far from being reached inductively on the basis of objective data, as the old-fashioned empiricist would have it, are for

[77] John E. Chappell, Jr., "What Ideas Does The NPA Stand For?" February, 2000.

[78] R. M. Santilli, *Il Grande Grido: Ethical Probe on Einstein's Followers in the U. S. A. : An Insider's View*, 1984, p. 7.

> the most part simply postulated as the most probable explanation or interpretation of certain data in accordance with a specific model which the scientist in question happens to have accepted.[79]

Going deeper into our subject, Sherrard compares modern science to Eastern mysticism:

> Indeed, some scientists…claim that what they call the new physics has entirely emancipated itself from the mechanistic worldview of Cartesian and Newtonian physics and has in fact moved close to the worldview of Eastern mysticism. The two basic theories of modern physics – the quantum theory and the theory of relativity – exhibit…all the main features of the Eastern world view.[80]

> Ultimately, if the 'new physics' has performed any positive service it is that it demonstrates more clearly than ever before the total incompetence of modern science to say anything about the nature of the universe in which one can place any trust at all….their attempt to explain many phenomena by their examination of a few is a purely arbitrary process and cannot have anything to do with knowledge in the real sense of the word. Yet this on their own confession is all they are capable of doing: That all scientific theories and models are by definition approximations, and may be totally inadequate to convey a true picture of the reality with which they purport to be dealing, is a conclusion to which all modern scientific research is condemned by the premises from which it starts.[81]

Finally, an observation that relates directly to our present cosmological debate, Sherrard states:

> In its turn, this revolution may be said to have two main characteristics, which are closely interconnected. The first is that it assumed that knowledge must be based on the observation of external phenomena: it must be based on sense-data without reference to the divine or indeed to any preconceived *a priori* ideas. The second is that it concluded that in order to reduce the data obtained from the observation of external phenomena to a coherent and reliable system of knowledge they must be submitted to the discipline of mathematics….The divorce between religion and philosophy is absolute: concern for the spiritual is banished from the study of physical phenomena and all scientific knowledge must be derived from the observation of a natural world regarded as a self-subsistent entity.[82]

Astronomer Tom van Flandern, once a card-carrying member of the scientific elite, writes how amazed he became when he discovered that almost every theory he had been taught in his professional career was wrong:

> I particularly noted a regular practice of not re-examining the fundamental assumptions underlying a theory once it gained "accepted" status, almost no matter how incompatible some new observations or experiment might be. And I saw powerful vested interests in a "status quo" develop around certain accepted theories. It gradually became clear that a lot of people had a lot to lose if an accepted theory or practice were challenged; the authors of the original theory, whose names had become well-known; all those who published papers which reference or depend on the theory; journal editors and referees who have made decisions or criticized other works based on a theory; funding agencies which have paid for research which presupposes a theory; instrument builders and experiment designers who spend career time testing ideas which spring from a theory; journalists and writings whose publications

[79] Philip Sherrard, *The Rape of Man and Nature: An Enquiry into the Origins and Consequences of Modern Science*, 1987, p. 74.

[80] *Ibid*., p. 75.

[81] *Ibid*., p. 76.

[82] *Ibid*., p. 95.

> have featured or promoted a theory; teachers and interested members of the public who have learned a theory, been impressed by the wonder of it, and who have no wish to have to teach or learn a new theory; and students, who need to find a job in their field of training. It has been my sad observation that by mid-career there are very few professionals left truly working for the advancement of science, as opposed to the advancement of self. And given enough people with strong enough interests, professional peer pressure takes over from there. Peer pressure in science, as elsewhere in society, consists of alternately attacking and ignoring the people who advocate a contrary idea, and discrediting their motives and/or competence, in order to achieve conformity.

Adding to the list, Van Flandern speaks about specialization actually working against the attainment of scientific truth rather than fostering it:

> As if there weren't already enough inertia to major changes of models, I see yet another phenomenon – new to our era of rapid progress in science – which mitigates against change even in the face of overwhelming need for it. Few scientists consider themselves qualified very far outside their own areas of expertise. Since each expert can account for only a small portion of the data dealing with a model, he defers to the other experts to support the model in other areas. Few, if any, scientists have the breadth of knowledge to see the full picture for a given model. So the model remains supported because many individual authorities support it, none of whom have the expertise to criticize the model overall, and all of whom have the utmost confidence in the others collectively. Authorities can continue to multiply indefinitely, with no one taking responsibility for integrating all their combined knowledge. As a result, the existing models get perpetuated regardless of merit or the extent of counter-evidence, because "so many experts can't all be wrong." Thus each expert is persuaded to force-fit his own data into the accepted model.[83]

The truth is, not only does modern man know very little about true science, he makes a concerted effort to suppress true science when it conflicts with his pseudo-scientific presuppositions and personal agendas. When their errors can no longer be suppressed, scientists will eventually capitulate, resulting in theories that change every 50-100 years or so. As Max Planck once said: "Science proceeds funeral by funeral."[84] Rather than admitting their past failures, however, modern man hails the newest theory as evidence of his own intellectual prowess, until, of course, his new theory is eventually put on the chopping block and obliterated by the next genius.

After examining several cases of fraud in the science establishment, William Broad and Nicholas Wade made a thorough search into many of its claims. They provide us with the dismal results:

> Our conclusion, in brief, is that science bears little resemblance to its conventional portrait…In the acquisition of new knowledge, scientists are not guided by logic and objectivity alone, but also by such nonrational factors as rhetoric, propaganda, and personal prejudice. Scientists do not depend solely on rational thought, and have no monopoly on it. Science should not be considered the guardian of rationality in society, but

[83] Tom van Flandern, *Dark Matter, Missing Planets and New Comets*, 1993, pp. xvii-xviii.

[84] Anecdotal, and possibly an interpolation from his more complete remark: "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents die and a new generation grows up that is familiar with it." Max Planck's physics teacher once advised him: "Physics is finished, young man. It's a dead-end street," then advised Planck to become a concert pianist instead" (Nick Herbert, *Quantum Reality*, p. 31). A similar statement comes from Mark Twain: "When even the brightest mind in our world has been trained up from childhood in a superstition of any kind, it will never be possible for that mind, in its maturity, to examine sincerely, dispassionately, and conscientiously any evidence or any circumstance which shall seem to cast a doubt upon the validity of that superstition. I doubt if I could do it myself" (attributed, not verified).

> merely one major form of its cultural expression.[85]

Others have revealed the same corruption. Robert Bell, author of *Impure Science: Fraud, Compromise and Political Influence in Scientific Research*,[86] is one of the better. As one reviewer states:

> Bell shows time and again how the supposedly 'objective' scientific-research process is subverted by ego, infighting, and the lure of cold cash….Bell opens his well-researched account with a stunning attack on the scientific community's sacrosanct system of 'peer-review,' which he says often means 'review by one's competition' in today's highly competitive world of scientific research…all too often peer review simply becomes a process by which powerful, well-established scientists can reward their friends and frustrate their rivals….the greatest problem in today's scientific community may well be fraud…particularly in the field of medical research, has resulted in deadly drugs being left on the market and faulty heart valves being implanted in people's chests.[87]

Scientific historian Robert Jahn sees much the same:

> Thus, at the dawn of the 21st century, we again find an elite, smugly contented scientific establishment, but one now endowed with far more public authority and respect than that of the prior version. A veritable priesthood of high science controls major segments of public and private policy and expenditure for research, development, construction, production, education and publication throughout the world, and enjoys a cultural trust and reverence that extends far beyond its true merit. It is an establishment that is largely consumed with refinements and deployments of mid-20th century science, rather than with creative advancement of fundamental understanding of the most profound and seminal aspects of its trade. Even more seriously, it is an establishment that persists in frenetically sweeping legitimate genres of new anomalous phenomena under its intellectual carpet, thereby denying its own well-documented heritage that anomalies are the most precious raw material from which future science is formed.[88]

The problems haven't lessened since Wade (1982) and Bell (1992) revealed their statistics. Horace Judson, from my alma mater, George Washington University, published *The Great Betrayal: Fraud in Science* in 2004 showing that the problems are much worse than two decades ago. As the title denotes, Judson concentrates on the problem of fraud. As the reader digests the case studies Judson presents, he often has to reposition his jaw from the constant downward reflex it is prone to assume.[89] Recently, researcher Woo Suk Hwang

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[85] *Betrayers of the Truth*, William Broad and Nicholas Wade, 1982, pp. 8-9. Broad and Wade point out the problems with "peer review" (pp. 18-21, 89-102), faulty data collection (pp. 107-125), desire for advancement and continuation of government funding (pp. 88-106), non replication of experiments (pp. 60-87), *status-quo* obstacles (pp. 126-160), protecting popular scientists and pet projects from scrutiny (pp. 161-180), personal agendas (pp. 181-211). Broad and Wade uncover many discrepancies and problems with Galileo, Newton, Einstein, Darwin, and many other scientists involved with cosmological issues.

[86] Robert Bell, *Impure Science: Fraud, Compromise and Political Influence in Scientific Research*, 1992.

[87] Simon Garfinkel, "When Fraud Taints Science," *Christian Science Monitor*, July 1992.

[88] Robert G. Jahn, "20th and 21st Century Science: Reflections and Projections," *Journal of Scientific Exploration* 15, 1, 2001, p. 21.

[89] Horace F. Judson, *The Great Betrayal: Fraud in Science*, 2004, p. 463. A recent article titled "Most Scientific Papers are Probably Wrong" in *Science Medicine* says: "Most published scientific research papers are wrong, according to a new analysis. Assuming that the new paper is itself correct, problems with experimental and statistical methods mean that there is less than a 50% chance that the results of any randomly chosen scientific paper are true. John Ioannidis, an epidemiologist at the University of Ioannina School of Medicine in Greece, says that small sample sizes, poor study design, researcher bias, and selective reporting and other problems combine to make most research findings false. But even large, well-designed studies are not always right, meaning that scientists and the public have to be wary of reported findings. 'We should accept that most research findings

dazzled the world with his claims of cloning human embryonic stem cells, until he was forced to admit that he fabricated all of it.[90] For years the medical establishment told its patients that low-fat diets helped reduce stroke, heart disease and other such vascular maladies, but within a few short weeks into the year 2006 the same establishment told us that those studies were all erroneous based on the evidence from even "newer studies."[91] For years men and women advanced in years were told to take calcium supplements to strengthen their bones, and once again the year 2006 brought us the sad news that science, true to form, took a wrong turn, since other "studies" found that taking calcium supplements not only doesn't strengthen the bones but increases the risk of other maladies. Where will it all end?

The Changing Tide

So often we hear in the media of intellectuals in academia and the science community who ridicule those who take the Old and New Testaments at face value. With much ingratiating self-satisfaction they claim that literal interpretations of Scripture have been forever banished, since we have all come to accept that the Earth revolves around the sun. Once "biblical criticism" paved the way for scholars to ignore Scripture's testimony that the Earth had no movement, it was only a matter of time before the next biblical pillar – a six-day creation – would be attacked and suppressed, along with a global flood and the Genesis genealogies to the first man that stretched no longer than about 10,000 years.

Beginning around the mid-1900s, things began to change in the world of science. It was at this time that those who accepted Scripture both as divine revelation and at face value, began to delve more deeply into the sciences than ever before. They began to see that a proper interpretation of scientific facts did not preclude a non-evolutionary origin for the Earth or a non-uniformitarian development of its terrain, but actually supported it much better than the opposing evolutionary views. There has been so much information made available that we are beginning to see universities and secondary schools take a second look at these issues. For example, the Intelligent Design argumentation has proven itself to be one of the more formidable weapons against evolutionary theory in the ongoing wars of cosmogony. Of course, the opposition against creationism and catastrophism has mounted in proportion, since many of today's secular scientists refuse even to consider alternatives to their cherished atheistic evolutionary theories. As Oxford biologist Richard Dawkins put it: "Darwin made it possible to be an intellectually fulfilled atheist," or as Richard Lewontin admitted:

> It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are

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will be refuted. Some will be replicated and validated. The replication process is more important than the first discovery,' Ioannidis says. In the paper, Ioannidis does not show that any particular findings are false. Instead, he shows statistically how the many obstacles to getting research findings right combine to make most published research wrong. Massaged conclusions: Traditionally a study is said to be 'statistically significant' if the odds are only 1 in 20 that the result could be pure chance. But in a complicated field where there are many potential hypotheses to sift through - such as whether a particular gene influences a particular disease - it is easy to reach false conclusions using this standard. If you test 20 false hypotheses, one of them is likely to show up as true, on average. Odds get even worse for studies that are too small, studies that find small effects (for example, a drug that works for only 10% of patients), or studies where the protocol and endpoints are poorly defined, allowing researchers to massage their conclusions after the fact. Surprisingly, Ioannidis says another predictor of false findings is if a field is "hot", with many teams feeling pressure to beat the others to statistically significant findings. But Solomon Snyder, senior editor at the Proceedings of the National Academy of Sciences, and a neuroscientist at Johns Hopkins Medical School in Baltimore, US, says most working scientists understand the limitations of published research. 'When I read the literature, I'm not reading it to find proof like a textbook. I'm reading to get ideas. So even if something is wrong with the paper, if they have the kernel of a novel idea, that's something to think about,' he says." (Journal: Public Library of Science Medicine, DOI: 10.1371/journal.pmed.0020124).

See also: Richard Milton, *Forbidden Science: Exposing the Secrets of Suppressed Research*, 1994; Anthony Standen, *Science is a Sacred Cow*, 1952, 2000. Standen writes: "Physics is *not* a body of indisputable and immutable Truth; it is a body of well-supported probable opinion only, and its ideas may be exploded at any time" (p. 49).

[90] "Con Men in Lab Coats" *Scientific American*, March 2006, p. 10.

[91] "Low-Fat Diet Falls Short," *Science News*, February 11, 2006, vol. 169, p. 85.

> forced by our *a priori* adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door.[92]

But *Galileo Was Wrong: The Church Was Right* does not address the arguments against evolution, *per se*. Many well-qualified secular and biblical scientists have done their job quite well in refuting its precarious tenets. Our book deals solely with the issue of Earth-centered cosmology, a subject that, unfortunately, many of the aforementioned biblical scientists have been somewhat reluctant to address, let alone support, for fear of appearing like the uneducated Neanderthals and stubborn academics that their evolutionary opponents accuse them of being.

Copernicus, Galileo, Kepler, Newton and Einstein in Retrospect

In this chapter we have detailed the fraud and deception that often occurs in the scientific community. One facet of this deception is the suppression of historical facts about the personal lives of the world's renowned scientists. Their rejection of God and revelation are not in a vacuum. As we have seen from Gould to Sagan to Crick, their materialistic conclusions concerning the origins and function of the cosmos invariably affect the kind of lives they lead, and their biographies are often a sordid tale of pride and immorality. After forcefully releasing themselves from the motherly hand of the Church, scientists subsequently made themselves into icons of intellect and stamina that were bigger than life; 'men of renown' who took on an almost god-like quality, similar to the 'giants' who lived just prior to the Great Flood, and who also became the epitome of corruption and were eventually destroyed (Genesis 6:4-5). Interestingly enough, one scientist writing about Albert Einstein inscribed the words: "THERE WERE GIANTS IN THE EARTH IN THOSE DAYS" in the opening pages of his book.[93] The reality is, although these scientists are consistently revered in textbooks as the titans of humanity, history often tells quite a different story. In addition to the problems and anomalies in current science, the moral integrity of those who vied for its advancement was often at odds with convention, even by today's standards. We will limit our survey to just the prominent names associated with current Copernican cosmology: Copernicus, Kepler, Galileo, Newton and Einstein.

Nicolaus Copernicus
Too Many Pagan Influences

Copernicus' personal life is not as well known as that of others who followed him, but we do know several disturbing things about him. In 1509, Copernicus published a translation of the obscenity-filled letters of the Byzantine poet, Simoncatta. Further sexual exploits came to light when it was discovered that Copernicus kept a mistress, but he refused to dismiss her when confronted by his diocesan bishop, Dantiscus. As one Copernican historian describes it:

> Doctor Nicolaus had a mistress who regularly visited his house….Sometime between July 1531 and the summer of 1538, Copernicus started receiving a

[92] "Billions and Billions of Demons," *The New York Review of Books*, January 9, 1997, pp. 28, 31. At the Salk Institute forum, Dawkins stated: "I am utterly fed up with the respect that we – all of us, including the secular among us – are brainwashed into bestowing on religion. Children are systematically taught that there is a higher kind of knowledge which comes from faith, which comes from revelation, which comes from scripture, which comes from tradition, and that it is the equal if not the superior of knowledge that comes from real evidence" (*New York Times*, Nov. 21, 2006).

[93] Donald W. Rogers, *Einstein's Other Theory*, New Jersey, 2005.

> woman at his curia in Frombork….The woman was named Anna Schilling…. Copernicus and Anna's father were involved together for seven years, from 1529 to 1536….Most problematic for Copernicus was the fact that she was still technically married….Anna was reported to be pretty, well educated, and deeply interested in astronomy…. Despite Dantiscus's order to clean his household, Copernicus did not comply…. Though everyone knew the actual situation between Copernicus and Anna, it appears that the astronomer told people that she was simply his housekeeper….Six weeks later the situation seemed to have been addressed when Copernicus wrote to Dantiscus…. However, Copernicus had lied. He had not ended the relationship, and word of the continued presence of Anna Schilling in Copernicus's house got back to Dantiscus later that winter….In his old age, almost at the end of his allotted time, he is still said to let his mistress in frequently in secret assignations.[94]

Having heard of his fame, a fellow heliocentrist, Georg Joachim Rheticus,[95] visited with Copernicus in 1539. After befriending Copernicus and reading his works, Rheticus worked very hard in convincing him to publish his *De revolutionibus*. Prior to Copernicus' decision, Rheticus wrote a summary version of Copernicus' work titled *Narratio prima* in 1540.[96] It was Rheticus' purpose to do all that he could to disseminate the heliocentric universe. With the help of the Protestant publisher Johannes Petreius,[97] Rheticus acquired the services of Lutheran Andreas Osiander to write a preface for *De revolutionibus*. After years of labor, Rheticus was finally nearing success, but he did not get to see the final draft of *De revolutionibus* before it was published. In the meantime, Copernicus had suffered a stroke in December 1542, but his book was finally published in March 1543 by Petreius, and Copernicus had died shortly thereafter. After all the work that Rheticus had done to facilitate its publication, however, he received quite a shock when he read the opening credits of *De revolutionibus*. Koestler refers to it as a "double-cross." Repcheck describes it as follows:

> …when Rheticus opened the finished book…and finally read Copernicus's opening words [and] his acknowledgments, Rheticus must have been stunned to read that although Copernicus thanked several people, he somehow forgot to thank him. This had to have been a devastating blow to the young mathematician. Historians of science have been at pains to explain what happened…Giese wrote that "your teacher failed to mention you in his Preface to the treatise"….What happened?....It must have been something specific, because the oversight is glaring.[98]

Rheticus never really recovered from this slight, for many years afterward he refused to promote Copernicus' book. We might surmise that Copernicus was not in this cosmological pursuit solely as an altruistic venture for the truth, but for the fame that he so jealously desired to guard from any would-be usurper. Of course, Rheticus had his own problems, and perhaps Copernicus sensed

[94] Jack Repcheck, *Copernicus's Secret*, pp. 92-99, 145.

[95] Rheticus' original name was Georg Joachim Iserin. His father, Georg Iserin, had been convicted of various crimes (either sorcery or theft, or both) and was executed. Families of the executed were required to change their last name. He chose "Rheticus" from the region of Rhaetia from where his mother originated.

[96] Rheticus writes in the *Narratio*: "…each of the planets, by its position and order and every inequality of its motion, bears witness that the earth moves and that we who dwell upon the globe of the earth, instead of accepting its changes of position, believe that the planets wander in all sorts of motions of their own" (translated by Edward Rosen, in *Three Copernican Treatises*, 1971, p. 165).

[97] Petreius published works on Luther, Erasmus, Melanchthon, Henry VIII, Regiomontanus and Gasser. Although he also published a few works by Augustine, Calvin and Luther had commandeered some of Augustine's works on predestination for the cause of Protestantism.

[98] *Copernicus's Secret*, pp. 166-167. Repcheck goes on to speculate that "after Copernicus observed the acclaim bestowed on the *Narratio prima*, and after the young and enthusiastic Rheticus left Frombrok with his masterpiece, Copernicus might have sensed that he would not be around to enjoy the moment of victory, and Rheticus surely would. Perhaps this bothered him so much that he deliberately slighted Rheticus" (*ibid*).

something was amiss with the indulgent befriending he received from the young lad a few years earlier. As it turns out, Rheticus was a homosexual who, on several occasions, found himself being run out of town for his peccadilloes. On one occasion he was convicted of sodomy against a young boy. As Repcheck describes it:

> In April 1551, Hans Meusel, a merchant, brought a lawsuit against Rheticus for a shocking crime – the injunction claimed that the professor had "lured my son…plied him with strong drink, until he was inebriated; and finally did with violence overcome him and practice upon him the shameful and cruel vice of sodomy…Joachim Rheticus fled Leipzig immediately, leaving nearly all of his personal belongings behind…Over the next twelve months official letters were sent from the court to Rheticus and ignored. But on April 11, 1552, Rheticus, age thirty-eight, was found guilty of raping young Meusel. He was exiled from Leipzig for 101 years.[99]

In regard to his heliocentric theory, Copernicus consistently appealed to the "harmony" of his system, but it was a harmony ennobled by a sun that he personified, and, some say, deified. Copernicus writes:

> In the middle of all sits Sun enthroned. In this most beautiful temple could we place this luminary in any better position from which he can illuminate the whole at once? He is rightly called the Lamp, the Mind, the Ruler of the Universe: Hermes Trismegistus names him the Visible God, Sophocles' Electra calls him the All-seeing. So the Sun sits as upon a royal throne ruling his children the planets which circle round him. The Earth has the Moon at her service. As Aristotle says, in his *On Animals*, the Moon has the closest relationship with the Earth. Meanwhile the Earth conceives by the Sun, and becomes pregnant with an annual rebirth.[100]

Karl Popper shows the origin of these cultic ideas:

> Copernicus studied in Bologna under the Platonist Novara; and Copernicus' idea of placing the sun rather than the Earth in the center of the universe was not the result of new observations but of a *new interpretation* of old and well-known facts in the light of semi-religious Platonic and Neo-Platonic ideas. The crucial idea can be traced back to the sixth book of Plato's *Republic*, where we can read that the sun plays the same role in the realm of visible things as does the idea of the good in the realm of ideas. Now the idea of the good is the highest in the hierarchy of Platonic ideas. Accordingly the sun, which endows visible things with their visibility, vitality, growth and progress, is the highest in the hierarchy of the visible things in nature.…Now if the sun was to be given pride of place, if the sun merited a divine status…then it was hardly possible for it to revolve about the Earth. The only fitting place for so exalted a star was the center of the universe. So the Earth was bound to revolve about the sun. This Platonic idea, then, forms the historical background of

[99] *Ibid*., p. 178. Koestler adds: "Rheticus was a sodomite" (*The Sleepwalkers*, p. 179, see also pp. 170f, 184f). Gingerich confirms with: "There were dark rumors of a drunken homosexual episode involving a student half his age. The irate father of the young man involved brought a lawsuit. In disgrace, Rheticus fled from Leipzig" (*The Book that Nobody Read*, p. 182).

[100] *De revolutionibus*, "10. Of the Order of the Heavenly Bodies," as cited in *The Copernican Revolution*, pp. 179-180 (Kuhn's translation from the Latin). Charles Glenn Wallis' translation (or his editor's), although similar, seems desirous to lessen Copernicus' deification of the sun by using slightly different wording and lower case letters: "In the center of all rests the sun. For who would place this lamp of a very beautiful temple in another or better place than this wherefrom it can illuminate everything at the same time? As a matter of fact, not unhappily do some call it the lantern; others, the mind, the pilot of the world. Trismegistus calls it a 'visible god'; Sophocles' Electra, 'that which gazes upon all things.' And so the sun, as if resting on a kingly throne, governs the family of stars which wheel around. Moreover, the Earth is by no means cheated of the services of the moon; but as Aristotle says in the *De Animalibus*, the Earth has the closest kinship with the moon. The Earth moreover is fertilized by the sun and conceives offspring every year" (*On the Revolutions of Heavenly Spheres*, 1995, pp. 24-26).

> the Copernican revolution. It does not start with observations, but with a religious or mythological idea.[101]

Popper, being a supporter of the heliocentric revolution, couches his critique of Copernicus in rather polite terms, but essentially he is saying that Copernicus' brainchild had all the earmarks of originating from pagan sun-worship. As Wolfgang Smith notes:

> …in the Renaissance movement championed by Marsiglio Ficino, the doctrine came alive again, but in a somewhat altered form; one might say that what Ficino instituted was indeed a religion, a kind of neo-paganism. Copernicus himself was profoundly influenced by this movement, as can be clearly seen from numerous passages in the *De revolutionibus*.[102]

Upon reading *De revolutionibus*, one is struck by the preponderance of philosophical and humanistic arguments Copernicus brings to his aid. As J. D. Bernal notes: "[Copernicus'] reasons for his revolutionary change were essentially philosophic and aesthetic," and in a later edition he is more convinced that the "reasons were mystical rather than scientific."[103] Overall, Copernicus presents about five-dozen arguments, at least half of which are solely philosophical in nature. Although the other half of his argumentation depends more on mechanics, these also have philosophical appendages to them. Very few of his arguments are based on his own personal observations, since, as we noted earlier, Copernicus merely reworked the observations of his Greek predecessors. In fact, Copernicus concludes that, because the Greeks did not detail their cosmological models more thoroughly, history (and God) have called upon him to provide the long-awaited documentation of true cosmology.[104]

This brings us to another disturbing aspect of Copernicus' approach to cosmology. Since Copernicus was a Canon of the Catholic Church and one who rubbed shoulders with high-placed Cardinals and enjoyed audiences with the reigning pope, one might expect him to have been a high churchman in his own right, with regular recourse to the Church Fathers, especially since he knew that a good number of them wrote definitive works on cosmology and cosmogony.[105] Moreover, one would

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[101] *Conjectures and Refutations: The Growth of Scientific Knowledge*, p. 187. Popper is referring to Dominicus Maria da Novara, a mathematician and astronomer in Italy. Indulging in a bit of anachronistic evaluation, Popper goes on to defend him, suggesting that even though Copernicus' idea came before the observation, he was nevertheless correct and "not a crank." More of Popper's *a-posteriori* thinking appears later in the book: "The Copernican system, for example, was inspired by a Neo-Platonic worship of the light of the Sun who had to occupy the 'centre' because of his nobility. This indicates how myths may develop testable components. They may, in the course of discussion, become fruitful and important for science" (*ibid*., p. 257).

[102] Wolfgang Smith, *The Wisdom of Ancient Cosmology*, p. 174. Copernicus was also influenced heavily by the liberal humanist, Codrus, who was known for denying various Church doctrines.

[103] J. D. Bernal, *Science in History*, 1st edition, London, Watts, 1954; 2nd edition, 1965. Cited in Lakatos, *Methodology of Scientific Research Programmes*, p. 129.

[104] Thomas Heath sheds more light on this connection: "Copernicus himself admitted that the [heliocentric] theory was attributed to Aristarchus, though this does not seem to be generally known….But it is a curious fact that Copernicus did mention the theory of Aristarchus in a passage which he afterwards suppressed: 'Credibile est hisce similibusque causis Philolaum mobilitatem terrae sensisse, quod etiam nonnulli Aristarchum Samium ferunt in eadem fuisse sentential.'" Heath also shows by quotes from Plutarch and Archemides that Aristarchus was the originator of the heliocentric view (Thomas Heath, *Aristarchus of Samos: The Ancient Copernicus*, 1913, p. 301ff). J. L. E. Dreyer provides a more readable translation of Archimedes' words: "You know that according to most astronomers the world (κόσμος) is the sphere, of which the center is the center of the earth, and whose radius is a line from the center of the earth to the center of the sun. But Aristarchus of Samos has published in outline certain hypotheses, from which it follows that the world is many times larger than that. For he supposes (ὑποτιθέται) that the fixed stars and the sun are immovable, but that the earth is carried round the sun in a circle which is in the middle of the course…" (J. L. E. Dreyer, *History of the Planetary Systems from Thales to Kepler*, 1906, pp. 136-137).

[105] Chief among them were **Basil the Great**, bishop of Caesarea. Advancing a dogmatic assertion of geocentrism, he writes: "There are inquirers into nature who with a great display of words give reasons for the immobility of the Earth....Do not then be surprised that the world never falls: it occupies the center of the universe, its natural place. By all necessity it is obliged to remain in its place, unless a movement contrary to nature

also expect him to have sought out their consensus on important issues, since this was the Church's most formidable weapon against erroneous ideas, even as Robert Bellarmine admonished Foscarini and Galileo.[106] But one searches in vain for any patristic references in *De revolutionibus*, or, for that matter, in any of Copernicus' works. After prefacing his remarks to Pope Leo X with a castigation of those who "…although wholly ignorant of mathematics… shamelessly distorting the sense of some passage in Holy Writ to suit their own purpose," the only time Copernicus crosses the threshold into the patristic witness for Leo's sake is a derisive remark about Lactantius:

> For it is not unknown that Lactantius, otherwise a distinguished writer but hardly a mathematician, speaks in an utterly childish fashion concerning the shape of the Earth, when he laughs at those who have affirmed that the Earth has the form of a globe.[107]

Consequently, as a lot, the Fathers are made to appear as ignorant partisans against the goals of science and not worthy of comment on so important a subject. The reality is that Lactantius was the only Father of the Church (and he was not a highly esteemed patristic witness) who held to the idea of a non-spherical Earth.[108] Every other Father who wrote at length on cosmological issues stated his belief, based on Scripture and science, that the Earth was a sphere.[109] But one would never know these essential facts from the biased Copernicus. Instead, Copernicus rests his lot with the Greek philosophers and astronomers, the very individuals upon whom the Church Fathers focused their critiques in the areas of cosmology and cosmogony. *De revolutionibus* is saturated with nothing but praise for the Greek cosmologists, more particularly, the ones who advocated a moving Earth:

> I found in Cicero that Hicetas [of Syracuse, fifth century B.C.] had realized that the Earth moved. Afterwards I found

should displace it. If there is anything in this system which might appear probable to you, keep your admiration for the source of such perfect order, on the wisdom of God" (*Hexameron*, Homily 1, 10); and **Chrysostom**: "For they who are mad imagine that nothing stands still, yet this arises not from the objects that are seen, but from the eyes that see. Because they are unsteady and giddy, they think that the Earth turns round with them, which yet turns not, but stands firm. The derangement is of their own state, not from any affection of the element." (*Homilies on Titus* 2:1).

[106] Bellarmine states: "Second, I say that, as you know, the Council [of Trent] prohibits interpreting Scripture against the common consensus of the Holy Fathers; and if Your [Reverence] wants to read not only the Holy Fathers, but also the modern commentaries on Genesis, the Psalms, Ecclesiastes, and Joshua, you will find all agreeing in the literal interpretation that the sun is in heaven and turns around the earth with great speed, and that the earth is very far from heaven and sits motionless at the center of the world. Consider now, with your sense of prudence, whether the Church can tolerate giving Scripture a meaning contrary to the Holy Fathers and to all the Greek and Latin commentators" (Bellarmine to Paolo Antonio Foscarini, April 12, 1615).

[107] *De revolutionibus*, Dedication to Pope Paul III, *Revolutions of Heavenly Spheres*, Charles G. Wallis, p. 7.

[108] Lactantius, *The Divine Institutes*, Book 3, Chapter 23: "…they thought that the world is round like a ball…But if this were so, the Earth also itself must be like a globe…And if this were so, that last consequence also followed, that there would be no part of the Earth uninhabited by men and the other animals. Thus the rotundity of the Earth leads, in addition, to the invention of those suspended antipodes."

[109] **Athanasius**: "And wells, again, and rivers will never exist without the Earth; but the Earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, being bound fast at the center of the universe. And the sea, and the great ocean that flows outside round the whole Earth, is moved and borne by winds wherever the force of the winds dashes it." (*Against the Heathen*, First Book, Part 1, 27); **Gregory of Nyssa**: "As, when the sun shines above the Earth, the shadow is spread over its lower part, because its spherical shape makes it impossible for it to be clasped all round at one and the same time by the rays, and necessarily, on whatever side the sun's rays may fall on some particular point of the globe…" (*On the Soul and the Resurrection*); **Augustine**: "Think we, had he ascended to the peak of some very high and pointed mountain, and looked out thence and seen the compass of the Earth, and the circles of the round world, and therefore said, 'I have seen the end of all perfection'"? (*Homilies on First John*, x, 5); **Jerome**: "…the sphere which I have called motionless and all that it contains will be dissolved into nothing, and the sphere in which the antizone itself is contained shall be called 'good ground,' and that other sphere which in its revolution surrounds the Earth and goes by the name of heaven shall be reserved for the abode of the saints" (*Letters*, 124, *To Avitus*).

> in Plutarch that certain others had held the like opinion. I think fit here to add Plutarch's own words, to make them accessible to all: "The rest hold the Earth to be stationary, but Philolaus the Pythagorean says that she moves around the [central] fire on an oblique circle like the Sun and Moon. Heraclides of Pontus and Ecphantus the Pythagorean also make the Earth to move, not indeed through space but by rotating round her own center as a wheel on an axle from West to East.[110]

In the text of *De revolutionibus* he continues:

> It is the vault of Heaven that contains all things, and why should not motion be attributed rather to the contained than to the container, to the located than the locater? The latter view was certainly that of Heraclides and Ecphantus the Pythagorean and Hicetas of Syracuse (according to Cicero). All of them made the Earth rotate in the midst of the Universe…That the Earth, besides rotating, wanders with several motions and is indeed a Planet, is a view attributed to Philolaus the Pythagorean, no mean mathematician, and one whom Plato is said to have sought out in Italy.[111]

We see that, despite the fact that the Greeks have quite a confusing assortment of views on the cosmos, Copernicus is still enamored with their cosmologies, and especially with their mathematics, but he holds dear only the select few who believed in heliocentrism. As we have noted earlier, the appeal to "mathematics" or "mathematical harmonies" is a common thread running through most of the new cosmology, from Copernicus to Kepler through Einstein and Quantum Mechanics. The appeal, though appearing logical and formidable, is baseless. Mathematics proves very little, except that the right side of the equation often equals the left side.

[110] *De revolutionibus*, Dedication to Pope Paul III. Heraclides (d. 310 BC) a Greek astronomer who was one of the first to propose that the revolution of the stars around the Earth could also be understood as the Earth rotating on its axis in the midst of stationary stars.

[111] *De revolutionibus*, 5. *Whether Circular Motion Belongs to the Earth; and Concerning its Position*.

Johannes Kepler

Suspected of Murdering Tycho Brahe

Kepler, although a Lutheran, was heavily influenced by the occult, as was his mother, Katherina Kepler, and the latter's endeavor may have led to her trial as a witch.[112] Following his

particular philosophy, Kepler's main motivation for bringing the sun into the center of the planetary system, as had Copernicus before him, was that he considered it worthy of symbolic deification. In one passage he describes the sun as: "Who alone appears, by virtue of his dignity and power, suited…and worthy to become the home of God himself, not to say the first mover."[113]

Much more disturbing, however, is another facet to Kepler's life that has been hidden from the eyes of the world for the last four hundred years. Although most historians were aware of Kepler's nefarious inclinations wherein jealousy and ambition ruled his motives, few were prepared for what recent forensic evidence has revealed. Whereas most

[112] *Kepler's Witch*, James A. Connor, 2004, pp. 275-307. *The Sleepwalkers*, pp. 389-393. The woman relative who raised Katherina was executed for practicing witchcraft (John Lear, *Kepler's Dream*, 1965, p. 31).

[113] *On the Motion of Mars*, Prague, 1609, Chapter 4, as cited in Thomas S. Kuhn, *The Copernican Revolution*, 1959, p. 214. Kuhn notes: "This symbolic identification of the sun and God is found repeatedly in Renaissance literature and art" (*ibid*., p. 130). Later adding: "This conviction [of Kepler's], together with certain intrinsic incongruities discussed above, was his reason for rejecting the Tychonic system" (*ibid*., p. 214). Kepler's reference to the "first mover" encapsulates his concept that as the sun rotated on its axis, its rays would act like a brush to move the planets.

scholars had thought Kepler's employer, the renowned Tycho de Brahe, died of a urinary tract infection, an exhumation of his body leading to a chemical analysis of his hair shows lethal levels of mercury poisoning just hours before his death.[114] Kepler, already steeped in the Copernican theory that he freely wielded in his Lutheran circles with little reproach, desperately needed Brahe's forty-years' worth of planet- and star-charting to bring his "*Mysterium Cosmographicum*" visions to fruition. As Kepler describes it:

> For among the most powerful causes of visiting Tycho was this also, that I might learn the truer proportions of the deviations [of the planets] from him, by which I might examine both my *Cosmic Mystery* and *The Harmony of the World*. For these *a priori* speculations ought not to impinge on clear experience: but with it be reconciled.[115]

How valuable were these charts and data? Without them Kepler would have been just another seventeenth-century astronomer struggling to make a living by reading astrological horoscopes, for he would have had little evidence upon which to base his theory regarding the motions of the planets. Modern telescopic observation reveals that, without ever using a telescope, Brahe's data of stars was consistently accurate to within 1 minute of arc or better. His observations of planetary positions were reliable to within 4 minutes of arc, which was more than twice the accuracy produced by the best observers of antiquity. In fact, it was Tycho's express desire to use his precise measurements to uncover the errors in Copernicus' solar system. This data was absolutely priceless, and Kepler, who revered Tycho and called him *The Phoenix of Astronomy*, would eventually pay, the evidence shows, the ultimate price to obtain them. Tycho knew of Kepler's intention to acquire the charts, but Tycho wouldn't budge since he was the staunchest anti-Copernican of his day. Tycho's very first letter to Kepler outlined his express desire that his forty-years of painstaking work be used to promote the geocentric system. In his book published in 1588, De mundi aetherei recentioribus phaenomenis, he stated his devotion to Scripture and to geocentrism:

> What need is there, without any justification, to imagine the earth, a dark dense and inert mass, to be a heavenly body undergoing even more numerous revolutions than the others, that is to say, subject to triple motion, in violation not only of all physical truth but also of the authority of Holy Scripture, which ought to be paramount.[116]

Tycho had more than a suspicion that Kepler saw things very differently. In the words of one author:

> Kepler knew that in Tycho's possession were the raw observations that he, as "architect," longed to assemble into a coherent picture of planetary motion. And Tycho knew that the gifted Kepler had the mathematical wherewithal to prove the validity of the Tychonic [geocentric] system of the heavens. But Kepler was a confirmed Copernican; Tycho's model had no appeal to him, and he had no intention of polishing this flawed edifice to the great man's ego.[117]

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[114] Joshua Gilder and Anne-Lee Gilder, *Heavenly Intrigue: Johannes Kepler, Tycho Brahe, and the Murder Behind one of History's Greatest Scientific Discoveries*, 2004, pp. 145, 206-234. After several of Kepler's plots to confiscate Brahe's records were foiled (pp. 188-194) the ultimate plot was hatched. Kepler, having become familiar with Brahe's alchemical laboratory, knew the precise dosage of mercuric chloride solution that would initiate the onset of Brahe's demise. PIXE analysis [particle-induced X-ray emission] has confirmed the presence of the lethal levels of residual mercury and calcium, the latter originating from the milk was used to camouflage the poison – a favorite medium for poison in those times.

[115] *Heavenly Intrigue*, p. 154. The Gilders' add: "Kepler had not forgotten Brahe's advice; he understood that, without the empirical backing only Brahe's incomparable observations could provide, his idea of universal structure and harmony would never amount to anything but an elegant theory" (*ibid*.).

[116] Cited in Repcheck's *Copernicus's Secret*, p. 187.

[117] Alan W. Hirshfeld, *Parallax: The Race to Measure the Universe*, 2001, pp. 92-93. Brahe was the principal author but perhaps not the only one who discovered what we now know as the Tychonic system. Helisaeus Roeslin worked on a similar system, but his work was never published. Nicholas Reimers Bär (also known as Ursus), published a Tychonic system with a rotating Earth in the *Fundaments of Astronomy* [actual title: *Nicolai Raimari Ursi Dithmarsi Fundamentum astronomicum*, Strasburg,

As the plot thickens, Kepler tells his diary:

> Let all keep silence and hark to Tycho who has devoted thirty-five years to his observations… For Tycho alone do I wait; he shall explain to me the order and arrangement of the orbits… Then I hope I shall one day, if God keeps me alive, erect a wonderful edifice.[118]

> Brahe may discourage me from Copernicus (or even from the five perfect solids) but rather I think about striking Tycho himself with a sword…I think thus about Tycho: he abounds in riches, which like most rich people he does not rightly use. Therefore great effort has to be given that we may wrest his riches away from him. We will have to go begging, of course, so that he may sincerely spread his observations around.[119]

Scheming to come into Brahe's company, Kepler finally met him on February 4, 1600. Tycho put Kepler to work crunching numbers in the hopes of

> …turning his Tychonic system from a rough schematic diagram of the heavens into an accurate model from which exact predictions of planetary motion could be made…the Tychonic system – which Kepler, as a Copernican, disdained.[120]

As Kepler describes the toil:

> I would have brought my discussion about the *Harmony of the World* long ago to an end except that the Astronomy of Tycho occupied me so totally that I almost was insane.

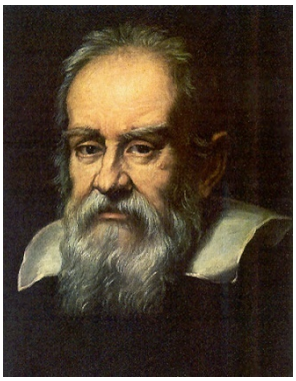
Just eighteen months later, Brahe, the epitome of perfect health, suddenly died. All the evidence points the finger at Kepler. With his usual knack for introspective understatements, Kepler tells his diary:

> I confess that when Tycho died, I quickly took advantage of the absence, or lack of circumspection, of the heirs, by taking the observations under my care, or perhaps usurping them…"[121]

The rest is history, as they say, but it is filled with enough intrigue to make even Agatha Christie envious of the story line.

Galileo Galilei
The Rebel Turned Repentant

Galileo followed right on the heels of Kepler. Like Kepler, he had an eccentric and irascible personality, at least up until the later years of his life. But whereas Kepler was more reserved, the unconverted Galileo was the quintessential know-it-all, always and everywhere trying to outshine everyone who crossed his path.



As Koestler sees him:

1588] but was known to have stolen it from Brahe, whereupon Brahe sought litigation against him, but Ursus died before the trial [see *Heavenly Intrigue*, pp. 120-185].

[118] Letter to Michael Maestlin, February 16, 1599, *Gesammelte Werke*, vol. xiii, p. 289 *seq*. (cited in *The Sleepwalkers*, p. 280). Koestler adds: "With one eye he was reading the thoughts of God; the other squinted enviously at Tycho's shining armillary spheres. But Tycho refused to publish his observations until he had completed his own theory. He jealously guarded his treasure, volumes of figures, the result of a lifetime of work."

[119] Letter to Michael Maestlin, February 16 1599, *Gesammelte Werke*, vol. xiii, p. 289 *seq*. Partially translated from the Latin by the Gilders, *Heavenly Intrigue*, p. 132.

[120] *Heavenly Intrigue*, p. 157.

[121] Letter to D. Fabricius, February 1604, *Gesammelte Werke,* vol. xv, p. 231 *seq*., *The Sleepwalkers*, p. 350.

> Galileo had a rare gift of provoking enmity; not the affection alternating with rage which Tycho aroused, but the cold, unrelenting hostility which genius plus arrogance minus humility creates among mediocrities.[122]

Historian A. C. Custance adds:

> Judging by Galileo's correspondence and other records of his opinion of himself he was fantastically selfish intellectually and almost unbelievably conceited. As an illustration of the former there is the now well-known fact that he refused to share with his colleagues or with acquaintances such as Kepler any of his own findings or insights; he actually claimed to be the only one who ever would make any new discovery![123]

By the same token, Galileo would ignore the overtures of his colleagues but steal secrets behind their backs. Kepler was alerted to this fact when one of his admirers wrote to him and said: "Galileo has your book and teaches your discoveries as his own…" but which Kepler, for reasons of his own, allowed him to do so without litigation.[124] In fact, Kepler sought Galileo's written correspondence on many occasions. In one instance he sent Galileo his magnum opus, *Mysterium Cosmographicum*, hoping for a review, but Galileo ignored all but two inquiries from Kepler, and those responses were separated by thirteen years. The second response was prompted by nothing less than a threat from Kepler to expose Galileo as a fraud unless he produced the evidence of his telescope sightings about which he had been continually bragging.

Among his other braggadocios, Galileo claimed to have invented the telescope, but Kepler and his colleagues knew it was available twenty years earlier from one of Galileo's countrymen, Giovanni Della Porta. Records also show that spectacle-maker Johann Lippershey possessed a license to make telescopes by the mid-1580s. By April 1609 one could buy a telescope from shops in Paris, the same year Galileo published that he was the first to see the moons of Jupiter, a claim which is also in doubt since there is evidence that other observations of Jupiter preceded Galileo's, and that Galileo's telescope was so small and clumsy it would have been hard to see Jupiter itself, much less its moons.[125] When Kepler pressed him to send the telescope so that his claims could be verified, Galileo gave him the typical 'the-dog-ate-it' excuse, claiming that he had "lent it to the Grand Duke for exhibition."

Still, Galileo managed to have himself become the celebrated discover of Jupiter's moons. The Jesuits of the Roman College set aside a day of ceremonies in his honor, and he was invited to a personal audience with Pope Paul V. Galileo followed this by naming the moons the "Medicean Stars" in honor of the Medici family who were the financial barons of Italy. Having previously dabbled in astrology, Galileo wrote a personal horoscope for Cosimo Medici, the Grand Duke of Tuscany, stating: "It was Jupiter, I say, who at your Highness' birth…looked down upon your most fortunate birth."[126] Cosimo promptly elevated Galileo to the position of chief mathematician and philosopher, whereupon he received a salary of 1,000 florins a year, and was thus financially secure for the rest of his life. In his usual lack of gratitude, Galileo rarely mentions Kepler's name in his books, and even those occasions are with the intent to refute him. It is no surprise that Galileo rejected Kepler's three laws of planetary motion as well as his discoveries in optics. Not surprisingly, the unconverted Galileo thought he had a better idea. To one of his other rivals Galileo stated:

> You cannot help it, Mr. Sarsi [*i.e.*, Grassi] that it was granted to me alone to discover all the new phenomena in the sky and nothing to anybody else. This is the truth

[122] *The Sleepwalkers*, p. 373.

[123] A. C. Custance, "The Medieval Synthesis and the Modern Fragmentation of Thought," in *Science and Faith*, p. 153.

[124] *The Sleepwalkers*, p. 365.

[125] Ernst Zinner, *Entstehung und Ausbreitung der Copernicanischen Lehre* (Erlangen, 1943), p. 345, cited in *The Sleepwalkers*, pp. 372-374. Various unverified stories are circulated about the unwillingness of various people to accept Galileo's sighting of Jupiter's moons, such as Cesare Cremoni and Giulio Libri, professors of philosophy at Padua and Pisa, respectively, and Christoph Clavius who is purported to have said that the moons were a trick of Galileo's telescope lenses. See Paul Feterabend's extensive treatment of this issue and the matter of Galileo's alleged invention of the telescope in *Against Method*, pp. 81-93.

[126] *The Book that Nobody Read*, pp. 200-201.

> which neither malice nor envy can suppress."[127]

His self-appointed monopoly on the sky is probably why Galileo also claimed to be the first to discover sunspots, but the records show that the Jesuits Johannes Farricius and Christopher Scheiner and his assistant Cysat had found the spots much earlier, both of whom had published their findings separately, many months before Galileo.

Galileo's deceit reached new heights in his confrontations with the Church's Holy Office from 1616-1633. Prior to this, Galileo had made known his views of heliocentrism privately in a 1597 letter to Kepler:

> I have already for many years come to accept the Copernican opinion and with this hypothesis have been able to explain many natural phenomena, which under the current hypotheses remain unexplainable.[128]

Yet in his characteristic duplicity, in the intervening years between 1597 and up until 1613, he had been teaching against Copernicanism quite vigorously, complete with charts and graphs. A 1601 manuscript of his musings still survives today.[129] Galileo was in a constant whirlwind: saying one thing and doing another, and doing one thing and saying another. Suffice it to say, after the Church gave him every grace and favor to treat Copernicanism as a hypothesis, not fact, Galileo refused to comply, claiming he had proof when, indeed, he had none at all. The Church hierarchy simply could not put up with his roguery any longer. His former confidant, Cardinal Barberini, later became Urban VIII, and, as pope, made it a point to condemn Galileo for lack of proof. Urban upheld the 1616 Sacred Congregation's verdict of "formal heresy" for Copernicanism and "vehemently suspect of heresy" for Galileo after obtaining Galileo's renunciation in 1633. He sent notice of the condemnation to all the inquisitors and papal nuncios of Europe, making it an official proclamation of the Vatican.[130]

Galileo never married but he fathered two illegitimate daughters and one son between the years of 1600 and 1606 with his long-time mistress, Marina Gamba of Venice, whom he eventually abandoned. In light of his immorality, the unconverted Galileo was hardly the example of a devout Catholic. Although Galileo took his children with him to Florence, he soon found caring for them to be very annoying and he decided to send the daughters to an impoverished convent in Arcetri because of what one historian calls his "irrepressible egotism"[131] that led him to abandon them. The older daughter was baptized as Virginia and adopted the name Maria Celeste when taking her vows as a nun. She was very close to Galileo and had much correspondence with him. At her death in 1634 (a year after Galileo's trial) Galileo became very despondent. She was chosen to read to Galileo the daily penitential Psalms imposed upon him in exile by Pope Urban VIII. The other daughter, Livia, who took the name Arcangela at the convent, maintained her animosity toward him for the rest of his life. The son, Vincenzio, was legitimized by Galileo's former student and now Grand Duke of Tuscany, Cosimo Medici.

All things considered, the unconverted Galileo was probably one of history's better examples of a sophist and propagandist. Although his image is one

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[127] *The Sleepwalkers*, p. 436. Taken from Galileo's 1623 book titled *Il Saggiatore* (*The Assayer*). The book starts with a tirade against his opponents: "Others, not wanting to agree with my ideas, advance ridiculous and impossible opinions against me; and some, overwhelmed and convinced by my arguments, attempted to rob me of that glory which was mine, pretending not to have seen my writings and trying to represent themselves as the original discoverers of these impressive marvels" ("The Assayer," *Theories and Opinions of Galileo*, translated by Stillman Drake 1957, p. 274).

[128] *Le Opere di Galileo Galilei*, Vol. 10, p. 68.

[129] *Trattato della Sfera*, Florence, Opere, Ediz. Nationale, Vol. II, 1929, pp. 203ff. Galileo said the Earth did not move, since if it did, the clouds could not keep up with it. Klaus Fischer surmises that often Galileo doubted the Copernican system, since he knew he had no solid proof (*Galileo Galilei*, p. 94).

[130] As Dorothy Stimson reports, "Pope Urban had no intention of concealing Galileo's abjuration and sentence. Instead, he ordered copies of both to be sent to all inquisitors and papal nuncios that they might notify all their clergy and especially all the professors of mathematics and philosophy within their districts…" (*The Gradual Acceptance of the Copernican Theory of the Universe*, 1917, pp. 67-68).

[131] As quoted in: *This Wild Abyss: The Story of the Men Who Made Modern Astronomy*, Gail E. Christianson, 1978, p. 272.

of an empiricist who made no claims apart from experiment, Galileo often gloried in credit where no credit was due. Arthur Koestler, helps reveal the man behind the image:

> The personality of Galileo, as it emerges from works of popular science, has even less relation to historic fact than Canon Koppernigk's…[H]e appears…in ration-alist mythography as the Maid of Orleans of Science, the St. George who slew the dragon of the Inquisition. It is, therefore, hardly surprising that the fame of this outstanding genius rests mostly on discoveries he never made, and on feats he never performed. Contrary to statements in even recent outlines of science, Galileo did not invent the telescope; nor the microscope; nor the thermometer; nor the pendulum clock. He did not discover the law of inertia; nor the parallelogram of forces or motions; not the sun spots. He made no contribution to theoretical astronomy; he did not throw down weights from the leaning tower of Pisa and did not prove the truth of the Copernican system. He was not tortured by the Inquisition, did not languish in its dungeons, did not say 'eppur si muove'; and he was not a martyr of science.[132]

The most egregious fact about the pre-1641 Galileo is that at the time he was vigorously defending Copernicanism before the Holy Office in 1633, he knew *even then* the system didn't work and that he had no substantial proof for it. Since he rejected Kepler's elliptical orbits,[133] and refused any compromise with the Jesuits who were going over to Brahe's geocentric model,[134] he was stuck with Copernicus' forty-eight epicycles, yet he advertised the model as one that bypassed the earlier mechanical problems "with one single motion of the Earth."[135] It is obvious that either Galileo was lying

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[132] *The Sleepwalkers*, p. 358. Koestler adds, however, that Galileo discovered that a pendulum swings at constant frequency, regardless of amplitude, and that he invented the pulsilogium, a timing device for taking pulses, and the thermoscope, a forerunner of the thermometer (pp. 359-360). Regarding the experiment on falling bodies, I. Bernard Cohen states that Galileo's conclusion "only shows how firmly he had made up his mind before hand, for the rough conditions of the experiment would never have yielded an exact law" (*Lives in Science*, 1957, p. 14). Some admirers even revise Galileo's words to conform to the empiricist image. Broad and Wade point out Alexandre Koyré's discovery that an author added the phrase "by experiment" to Galileo's original wording: "Nevertheless, I have discovered *by experiment* some properties of it which are worth knowing and which have not hitherto been observed or demonstrated" ("Traduttore-Traditore. A Propos de Copernic et de Galilée," *Isis*, 34, 209-210, 1943; *Metaphysics and Measurement: Essays in Scientific Revolution*, 1968). They continue: "With Galileo, the desire to make his ideas prevail apparently led him to report experiments that could not have been performed exactly as described…The Renaissance saw the flowering of Western experimental science, but in Galileo, the propensity to manipulate fact was the worm in the bud" (*Betrayers of the Truth*, p. 27).

[133] Kepler tried in many instances to establish a correspondence with Galileo, but Galileo remained quite aloof, thinking he had a better answer to cosmology. He used Kepler's material, however, whenever it was to his advantage, and claimed it as his own.

[134] Koestler writes: "Jesuit Father Horatio Grassi of the *Collegium Romanum*…quoted with approval Tycho's conclusions…a further step in the Jesuits retreat from Aristotle…and a further sign of the Order's implicit endorsement of the Tychonic system" (*The Sleepwalkers*, pp. 473-474). In 1619, Grassi wrote *The Astronomical and Philosophical Balance* in support of the Tychonic system, and Galileo answered with *Il Saggiatore* (The Assayer) in 1623, which, in his usual sardonic manner, calls Brahe's 40-years worth of planet-charting mere "alleged observations" and, not believing in comets himself, assigns them the title "Tycho's monkey-planets." He berates Grassi with epithets such as "piece of asininity," "buffoon," "evil poltroon," and "ungrateful villain." De Santillana adds that some of Galileo's favorites were "mental pygmies," "dumb mooncalves" and "hardly deserving to be called human beings." In all of history, only Martin Luther surpasses Galileo in the category of producing the most caustic vitriol against his opponents.

[135] As quoted from the third day of arguments in *Dialogue on the Flux and Reflux of the Tides*, also known from the title that Pope Urban preferred: *The Dialogue on the Two Great World Systems*. Koestler adds: "The third day is concerned with the astronomical arguments for and against Copernicus, and here Galileo is downright dishonest…that to 'save' the planets' apparent stations and retrogressions, Ptolemy had to introduce 'very great epicycles' which Copernicus was able to dispense 'with one single motion of the Earth.' But he breathes not a word about the fact that Copernicus, too, needs a whole workshop full of epicycles; he keeps silent about the eccentricity of the orbits, the various oscillations and librations, the fact that the sun is neither in the center of

or he never read Copernicus' book, which is one of the reasons Koestler refers to Copernicus' work as "The book that nobody read." Even Owen Gingerich, who disagrees with Koestler's general assessment that Copernicus' book was unread, agrees that Galileo didn't read it.[136] Calling his bluff, Robert Bellarmine stated quite clearly to Galileo that the Church would not even consider changing its position on the cosmos unless Galileo could provide proof of his claims. In one of his more audacious moves, Galileo tried to prove his case by a strange concoction of theory and conjecture on the nature of tidal action. Having rejected as "occultish" Kepler's explanation that the combination of the sun's and moon's gravity caused the daily tides, Galileo, even knowing that his own explanation could not be physically possible, nevertheless, to save his prestige, tried to convince the Catholic prelates that tides were caused by the tilt of the Earth's axis and the Earth's monthly changes in orbital velocity. In addition, his theory addressed only a 24-hour tidal cycle, but sailors knew, and reported to the common folk, that the tides alternated every 12 hours, creating two tides per day. Galileo then tried to explain the discrepancy by postulating that the ocean floor varied in depth. No wonder Koestler concludes his remarks with:

> There can be no doubt that Galileo's theory of the tides was based on unconscious self-deception…. Making the complexities of Copernicus appear deceptively simple, was part of a deliberate strategy, based on Galileo's contempt for the intelligence of his contemporaries. We have seen that scholars have always been prone to manias and obsessions, and inclined to cheat about details; but impostures like Galileo's are rare in the annals of science.[137]

Identical to Copernicus, Galileo was enamored with circles, and if something did not fit into that mold, it was eliminated. As Feyerabend notes:

> Galileo's circular law is not the right dynamics. It fits neither the epicycles which still occur in Copernicus, nor Kepler's ellipses. In fact, it is refuted by both. Still, Galileo regards it as an essential ingredient of the Copernican point of view and tries to remove bodies, such as comets, whose motion quite obviously is not circular, from interplanetary space. In his Assayer "Galileo talked about comets [and interpreted them as illusions, similar to rainbows] in order to protect the Copernican system from possible falsifications."[138]

As we will detail later, however, Galileo finally came to his senses after his chastisement from Pope Urban VIII. Without any hint that he is speaking under duress or to save himself from further condemnation, Galileo writes his letter to Francesco Rinuccini denouncing Copernicanism in the most explicit terms. Of course, the malice with which Galileo started his highfalutin theories continues today, since hardly anyone in the world has ever heard of the fact that Galileo renounced Copernicus in favor of geocentrism.

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the motions, nor lies in their plane; in a word, he deliberately evades the real problems of astronomy which had started Tycho and Kepler on their quest….Moreover, he keeps silent about the fact that the Tychonic system fits the phenomena equally well.…He employs his usual tactics of refuting his opponent's thesis without proving his own; in this case not by sarcasm, but by confusing the issue" (*The Sleepwalkers*, pp. 483-485).

[136] After seeing hardly any annotations in Galileo's personal copy of Copernicus' *De Revolutionibus*, Gingerich notes: "I had long supposed that Galileo was not the sort of astronomer who would have read Copernicus' book to the very end. Even…when we had speculated how few early readers of *De Revolutionibus* there might have been, we had been reluctant to include Galileo in the list of readers. Unlike Reinhold or Maestlin or Kepler, he was not interested in the details of celestial mechanics" (*The Book that Nobody Read*, p. 200).

[137] *The Sleepwalkers*, p. 486. See also W. R. Shea and M. Artigas, *Galileo in Rome: The Rise and Fall of a Troublesome Genius*, 2003.

[138] *Against Method*, p. 77, n. 1, quoting Redondi's *Galileo Heretic*, pp. 145, 31. Feyerabend later adds: "An example of backward movement of this kind is Galileo's return to the kinematics of the *Commentariolus* [of Coerpnicus] and his disregard for the machinery of epicycles as developed in the *De revolutionibus*" (*ibid*., p. 114).

Isaac Newton

Climbing the Ladder of Success: One Body at a Time

Although Isaac Newton is much deserved of scientific credit for at least providing mathematical formulas of motion that, within the margin of error, are quite accurate, his personal life was little to be admired. Kepler's jealousy of Brahe was only slightly worse than the avarice that drove Newton's to confiscate the work of his contemporaries and credit it to himself.

Case in point: astronomer John Flamsteed was the owner of voluminous notes charting lunar movements and the positions of the stars, notes that Newton desperately needed to fit the moon into his gravitational theory for the publishing of his famous *Philosophiae Naturalis Principia Mathematica*. A bitter feud resulted between the two men wherein Newton, using his influence with government officials, forced Flamsteed's hand. Not only did Newton surreptitiously wrest Flamsteed from his painstaking work, he did the same to Gottfried Leibniz, Stephen Gray and Robert Hooke. Regarding Leibniz, Westfall informs us:

> By 1713, moreover, Newton's perpetual neurosis had reached its passionate climax in the crusade to destroy the arch-villain Leibniz. Only a year earlier the Royal Society had published its Commercium epistolicum, a condemnation of Leibniz for plagiary and a vindication of Newton, which Newton himself composed privately and thrust upon the society's committee of avowed impartial judges.[139]

In 1666,[140] 1674[141] and again in 1679 in direct correspondence with Newton, Hooke published his theory of the 'inverse square law' regarding the force of gravity. Despite admitting in his letter to Hooke that Hooke deserved credit for the discovery, Newton tried to claim it as his own, feigning that he had thought about it many years earlier but didn't decide to publish it in his own book until thirteen years after the initial ideas came to him. As historian Ellen Tan Drake notes:

> Newton, however, claimed to have arrived at his universal law of gravitation at his country home in Woolsthorpe during the plague years 1665 or 1666 (it is not clear which), during his *annas mirabilis* (this "marvelous year" when the legendary apple fell). This date, of course, would clearly predate Hooke's expression of the law except that there is clear proof that as late as 1675, Newton still thought that the planets and Sun were kept apart by "some secret principle of unsociableness in the ethers of their vortices," and that gravity was due to a circulating ether that had to be replenished in the center of the Earth by a process like fermentation or coagulation.[142]

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[139] Richard S. Westfall, "Newton and the Fudge Factor," *Science*, 179, 751, 1973.

[140] Lecture given to the Royal Society titled *Planetary Movements as a Mechanical Problem*, on May 23, 1666, as reproduced in *Early Science in Oxford* by R. T. Gunther, 1930, ref. 1, Vol. vi, p. 256..

[141] Hooke's monograph: *An Attempt to Prove the Motion of the Earth by Observation*, London, 1674, as reproduced in *Early Science in Oxford* by R. T. Gunther, 1930, ref. 1, Vol. vii, pp. 1-28.

[142] *Restless Genius: Robert Hooke and his Earthly Thoughts*, Ellen Tan Drake, 1966, pp. 32-33. Drake's source is Newton's letter to Oldenberg, Dec. 7 1675, as cited in Turnbull, 1959, vol. 1: 368; Patterson, 1950. John Aubrey in *Aubrey's Brief Lives*, 1957, p. 166, confirms that Hooke's discovery of the Inverse Square Law predated Newton's *Principia*, as does I. Bernard Cohen: "In 1717 Newton wanted to ensure his own priority in discovering the inverse-square law of gravitation, and so he invented a scenario in which he made the famous

Newton won the day against Hooke by using his influence at the Royal Society, just as he did in heading off the new discoveries of Robert Boyle, all in an effort to advance his own career.[143] On at least three separate occasions Newton introduced fallacious figures into the *Principia* in order to increase its apparent power of prediction.[144] As Westfall notes:

> And having proposed exact correlation as the criterion of truth, it took care to see that exact correlation was presented, whether or not it was properly achieved. Not the least part of the *Principia's* persuasiveness was its deliberate pretense to a degree of precision quite beyond its legitimate claim. If the *Principia* established the quantitative pattern of modern science, it equally suggested a less sublime truth that no one can manipulate the fudge factor quite so effectively as the master mathematician himself.[145]

Because of Newton's vast social influence, the book was considered an "epoch-making" work long before it was thoroughly reviewed, the highly popular John Locke having accepted it based merely on the word of Newton.[146]

In addition to the ill-treatment he gave to his scientific colleagues, Newton was rumored to have had a homosexual relationship with one John Wickins, a friend with whom he had lived for twenty years. He is also said to have had a liaison with Nicholas Fatio De Duillier, a man twenty years his junior and with whom he exchanged intimate letters, many of which were later censured by Newton or a confidant. Newton was also deep into alchemy (illegal at the time) and the Jewish Kabbalah, the occult musings of medieval Talmudic authors. Although he was reputed to have Christian moorings, Newton embraced the heresy of Arianism (*i.e.*, the denial of both the divinity of Christ and the Trinity).[147]

Unknown to most, Newton spent most of his time interpreting biblical prophecy, writing over a million words on the subject. One of his more intriguing predictions is the date of 2060 A.D. as the end of the world, but that date surfaces only because Newton decided that the Roman Catholic Church was the Antichrist. Having arbitrarily put the

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moon test not while writing the *Principia* but two decades earlier in the 1660's.… Newton never published his invented scenario of the early moon test. He included it in the manuscript draft of a letter to the French writer Pierre Des Maizeaux but then crossed it out. Newton also circulated the familiar story that a falling apple set him on a chain of reflections that led to the discovery of universal gravitation. Presumably this invention was also part of his campaign to push back the discovery of gravity, or at least the roots of the discovery, to a time 20 years before the *Principia*" ("Newton's Discovery of Gravity," *Scientific American*, 244 (3), 166, 1981).

[143] David Clark and Stephen P. H. Clark, *Newton's Tyranny: The Suppressed Scientific Discoveries of Stephen Gray and John Flamsteed*, 2001; Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 471f, 601f; on Robert Boyle see *False Prophets*, Alexander Kohn, 1986, p. 39.

[144] Richard S. Westfall, "Newton and the Fudge Factor,", *Science*, 179, 751-758, 1973; *False Prophets*, Alexander Kohn, 1986, pp. 36-39.

[145] Richard S. Westfall, "Newton and the Fudge Factor," *Science*, 179, 751, 1973.

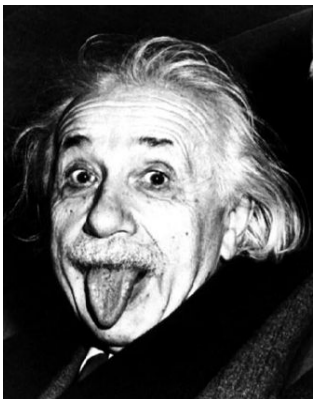
[146] Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 469-470; Morris Kline, *Mathematics in Western Culture*, 1953, p. 230. See also Kline's *Mathematics: The Loss of Certainty*, 1982.

[147] Westfall writes: "In Newton's eyes, worshiping Christ as God was idolatry, to him the fundamental sin" (Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, Cambridge University Press, 1981, 1983, p. 314). On Newton's intimacy with Wickens and Fatio, see *Isaac Newton: The Last Sorcerer*, Michael White, 1997, pp. 235-254. In addition, Voltaire had accused Newton of using his niece to entice politicians so that Newton could gain various positions of prestige. Voltaire writes: "I thought in my youth that Newton made his fortune by his merit. I supposed that the court and the city of London named him Master of the Mint by acclamation. No such thing. Isaac Newton had a very charming niece, Madame Conduitt, who made a conquest of the minister of Halifax. Fluxions and gravitation would have been of no use without a pretty niece" (*Dictionnaire Philosophique*, as cited in N. Martin Gywnne's *Sir Isaac Newton and Modern Astronomy*, Britons Catholic Library, n. d., p. 8). Westfall, although an admirer of Newton and predisposed to dismiss any hearsay, adds: "The wider ramifications with Halifax, and Newton's involvement in it, do not evaporate with equal ease," although "With Halifax the libertine, Victorian eulogizers could not bear to associate Newton. Nor could they bear the thought, the point of Voltaire's jibe, that Newton used the degradation of his niece to advance his own career." (*Never at Rest: A Biography of Isaac Newton*, 1981, 1983, pp. 596-597).

Church's historical peak at 800 A.D., he interpreted the 1260 days of Apocalypse 11-13 as years, adding them to 800 A.D. to come up with 2060 A.D. as the date of the end of the world.[148] As Westfall says, Newton "hated and feared popery,"[149] and as Koestler concludes, Newton was "a crank theologian like Kepler…and held that the tenth horn of the fourth beast of the Apocalypse represented the Roman Catholic Church."[150]

Albert Einstein

Everything's Relative: Including Morality



Albert Einstein's biography is one of the more lurid in the annals of science, but most of it has been hidden from the public for many years. Although *Time* magazine named him "Person of the Century,"[151] as a matter of fact, few in modern history have been so thoroughly shrouded in impenetrable media insulation as Einstein. The decease of the executors of his estate, Helen Dukas (d. 1982) and Otto Nathan (d. 1987) precipitated the release of many of Einstein's previously censured personal papers.[152] In them we find that, close behind the wire-haired, absent-minded and winsome Dr. Jekyll, there lurked a veritable Mr. Hyde.

[148] Newton borrowed the '1260 days = 1260 year' scheme from the Puritan mystic Joseph Mede. Mede added the 1260 years to 400-455 AD and held that the end of the world would come around 1760-1815 AD. Others began at different dates (*e.g.*, Bengel at 576; Ellicott at 608; Melanchthon at 660, et al., most trying to bring the terminus to the Reformation). Newton believed that the Second Coming of Christ would follow plagues and war and would precede a 1,000-year reign of Christ and the saints on Earth, otherwise known today as "premillenniallism." He spent close to 50 years delving into biblical prophecy, writing over 4,500 pages in an effort to determine the end of the world. Many of these papers had lain undisturbed in the house of the Earl of Portsmouth for 250 years, which were eventually sold by Sothebys in the late 1930s. This collection of papers was purchased by Abraham Yahuda, and was stored in the Hebrew National Library. It was among these documents that the date 2060 was found. (See also Michael White's *The Last Sorcerer*, pp. 156-157).

[149] Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton*, 1981, 1983, p. 483.

[150] Arthur Koestler, *The Sleepwalkers*, p. 536.

[151] Stephen Hawking, "Person of the Century," *Time Magazine*, December 31, 1999. *Time* lavished praise on Einstein with such phrases as: "first among the century's giants," "its greatest scientific genius," "the person who, for better or worse, personified our times and will be recorded in history as having the most lasting significance," "the world's first scientific celebrity," "the century's greatest thinker," and "the patron saint of distracted schoolkids." Such unqualified admiration for Einstein is quite sacrosanct in the scientific field. In the book *Einstein's Unfinished Symphony* by Marcia Bartusiak (New York, Berkley Books, 2000, p. 4), MIT scientist Rainer Weiss, working on the federally funded LIGO system to test for gravity waves to confirm General Relativity, is quoted as saying: "The worship of Einstein, it's the only reason we're here, if you want to know the truth." Incidentally, Bartusiak's book is titled "Unfinished Symphony" because, of all the LIGO systems built across the world, no one has ever detected General Relativity's "gravitational wave" (*ibid*., p. 10).

[152] Helen Dukas had motivation to do so, since she met Einstein in 1928 when Einstein's second marriage [to his cousin Elsa Löwenthal] was rapidly deteriorating, of which Elsa "sought as far as possible to block the subject of infidelity from her mind" (*The Private Lives of Albert Einstein*, p. 210). Zackheim adds: "Hans Albert suspected they were lovers. His allegation was fortified by the proximity of her room in Princeton – just off Albert's study and down the hall from Elsa's. In addition, Einstein left Dukas more money in his will than any other member of his blood family, as well the net income from his royalties and copyright fees and all his books and personal effects" (*Einstein's Daughter: The Search for Lieserl*, p. 253). Highfield and Carter add: "Dukas became fiercely loyal to her employer: she was liable to attack as 'dung' any biography that dared shed light on Einstein's personal life, and she saw newsmen as her 'natural enemies'" (*The Private Lives of Albert Einstein*, p. 211).

Einstein's misdeeds began early in his career. He fathered a daughter out of wedlock with Mileva Marić, although the couple eventually married. They named the child Lieserl, but that is all the attention she would ever receive from Einstein. He persuaded Mileva to give the child to an orphanage so that he could avoid the social repercussions of having an illegitimate daughter. He handled it as a mere business transaction, for he never saw Lieserl face-to-face. As biographer Michele Zackheim explains it:

> Einstein scholars have concluded from his September 19 [1903] letter that the couple had decided to put Lieserl up for adoption, based on Albert's concern that the child's registration (or lack thereof) not be a source of trouble for her – or her parents – in the years to come….Apparently, in the end, Albert and Mileva agreed it would be best to pretend that Lieserl had never existed. And so, with a deliberate hand, the short life of Lieserl Einstein-Marić was erased.[153]

That such callousness wasn't merely an incidental quirk is demonstrated when Einstein later forsook his son Eduard and consigned him to a sanatorium so that he could be relieved of the financial responsibility of Eduard's care and take full advantage of the public funding available. Eduard eventually died in the sanatorium.[154]

Einstein's indifference to his children, however, was overshadowed by the animosity he showed to his wife. According to the divorce papers, Mileva was the victim of physical violence in the marriage, and Einstein's adultery was the final straw that led to the legal separation in 1914 and final divorce in 1919.[155] As the marriage to Mileva began to

[153] *Einstein's Daughter: The Search for Lieserl*, pp. 52-53. Zackheim also concludes from her massive evidence that Lieserl had a severe mental handicap, which helped seal the Einsteins' decision, and that she died at twenty-one months old, on September 21, 1903. Mileva's father was given the task of making sure that no official records concerning her short life remained in any governmental or church repositories (*ibid*., pp. 276-277). Highfield and Carter describe the situation: "There is no evidence that Einstein and his daughter ever set eyes on one another. For all his apparent enthusiasm after the birth, it seems that his main concern was to free himself of this burden at the earliest opportunity. Lieserl's existence was kept hidden even from his closest friends, and within months she had disappeared from his life without trace. Einstein was never to talk of her publicly, and Lieserl might have been erased from history had it not been for the discovery of his letters to Mileva by the Einstein papers project….The dangers that seemed to preoccupy him were unconnected to the child's illness: his question about registration strongly suggests that she was being surrendered for adoption, and that Einstein was eager to cover his tracks. The lack of any official record of the birth would appear to be a tribute to the thoroughness of the precautions that he referred to. Lieserl's birth posed a threat to Einstein's new start as a patent examiner in Berne. He had gained Swiss citizenship only a year earlier, and the stigma of an illegitimate child would have harmed his prospects…The couple's meager income may have provided another motive for giving the child away…" (*The Private Lives of Albert Einstein*, pp. 88-90).

[154] Mileva wrote to Albert: "'You have here a dear, seriously ill child. Often he asks if his father will come, and with each postponement, he becomes even more morose. He is terribly wounded.' Albert refused to come back to Zurich to see Eduard. And he refused to acknowledge the financial and psychological battles that Mileva had to wage over his care" (*Einstein's Daughter*, p. 190).

[155] Zackheim writes: "He tended to have a few romances going at once, but after Mileva, he was known to prefer simpler women" (*Einstein's Daughter*, p. 227). Highfield and Carter write: "Einstein was obliged to admit in his legal submissions that he had committed adultery. There were also references to fierce fights between him and his wife, which had made their continued marriage intolerable" (*The Private Lives of Albert Einstein*, p. 188). Zackheim gives the wording of the deposition from Einstein's own hand: "…It is true that I have committed adultery. I have been living for approximately four and one-half years with my cousin, the widow Elsa Löwenthal, and since then I have had intimate relations with her. My wife, the plaintiff, has been informed that I have had intimate relations with my cousin since the summer of 1914" (*Einstein's Daughter*, p. 87). In a related incident, the biographers add: "The following day Lisbeth and her mother visited Mileva and found her face badly swollen. It seems that Lisbeth may have been suggesting that Mileva had been beaten. Einstein was a powerful man and, for what it is worth, Hans Albert recalled that when he misbehaved his father 'beat me up'. …. It is known that Einstein's divorce papers – which remain under seal in Jerusalem – refer to violence within the marriage" (*The Private Lives of Albert Einstein*, pp. 153-154; See also *Einstein's Daughter*, p. 73). After Mileva suspected an affair between Albert and Anna Meyer-Schmid, Albert complained that this "was typical in a woman of such 'uncommon ugliness,'" adding, "Professor John Stachel says this remark was the first to shock him as he worked through Einstein's papers after his appointment as their editor" (*Private Lives*, pp. 125-126). Mileva describes herself as "starved for love" as

deteriorate, "Einstein established himself in a bachelor apartment around the corner from Elsa," his cousin and next love interest, whom he eventually married in 1919, only four months after his divorce.[156] In one of his more audacious moves, Einstein had actually pleaded with Mileva to allow him to marry Elsa, using as his excuse that Elsa's daughter "…had to suffer from rumors that have been circulating regarding my relationship with her mother. That weighs upon me and needs to be remedied through a formal marriage."[157] If this had been the real motive for Einstein's pleading, we might be tempted to conclude that he was merely a deranged individual who had lost touch with reality. The real truth is even more sinister and shocking. The thirty-nine-year-old Einstein was actually in a debate with himself whether he should marry Elsa or her twenty-year-old daughter, Ilse, while all along he had been shacking up with Elsa (for the four years prior), and while still married to Mileva. As Zackheim explains:

> Albert was not being honest [with Milvea]. By May [1918], he had made it clear that he wanted to marry Elsa's daughter Ilse. Ilse reported to a friend, Georg Nicolai: "Yesterday, suddenly the question was raised about whether A[lbert] wished to marry Mama or me…A[lbert] himself is refusing to take any decision, he is prepared to marry either Mama or me. I know that A[lbert] loves me very much, perhaps more than any other man ever will, he also told me so himself yesterday…"[158]

In the waning months of his time with Mileva, records made public in 1996 show that Einstein gave her a list of conditions in order for her to remain under his financial care:

> (A) You will see to it: (1) that my clothes and linen are kept in order; (2) that I am served three regular meals a day in my room; (3) that my bedroom and study are always kept in good order and that my desk is not touched by anyone other than me.
>
> (B) You will renounce all personal relationships with me, except when these are required to keep up social appearances. In particular, you will not request: (1) that I sit with you at home; (2) that I go out with you or travel with you.
>
> (C) You will promise explicitly to observe the following point in any contact with me: (1) You will expect no affection from me and you will not reproach me for this; (2) You must answer me at once when I speak to you; (3) You must leave my bedroom or study at once without protesting when I ask you to go; (4) You will promise not to denigrate me in the eyes of the children, either by word or deed.[159]

early as 1900 (*ibid*., p. 128). See also *In Albert's Shadow: The Life and Letters of Mileva Marić*, pp. 16-17.

[156] *The Private Lives of Albert Einstein*, p. 172. Yet, Highfield and Carter add: "But there is no evidence that Mileva believed her husband was about to be stolen from her, battered though their marriage was. Einstein…had no plans to leave her. Instead he intended to pursue his affair while remaining her husband. … He remarked to Elsa 'But the order is always to pretend. Only when we are born and when we die are we permitted to act in an honest way'" (*The Private Lives of Albert Einstein*, pp. 163-164); "Mileva would remain a virtual invalid for three years after Albert's decision to end the marriage…" (*In Albert's Shadow*, p. 19). Prior to his involvement with Elsa, Einstein had a short fling with Paula Einstein, Elsa's sister, but soon ended the relationship. He then wondered why he had become involved with her, settling for the rationale that "she was young, a girl, and complaisant. That was enough" (*Einstein's Daughter*, p. 72).

[157] *Einstein's Daughter*, p. 85.

[158] *Einstein's Daughter*, pp. 85-86. Zackheim adds: "At the top of the letter, Ilse had written, 'Please destroy this letter immediately after reading it!'" Shortly after Ilse wrote this letter, Albert wrote to Mileva and told her that he had changed his mind about coming to see the boys in the summer. Instead, he had decided to go to Ahrenshoop, a remote village on the Baltic Sea, with Elsa, Ilse, and Ilse's younger sister, Margot" (*ibid*., p. 86). Sixteen years later when Ilse lay dying of cancer in Paris at age 34, Elsa asked Albert to go to her bedside but he refused (*A World Without Time: The Forgotten Legacy of Gödel and Einstein*, p. 148).

[159] *London Daily Telegraph*, October 30, 1996; *Einstein's Daughter*, p. 77. In one of his love letters to Elsa, Einstein wrote: "I treat my wife as an employee whom I cannot

Mileva was apparently no fool. A few months after receiving the above letter she moved to Zurich with her children and never returned to Einstein.

Things fared no better for Elsa, the eventual winner of the 'Elsa versus Ilse' contest. Einstein persuaded Elsa to divorce her husband, Max Löwenthal, so that the two lovers could marry. But this marriage shortly began to deteriorate due to Einstein's sexual affairs. According to one biographer, "she told him he could have a woman on the side, but only one at a time,"[160] and to her dismay, Einstein's adultery was, indeed, serial.[161] As he had with Mileva, Einstein recast their relationship as one of mere convenience. She died in 1936, nineteen years before Einstein.

It is amazing to read what other scientists say about this part of Einstein's life. We encounter nothing short of a willful moral blindness to his immoral exploits. For example, Ludwik Kostro, concealing any unethical behavior on the part of Einstein, writes:

> His wife and two sons left him soon after that, moving back to Zürich, and it was a shock to him. After she left him, he rented a bachelor flat at 13 Wittelsbach-erstrasse.[162]

Yet perhaps the reason Kostro writes such a biased description is that he is merely citing one of the chief biographies of Einstein, which is itself a systematic and deliberate attempt to conceal Einstein's improprieties. The book is *Subtle is the Lord* written by Abraham Pais.[163] The mere title implies that Pais set out to idolize Einstein and make it appear as if his theories were divinely endorsed, if not inspired. Although Roger Penrose is honest enough in the Foreword to admit that: "Einstein was certainly no saint,"[164] his penetration stops there, and following him, Pais fails to mention even one incident of Einstein's unethical or immoral behavior in his entire 552 page treatise. Whenever accusations of plagiarism surface against Einstein, Pais invariably makes it appear as if Einstein miraculously and coincidentally came to the same discovery by his own independent study. Whenever Einstein is guilty of abandoning his family, Pais invariably makes it appear as if Einstein is a dedicated father who is misunderstood. Whenever Einstein is guilty of adultery, Pais glosses over it and divulges no such improprieties. Instead he makes Einstein's wives appear as if they are neurotic, referring to Mileva as a "difficult woman, distrustful of other people and given to spells of melancholy,"[165] but never making so much as a suggestion that she might have fallen into such mistrust and depression because her husband was committing heinous sins against her and the family.

Pais is not alone in his exoneration of Einstein. Gerald Holton, the Harvard physicist and scientific historian excuses Einstein's behavior as a mere product of his times. He writes:

> You have to keep in mind that in Europe at the time, for a pursued charismatic man, his behavior wasn't so unusual. Moreover, the letters show that it was generally he who asked to end such [adulterous] relationships.[166]

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fire. I have my own bedroom and avoid being alone with her" (*Einstein's Daughter*, p. 73).

[160] From biographer Michael Shara, *Discover*, Sept. 2004, pp. 29-30. Highfield and Carter write: "It has to be said that Elsa was not the only one of Einstein's female relatives to catch his eye. It appears that, either during this trip or some time earlier, he had also flirted with her younger sister, Paula" (*The Private Lives of Albert Einstein*, p. 148).

[161] Highfield and Carter note: "Einstein joked that he preferred 'silent vice to ostentatious virtue,' but there was little that was furtive about his affairs. Either they were conducted in open view, or easy clues were left for Elsa to discover. Another incident…gives the impression that Einstein was eager for his wife to know what he was up to…" (*The Private Lives of Albert Einstein*, p. 209).

[162] *Einstein and the Ether*, Aperion, 2000, p. 57.

[163] Abraham Pais, *Subtle is the Lord: The Science and Life of Albert Einstein*, 1982, 2005. Kostro cites pp. 224, 240.

[164] *Ibid*., p. ix.

[165] *Ibid*., p. 301. Pais complete description of these events is limited to pages 300-301. The reader would simply have no inkling to Einstein's malice upon reading Pais' biography.

[166] "Einstein's Theory of Fidelity," *Discover*, October 2006, p. 48. The last of Einstein's love letters were released in the summer of 2006 which, at the request of his stepdaughter, Margot, was to be initiated twenty years after her death.

In addition to his sexual escapades, Einstein was suspected of plagiarism, as well as failing to give scientific credit to Mileva who helped him develop his Relativity theories.[167] As we noted in Vol. 1, Appendix 2, one of the biggest myths surrounding the aura of Einstein is that he was the inventor of the famous $E=mc^2$ formula. In actuality, there were at least a dozen scientists who had either developed or employed the formula prior to Einstein.

Other instances of Einstein's outright plagiarism abound. Although Abraham Pais does his best either to minimize or to make these incidents coincidental, the facts speak for themselves.[168] One of the more notable instances occurs in September 1924. At a meeting of famous physicists Einstein proposed that the community investigate interference and diffraction phenomena with molecular beams. Louis de Broglie, however, had already been working on the idea for quite a while and eventually published a paper on it in November 1924. As it turns out, de Broglie had sent a copy of the unpublished manuscript to Paul Langevin some months earlier, and Langevin had passed it to Einstein, whereupon Pais records Einstein's reaction that de Broglie's ideas "seemed quite interesting to him."[169] Obviously, Einstein obtained the notion of searching for "interference and diffraction phenomena with molecular beams" from de Broglie's unpublished paper, but he failed to mention de Broglie's work to the September 1924 audience of physicists, thus leaving the impression that this was all his idea. De Broglie himself says: "I am certain that Einstein knew of my Thèse since the spring of 1924."[170] In the face of all this weighty circumstantial evidence, Pais, as he is prone to do in his biography, glosses over them and concludes: "Thus, Einstein was not only one of the three fathers of the quantum theory, but also the sole godfather of wave mechanics."[171]

Physically speaking, the youthful Einstein was the epitome of strength, vigor, and good looks. But as the years wore on, Einstein became grossly unhygienic, refusing to brush his teeth or even change his clothes. The image of the unkempt, wire-haired professor is not the prop of a Hollywood producer but the symptoms of a man who was loosing his grip on life.[172]

Eventually, the promiscuous lifestyle of his earlier years may have finally caught up with him. Einstein's personal doctor, János Plesch, who knew him quite well, concluded that he died of syphilis, demonstrating from the results of the autopsy that the abdominal aneurysm that took his life is always associated with the tertiary stage of syphilis, which can be 25 years or longer from time of onset. Historians Highfield and Carter write that, in an April 18, 1955 letter to his son Peter, Plesch, remarking on Einstein's sexual escapades, stated:

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[167] Highfield and Carter note: "As he grew older, Einstein had begun to express some very bitter feelings towards the opposite sex" (*The Private Lives of Albert Einstein*, p. 209). On the accusations of plagiarism, see C. J. Bjerknes, *Albert Einstein: The Incorrigible Plagiarist*, 2002; R. Carroll, "Einstein's E = mc^2 'was Italian's idea,'" *The Guardian*, Nov. 11, 1999; G. H. Keswani, "Origin and Concept of Relativity," *British Journal of the Philosophical Society*, 15:286-306, 1965; Richard Moody, Jr., "Plagiarism Personified," *Mensa Bulletin*, 442, Feb.: 5, 2001; *The Private Lives of Albert Einstein*, pp. 108-109.

[168] Abraham Pais, *Subtle is the Lord: The Science and the Life of Albert Einstein,* 1982, 2005. Pais claims Einstein's ignorance in many instances: "In 1905, at that time [he was] aware only of Lorentz's writing up to 1895" (*ibid*., p. 21); "…in the period of 1902-04…his knowledge of the writings of Ludwig Boltzmann was fragmentary and he was not at all aware of the treatise by Josiah Willard Gibbs" (*ibid*., p. 55); "In 1905, Einstein was blissfully unaware of the detailed history of Brownian motion. At that time, he knew neither Poincaré's work on relativity…" (*ibid*., p. 94); "By a quite remarkable coincidence, Eq. 5.12 was discovered in Australia at practically the same time Einstein did his thesis work. In March 1905 William Sutherland submitted a paper that contained the identical result…" (*ibid*., p. 92); and claims that Einstein knew nothing of the work of David Hilbert: "Five days earlier, David Hilbert had submitted a paper…which contained the identical equation but with one qualification. Einstein, having learned the hard way from his mistakes a few weeks earlier…" (*ibid*., p. 257), yet in all these cases Einstein's work contains other men's ideas and equations.

[169] *Subtle is the Lord*, p. 438.

[170] Letter to Abraham Pais from Louis de Broglie, September 26, 1978, cited in *Subtle is the Lord*, p.438.

[171] *Subtle is the Lord*, p. 438.

[172] *The Private Lives of Albert Einstein*, Robert Highfield and Paul Carter, 1993, pp. 59-217; *In Albert's Shadow: The Life and Letters of Mileva Marić*, ed. Milan Popocić, 2003, pp. 16-27; "Whose Relativity Was It, Anyway?" Patricia Nemo, *College of St. Thomas Magazine*, Spring 1990, pp. 22-25; "Sex-mad Father of Relativity left family out of equation," *London Daily Telegraph*, Anthea Hall, July 25, 1993; "Relatively imperfect genius," *Jewish Chronicle*, Monica Porter, August 8, 1993.

> "Why shouldn't a healthy and beautiful man have had bad luck in his youthful daredevil days and contracted a lues [syphilis]?" Plesch insisted that Einstein's symptoms were entirely consistent with the disease, and boasted that in all his years of medical practice he had never once been wrong in tracing an abdominal aneurysm to this cause.[173]

Michele Zackheim's research reveals the following:

> He [Plesch] also insisted that Albert had syphilis, the 'gentlemen's disease.' "In my long medical practice I have found, almost without exception, that abdominal aneurysms which Einstein suffered from are syphilitic in origin. It might, of course, be that Einstein was exceptional in that respect too and that his aneurysm was nonspecific. However, an earlier syphilitic infection is also indicated by the fact that he suffered from extensive secondary anemia attacks…I think the infection was acquired during the interval [between his marriages]…. Even though many may shake their heads about this, I am adhering to my thesis.[174]

For the record, syphilis is purported to be the impetus for the genius, and often the eventual madness, of many notables in history (*e.g.*, Beethoven, Capone, Dostoyevsky, Goya, H. Hughes, Hitler, Joyce, Lenin, Lincoln, Mozart, Napoleon, Nietzsche, Poe, Roosevelt, Toulouse-Lautrec, van Gogh, Wilde, *et al.*).[175] Whether or not this phenomenon had anything to do with Einstein's

[173] *The Private Lives of Albert Einstein*, pp. 265-266. The biographers add: "It appears that the same thoughts may have been occupying Seelig, for the cause of the aneurysm was a point on which he had been pressing Nathan….One is tempted to wonder whether the possibility of syphilis had occurred to Nathan too. Dr. Harvey has stated that, medically speaking, Plesch 'had justification for thinking along those lines,' but added, 'It is known that tertiary syphilis does cause aneurysms, but not in this location very often'" (*ibid*., p. 266). Mileva's letters reveal that in Albert's reading of the book *Die Sexuelle Frage*, he had underlined the parts dealing with venereal disease. Zackheim notes: "this highlighted passage about venereal disease suggests that Mileva apparently worried about Albert's sexual life outside their bedroom. Furthermore, Einstein historians believe that Albert frequented prostitutes before he married, and that Mileva may have been aware of it" (*Einstein's Daughter*, p. 268). "…Janos Plesch, who described his friend [Einstein] as a man with a strong sex drive… 'in the choice of sex partners he was not too discriminating,' wrote Plesch… 'Einstein loved women, and the commoner and sweatier and smellier they were, the better he liked them'" (*The Private Lives of Albert Einstein*, p. 206); "Einstein was also voicing deep misgivings about the institution of holy matrimony. He told Plesch that it must have been invented 'by an unimaginative pig,' and…it was 'slavery in a cultural garment'" (*ibid*., p. 210). Deborah Hayden's article, titled "Syphilis in the Einstein Factory," says that the interest level from other biographers regarding the possibility that Einstein contracted syphilis is practically nil. In order to protect Einstein, most have ignored or ridiculed the suggestion, yet Einstein's numerous sexual affairs remain an open book. Some doctors claim that abdominal aneurysms are not all caused by syphilis although they admit that many cases are (from a 6-17-05 letter to me from Deborah Hayden on file, used with permission).

[174] *Einstein's Daughter: The Search for Lieserl*, p. 255. Zackheim adds: "Dr. János Plesch had maintained that Albert contracted syphilis sometime between leaving Mileva and marrying Elsa. But Albert could have contracted the disease prior to 1910, when he began to exhibit active interest in other women. If Albert had contracted syphilis before Mileva became pregnant with Eduard, in November 1909, or even before Lieserl was born, in 1902, he might have passed the syphilis to Mileva, who could have been a latent carrier. She, in turn, could have passed it to a baby *in utero*. The closer to conception that the mother is infected, the greater the risk of congenital syphilis in the fetus, which can result in a variety of birth defects from skin lesions to a failure to thrive to an enlarged liver and spleen to mental retardation. But with a mother who is a latent carrier, a healthy child can be born between two syphilitic children. Hans Albert, Mileva and Albert's only healthy offspring, was a middle child" (*ibid*., p. 268). Despite his candidness about Einstein's syphilis, Plesch had written a much softer biography of Einstein, after having discussed its contents with Einstein. In remarking on the book, Plesch tells Einstein: "You can believe me that while I was writing these seven hundred pages, I was laughing a lot about how marvelously we are all trained to lie and how little human beings are allowed to state the truth. Our good Ibsen hit the nail on the head when he said, 'Take somebody's life lie away and you will take away his whole life.' The book is written with this compromise" (*ibid*., p. 249). Unfortunately, the publisher destroyed the book.

[175] *Pox: Genius, Madness and the Mysteries of Syphilis*, Deborah Hayden, 2003, p. 306f.

fantastic Relativity theories, we do not have enough evidence to make a firm conclusion, but the possibility certainly exists.

On the religious side of things, Mileva and her children converted to Catholicism in 1905, a fact little advertised by the secular press, then or now.[176] The year 1905, of course, was when his Relativity theory was introduced to the scientific community. Unmoved by his wife's religious life, Einstein wrote to his confidante Professor Hurwitz: "They've turned Catholic. Well, it's all the same to me."[177]

Einstein was, for all intents and purposes, an atheist.[178] Any notions he had of God were of an entity completely impersonal and uninvolved with human affairs. In one letter he wrote: "The word God is for me nothing more than the expression and product of human weaknesses, the Bible a collection of honorable but still primitive legends which are nevertheless pretty childish."[179] His closest friends and colleagues, such as "the Austrian socialist Friedrich Adler or the members of the 'Olympia Academy' in Berne, Maurice Solovine, Conrad Habicht, and Michel Angelo Besso…For all of them, the ideologies of Marx and Mach replaced the religion of the Bible."[180] His path toward allowing science to unseat Scripture and the Church as the ultimate authority for any intellectual endeavor that crossed its domain had begun very early in his life. After receiving instruction at Bavarian schools, which included teaching on the Catholic faith (and in particular the traditional six-day creation), "at the age of twelve…he suddenly became completely irreligious."[181] Einstein later reflected:

> Through the reading of popular scientific books I soon reached the conviction that much in the stories of the Bible could not be true. The consequence was a positively fanatic [orgy of] free thinking coupled with the impression that youth is intentionally being deceived by the state through lies; it was a crushing impression. Suspicion against every kind of authority grew out of this experience, a skeptical attitude towards the convictions which were alive in any specific social environment – an attitude which has never again left me…[182]

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[176] *Einstein: The Life and Times*, Ronald W. Clark, p. 139.

[177] *Einstein: Life and Times*, p. 139. When Einstein reached his heyday in the world, Cardinal O'Connell of Boston concluded that Relativity theory "cloaked the ghastly apparition of atheism" and "befogged speculation, producing universal doubt about God and His Creation" (*ibid*. p. 502).

[178] *The Private Lives of Albert Einstein*, p. 18. The authors write: "Einstein's views were atheistic in almost every important respect. He found it impossible to conceive of a personal deity, had no belief in an afterlife and considered morality an entirely man-made affair. His worship of cosmic harmony was genuine; his claims that this was the face of God were at best benign affectation." Highfield and Carter add that Einstein's pupil in Zurich, David Reichinstein, writes of a "Messiah-feeling" unfolding in Einstein's psyche, so much so that "his account contains dark hints that Einstein's arrogance bordered on hubris" (*ibid*., p. 127). "Einstein was well aware that his harsh attitude disturbed people" (*ibid*., p. 180). After quoting Einstein's statements: "I'm not an atheist, and I don't think I can call myself a pantheist….I am fascinated by Spinoza's pantheism….I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with fates and actions of human being," Max Jammer concludes that Einstein was a "practical atheist" because "there is no difference between there being no God to bother about man, and there being a God who does not concern himself with the fates and actions of human beings" (*Einstein and Religion*, pp. 48-50).

[179] Letter wrote in 1954 to the philosopher Eric Gutkind, which recently sold for $404,000 at an auction in London (*New York Times*, May 17, 2008, Dennis Overbye). As for his own race, the Jews, Einstein wrote in the same letter: "As far as my experience goes they are also no better than other human groups, although they are protected from the worst cancers by a lack of power. Otherwise I cannot see anything 'chosen' about them."

[180] Max Jammer, *Einstein and Religion*, p. 29. Jammer adds: "Some authors assign these ideological influences a crucial role in Einstein's intellectual development and regard them, in particular, as the driving force for his creation of the theory of relativity" (*ibid*).

[181] Max Jammer, *Einstein and Religion*, p. 24.

[182] Max Jammer, *Einstein and Religion*, p. 25. Jammer adds: "An immediate consequence of this change of mind was the fact that Einstein refused to become bar mitzvahed…[which] even liberal Jews regard it as a precept that must be obeyed….As far as we know, Einstein never attended religious service and never prayed in a synagogue or at any other place of worship….Einstein's last wish was not to be buried in the Jewish tradition, but to be cremated and his ashes

At another time he said: "It is quite possible that we can do greater things than Jesus, for what is written in the Bible about him is poetically embellished."[183] Obviously, Scripture's insistence on an Earth-centered cosmos is one idea Einstein had long ago dismissed as a childish fantasy. This presupposition is noted in an address to Princeton Theological Seminary (a seminary which by this time had become very liberal in its theology, denying the inerrancy of Scripture and the literal interpretation of Genesis to make room for the theory of evolution) to which Einstein stated:

> For example, a conflict arises when a religious community insists on the absolute truthfulness of all statements recorded in the Bible. This means an intervention on the part of religion into the sphere of science; this is where the struggle of the Church against the doctrines of Galileo and Darwin belongs.[184]

Einstein excused his immoral life as mere "stupidities" and blamed God for creating him:

> I see only with deep regret that God punishes so many of his children for their numerous stupidities, for which he himself can be held responsible; in my opinion, only his nonexistence could excuse him.[185]

Yet Einstein would later modify his position:

> In view of such harmony in the cosmos which I, with my limited human mind, am able to recognize, there are yet people who say there is no God. But what makes me really angry is that they quote me for support of such views.[186]

At times Einstein wrestled with the concept of God. In one of his later works he writes:

> The idea of God in the religions taught at present is a sublimation of that old concept of the gods. Its anthropomorphic character is shown, for instance, by the fact that men appeal to the Divine Being in prayers and plead for the fulfillment of their wishes. Nobody, certainly, will deny that the idea of the experience of an omnipotent, just, and omnibeneficent personal God is able to accord man solace, help, and guidance; also, by virtue of its simplicity it is accessible to the most undeveloped mind. But, on the other hand, there are decisive weaknesses attached to this idea in itself, which have been painfully felt since the beginning of history. That is, if this being is omnipotent, then every occurrence, including every human action, every thought, and every human feeling and aspiration is also His work; how is it possible to think of holding men responsible for their deeds and thoughts before such an almighty Being? In giving out punishment and rewards He would to a certain extent be passing judgment on Himself. How can this be combined with the goodness and righteousness ascribed to Him. The main source of the present-day conflicts between the spheres of religion and of science lies in this concept of a personal God.[187]

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scattered, indicating that he disregarded religious rituals until his death on 18 April 1955" (*ibid*., pp. 25, 27).

[183] Quoted in W. Hermanns, "A Talk with Einstein," October 1943. Einstein archive 55-285. Cited in *The Expanded Quotable Einstein*, p. 215.

[184] Albert Einstein, *Ideas and Opinions*, 1984, p. 45.

[185] To Edgar Meyer, a Swiss colleague, January 2, 1915. CPAE, Vol. 8, Doc. 44, *The Expanded Quotable Einstein*, 2000, p. 201.

[186] To a German anti-Nazi diplomat and author, Hubertus zu Löwenstein around 1941. Quoted in Löwenstein's book *Towards the Further Shore*, London, 1968, p. 156. Cited in the *Expanded Quotable Einstein*, p. 214.

[187] Albert Einstein, *Out of My Later Years*, 1950, p. 27; and Albert Einstein, *Ideas and Opinions*, 1984, pp. 46-47. In his book *The World as I See It*, Einstein writes: "I cannot conceive of a God who rewards and punishes his creatures, or has a will of the kind that we experience in ourselves. Neither can I nor would I want to conceive of an individual that survives his physical death; let feeble souls, from fear or absurd egoism, cherish such thoughts. I am satisfied with the mystery of the eternity of life and with the awareness and a glimpse of the marvelous structure of the existing world, together with the devoted striving to comprehend a portion, be it ever so tiny, of the Reason that manifests itself in nature" (Citadel Press, translated by Alan Harris, 1956, 1984, originally published in 1934).

This rationale for being an agnostic is ironic, in a way, since the complaint of not being able to combine God's omnipotence with man's free will comes from a man who had little problem combining the hitherto incompatible entities of space and time, energy and mass, inertia and gravity, and matter and antimatter. In fact, Einstein was known for trying to simplify things by combining them, as he sought, although in vain, for his Unified Field Theory. As Einstein himself admits about the methodology:

> [Science] seeks to reduce the connections discovered to the smallest possible number of mutually independent conceptual elements. It is in this striving after the rational unification of the manifold that it encounters its greatest successes…[188]

So why someone who spent his whole life combining incompatible things would suddenly falter when it involved a unification between God's will and man's will, is surprising. Perhaps, with Einstein's apparent fear of being held responsible for his "deeds and thoughts" and having to face the Almighty's "reward and punishment," he is echoing the deepest motives of all men who suppress the evidence of His existence in order to make themselves appear autonomous.

Einstein assured his followers that he, indeed, did not believe in a personal God, and, in fact, had no religious leanings other than, perhaps, the "structure of the world."

> It was, of course, a lie what you read about my religious convictions, a lie which is being systematically repeated. I do not believe in a personal God and I have never denied this but have expressed it clearly. If something is in me which can be called religious then it is the unbounded admiration for the structure of the world so far as our science can reveal it.[189]

His own reasons for rejecting a personal God are stated quite clearly. Albert Einstein was a humanist who gave no credence to the divine. This is summed up in one short sentence of his: "There is nothing divine about morality, it is a purely human affair."[190] He elaborates on this conviction in the following paragraph:

> To be sure, the doctrine of a personal God interfering with natural events could never be refuted, in the real sense, by science, for this doctrine can always take refuge in those domains in which scientific knowledge has not yet been able to set foot. But I am persuaded that such behavior on the part of the representatives of religion would not only be unworthy but also fatal. For a doctrine which is able to maintain itself not in clear light but only in the dark, will of necessity lose its effect on mankind, with incalculable harm to human progress. In their struggle for the ethical

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[188] Albert Einstein*, Ideas and Opinions*, 1984, p. 49.

[189] *Albert Einstein: The Human Side*, editors: Banesh Hoffman and Helen Dukas, 1981. In the same source, Einstein is quoted as saying: "I do not believe in immortality of the individual, and I consider ethics to be an exclusively human concern with no superhuman authority behind it." To a child who asked if scientists prayed, Einstein responded: "Scientific research is based on the idea that everything that takes place is determined by laws of nature, and therefore this holds for the action of people. For this reason, a research scientist will hardly be inclined to believe that events could be influenced by a prayer, *i.e.* by a wish addressed to a Supernatural Being." Einstein had a particular animosity for the Catholic Church. Another book by the same editors, *Albert Einstein: Creator and Rebel*, contains anecdotes that appear to be for the purpose of creating a cult following for Einstein. Other remarks from Einstein about God include: "Everything is determined, the beginning as well as the end, by forces over which we have no control. It is determined for the insect as well as for the star. Human beings, vegetables, or cosmic dust, we all dance to a mysterious tune, intoned in the distance by an invisible piper" (*Einstein: The Life and Times*, p. 422). In 1921 he replied to a Jewish rabbi: "I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with fates and actions of human beings" (*Einstein: The Life and Times*, p. 502). More to the point, Einstein writes: "I cannot conceive of a God who rewards and punishes his creatures, or has a will of the type of which we are conscious in ourselves. An individual who should survive his physical death is also beyond my comprehension, nor do I wish it otherwise; such notions are for the fears or absurd egoism of feeble souls" (*The World As I See It*, Citadel Press, 1956, 1984, p. 5); "The Jewish God is simply a negation of superstition, an imaginary result of its elimination" (*ibid*., p. 91).

[190] Albert Einstein, *The World As I See It*, translated by Alan Harris, 1956, 1984, p. 29.

> good, teachers of religion must have the stature to give up the doctrine of a personal God, that is, give up that source of fear and hope which in the past placed such vast power in the hands of priests. In their labors they will have to avail themselves of those forces which are capable of cultivating the Good, the True, and the Beautiful in humanity itself. This is, to be sure, a more difficult but an incomparably more worthy task.[191]

All of this, of course, reflects on Einstein's moral life. Instead of allowing the awe-inspiring complexities of the universe to bring him to the foot of God's throne in humble submission, science becomes the insulation to keep him away from God, so that in the end Einstein becomes his own god. In 1930 he wrote the following:

> When one views the matter historically one is inclined to look upon science and religion as irreconcilable antagonists, and for a very obvious reason. The man who is thoroughly convinced of the universal operation of the law of causation cannot for a moment entertain the idea of a being who interferes in the course of events—that is, if he takes the hypothesis of causality really seriously. He has no use for the religion of fear and equally little for social or moral religion. A God who rewards and punishes is inconceivable to him for the simple reason that a man's actions are determined by necessity, external and internal, so that in God's eyes he cannot be responsible, any more than an inanimate object is responsible for the motions it goes through. Hence science has been charged with undermining morality, but the charge is unjust. A man's ethical behavior should be based effectually on sympathy, education, and social ties and needs; no religious basis is necessary. Man would indeed be in a poor way if he had to be restrained by fear of punishment and hope of reward after death."[192]

Conclusion

In closing this chapter, let us be certain to add that, in spite of the harsh criticisms we levy against the conclusions of modern scientists, we are not disparaging their intellects or their place as human beings. The halls of science house some of the most intelligent men this world has ever known. One glance at their massive treatises and equations tells us that we are not dealing with ordinary human beings. Most of these men are geniuses. But the sad fact is, it doesn't matter how smart you are, how many books you've written, what chairs of science or mathematics you hold, how many Nobel prizes you've won, or how popular you are. The difficult but undeniable truth is: if you start out with the wrong premise, you are going to end up with the wrong conclusion. With the wrong answers, as the saying goes, 'you may be able to fool some of the people some of the time, but you cannot fool all the people all of the time.' The advantage this work has is that it starts with the right premise, for it obtained that premise from divine revelation and was not afraid to accept it at face value, and now all that is left is to work backwards, as it were, and verify the premise by using the very tools with which modern man prides himself: science, math, and logic. As Scripture assures us: "But thou hast arranged all things by measure and number and weight."[193]

Perhaps there may be a few who will see the truth, yet the world's scientists, by and large, are the last on our list of concerns. We do not expect those whose careers, salaries, and Nobel Prizes depend upon supporting Copernicanism, Evolution, and Relativity to their dying day, will ever consider that the Earth is motionless and in the center of the universe. As noted earlier, an immobile Earth in the center of the universe would destroy all three legs of *Scientism's* stool in one fell swoop. Sadly, rather than prompting such men to lift their eyes in awe, the information gathered herein may only serve to harden their hearts even more, and thus serve as a testimony against them when they meet their Maker. As such, our book is geared to the next generation of

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[191] Albert Einstein, *Ideas and Opinions*, 1984, p. 48.

[192] Albert Einstein, "Religion and Science," *New York Times Magazine*, November 9, 1930; as originally stated in *The World As I See It*, p. 27. Einstein adds: "Our actions should be based on the ever-present awareness that human beings in their thinking, feeling, and acting are not free but are just as causally bound as the stars in their motion" (Statement to the Spinoza Society of America, Sept. 22, 1932. Einstein Archive 33-291, cited in *The Expanded Quotable Einstein*, p. 209).

[193] Wisdom 11:20 [Douay-Rheims: 11:21].

scientists and theologians who are tired of the cosmological shell game that has been going on for the last several centuries.

Furthermore, in order to curb impudent clever persons, the synod decrees that no one who relies on his own judgment in matters of faith and morals, which pertain to the building up of Christian doctrine, and that no one who distorts the Sacred Scripture according to his own opinions, shall dare to interpret the said Sacred Scripture contrary to that sense which is held by Holy Mother Church, whose duty it is to judge regarding the true sense and interpretation of Holy Scriptures, or even contrary to the unanimous consent of the Fathers, even though interpretations of this kind were never intended to be brought to light.[194]

The Council of Trent, Fourth Session, 1563

The Apostolic and ecclesiastical traditions and all other observances and constitutions of that same Church I most firmly admit and embrace. I likewise accept Holy Scripture according to that sense which our Holy Mother Church had held and does hold, whose it is to judge of the true meaning and interpretation of the Sacred Scriptures; I shall never accept nor interpret it otherwise than in accordance with the unanimous consent of the Fathers.

The Profession of Faith of the Council of Trent[195]

"The main source of the present-day conflicts between the spheres of religion and of science lies in this concept of a personal God."

Albert Einstein[196]

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[194] *The Sources of Catholic Dogma*, translated by Roy J. Deferrari, from the 13th edition of Henry Denzinger's *Enchiridion Symbolorum*, Loreto Publications, 1954, p. 245, ¶ 786.

[195] *Ibid*., p. 303, ¶ 995. Giovanni Riccioli, S. J., notes that it was the daily routine of Jesuit colleges to open the school year with a recitation of the above oath on the Bible (*Almagestum novum*, Bononiae, Typis Haeredis Victorii Benatii, 1651, Part II, p. 479, as cited in *Galileo, Bellarmine and the Bible*, p. 14). Riccioli was the author of *Almagestum Novum* in 1651, the 2500-page tome that stands as the most detailed and comprehensive defense of the magisterium's condemnation of Galileo.

[196] Albert Einstein, *Ideas and Opinions*, 1954, 1984, p. 47.

Chapter 12

Scripture Passages Teaching Geocentrism

How Much Authority Does Scripture Possess?

Harvard historian I. Bernard Cohen gives us the secular world's view of the inevitable clash that would occur between Copernicanism and Scripture:

> One necessary consequence of his system was the position that the literal interpretation of Scripture cannot be the ultimate test for scientific explanation of the observed phenomenon of the world of nature around us. Like it or not, *De Revolutionibus* could not avoid constituting a challenge to authority. A significant feature of the Scientific Revolution was to base knowledge on experiment and observation and to disdain any authorities other than nature herself. The motto of the Royal Society, founded a little over a century after the publication of *De Revolutionibus*, was "Nullius in verba" (On the word of no man). Whether or not Copernicus was actually a major figure in this revolutionary tilt of knowledge away from authority, he has come to symbolize the first mover in this direction of science and it is an honorable role….In arguing for the 'reality' of his own system, and in not going along with those for whom 'reality' was not a central question, Copernicus was certainly a rebel. It is even reasonable to call him a revolutionary.[197]

Someone once said, "Scripture is not a science book." Although there is a certain degree of truth in that statement, unfortunately it has been badly misrepresented in arguments dealing with the Galileo affair. It has been used to politely take Scripture out of the jury room on whether Galileo's hypothesis was correct. Advocates of the heliocentric theory often make a glib reference to a certain Cardinal Baronius who in 1598 is said to have made the following summation of the supposed dichotomy between science and Scripture: "The Holy Spirit tells us how to get to heaven, not how the heavens go."[198] Various strains of this sentiment have been used throughout the last few centuries to silence theologians who seek to extract various truths from Scripture with which to build an understanding of the universe. For example, Catholic author George Sim Johnston writes:

> Galileo accepted the inerrancy of Scripture; but he was also mindful of Cardinal Baronius's quip that the bible "is intended to teach us how to go to heaven, not how the heavens go." And he pointed out correctly that both St. Augustine and St. Thomas Aquinas taught that the sacred writers in no way meant to teach a system of astronomy. St. Augustine wrote that:
>
> > One does not read in the Gospel that the Lord said: I will send you the Paraclete who will teach you about the course of the sun and moon. For He willed to make them Christians, not mathematicians.
>
> Unfortunately, there are still today biblical fundamentalists, both Protestant and Catholic, who do not understand this simple point: the bible is not a scientific treatise. When Christ said that the mustard seed was the smallest of seeds (and it is about the size of a speck of dust), he was not laying down a principle of botany. In fact, botanists tell us that there are smaller seeds. He was simply talking to the men of

[197] I. Bernard Cohen, *Revolution in Science*, p. 492.

[198] Galileo wrote it quite poetically in his native Italian to Madama Cristina di Lorena: "…ciò è l'intenzione dello Spirito Santo essere d'insegnarci come si vadia al cielo, e non come vadia il cielo" ("that is the intention of the Holy Spirit which is to teach us how to go to heaven, and not how the heavens go") and attributes it as coming from "Io qui direi quello che intesi da persona ecclesiastic constituita in eminentissimo grado" ("Here I refer to the understandings of an ecclesiastical person in a very eminent position"), who most suppose is Cardinal Cesare Baronio (*Le Opere di Galileo Galilei*, 1968, vol. 5, p. 319, lines 25-28).

> his time in their own language, and with reference to their own experience.[199]

It frequently occurs that in arguments defending Galileo various quotes are extracted from famous prelates and saints but often without thinking them through. Such is the case here. Although Scripture certainly does not reach the level of a science book, that does not mean it cannot, or does not, address scientific issues on various occasions. The difference is subtle, but it is very important. For example, we can all agree that the *Declaration of Independence* and the *United States Constitution* are not religious documents. Most categorize them as political documents. But every American will agree that when either of the two documents address a matter of religion, such as when the *Declaration of Independence* says: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness," all ears stop to listen, since everyone acknowledges that the *Declaration* is giving factual and authoritative statements about religion that form the basis of the country's foundation of government. The *Declaration* is certainly not a religious treatise, but it is, nevertheless, addressing an important area of religion in this particular instance, and it holds the same authority in that instance as it does when it speaks about political and governmental issues.

In the same way, although Scripture is not a science book and thus does not employ formulas such as $E = mc^2$ or $F = ma$, nevertheless, when it touches upon an area of science, men need to listen, for it is giving factual and authoritative statements that form the basis of our cosmogony and cosmology. Discovering the scientific formulas that coincide with those foundational truths has been assigned to man's labor under the six days God has given him to work by the sweat of his brow, and as such, man's science can safely complement divine revelation. Revelation does not seek to impinge upon man's freedoms and intellectual pursuits, but only to save him from the heartache and frustration of proceeding down the wrong scientific path, especially in areas regarding the creation of the world that no human being was present to witness, or with the structure of the cosmos from which no man has a high enough platform to determine which bodies are moving and which are not. As Pope St. Pius X once wrote:

> Human science gains greatly from revelation, for the latter opens out new horizons and makes known sooner other truths of the natural order, and because it opens the true road to investigation and keeps it safe from errors of application and of method. Thus does the lighthouse show many things they otherwise would not see, while it points out the rocks on which the vessel would suffer shipwreck"[200]

Or as Gregory of Nazianzus once put it:

> We, however, who extend the accuracy of the Spirit to the merest jot and tittle, will never admit the impious assertion that even the smallest matters were dealt with haphazardly by those who have recorded them.[201]

Accordingly, God drops small and precious rose petals of knowledge down from heaven to guide man in the paths of truth about the cosmos. It is only when we ignore this sweet-smelling flora that we soon go off into the myriad of conflicting theories man has concocted since the time of Copernicus, and which, as we have shown in the first volume of *Galileo Was Wrong: The Church Was Right*, are unfortunately being added to the unhealthy diet of modern science on a daily basis.

In light of these principles, Johnston's appeal to St. Augustine's statement: "I will send you the Paraclete who will teach you about the course of the sun and moon. For He willed to make them Christians, not mathematicians,"[202] actually speaks

[199] George Sim Johnston, "The Galileo Affair," *Lay Witness*, Vol. 14, No. 7, April 1993, p. 5. Johnston's claim that the mustard seed upsets the inerrancy of Scripture is shortsighted and fails to contextualize. Jesus was referring to the known seeds of the land of Palestine, for in that region the mustard seed was, indeed, the smallest seed.

[200] Pope Pius X, encyclical of March 12, 1904, *Iucunda Sane*, 35.

[201] *Orations*, II.

[202] Another version is: "we do not read in the Gospel that the Lord said: I will send you the Paraclete to teach you how the sun and moon move. Because he wished to make them Christians, not mathematicians" (Paul Newall, "The Galileo Affair," The Galilian Manuscripts Library, wwwgalilean-library.org, p. 8, citing *De Actis cum Felice Manichaeio*, I, 2).

more against Johnston's case than for it. Notice first that Augustine reaffirms that the sun and the moon move, not the Earth. Obviously, Augustine does not intend to go against all the statements he made in his other works affirming the Earth's motionlessness and the sun's movement.[203] Second, Augustine's concern regards only that the Lord did not intend to teach how the sun and moon move in their courses, not that the Lord did not intend to teach that the sun and moon move. That is, the Lord did not desire to give us detailed information as to what pushes or pulls the sun and moon around the Earth, or how it is that they keep such precise time year after year. But we can certainly conclude from the Lord's teaching that the sun and moon move. Christians don't have to become "mathematicians" in order to know the simple fact that the celestial bodies revolve around the Earth. A child could understand it. Mathematics is necessary only when one wants to calculate such things as how fast the sun and moon accomplish their appointed tasks or how far away they are from Earth. Hence, because the Lord taught them in Scripture that the sun and moon move around the Earth, it was for that very reason that St. Augustine and St. Thomas were both geocentrists, in opposition to the Greeks and Indians who were promoting heliocentrism.

Johnston's attempt to commandeer Augustine to support heliocentrism is common among Catholic authors who are seeking some way to counter the magisterium's condemnation of Copernican cosmology and Galileo's support of it in the 1600s. All these attempts, of course, are done in the face of the fact that Augustine, as we will see later, believed firmly in geocentrism and defended it vigorously. Ignoring these facts, heliocentric advocates will often appeal to Augustine's general hermeneutical principles concerning the need to be cautions when science and Scripture seem to clash, or they will take Augustine's comments out of context and make it appear as if he is saying one thing when, in fact, he is saying quite another. For example, Galileo historian, Annibale Fantoli, in his 1997 book *Galileo: For Copernicanism and for the Church*, introduces an argument from Galileo that makes it appear as if Augustine had no commitment or interest in geocentrism and would much prefer dealing with matters of salvation. Fantoli writes:

> But, comments Galileo, the mobility or stability of the Earth or of the Sun are not questions of faith or morals, and as to those who uphold the mobility of the Earth none of them has ever wished to abuse the sacred texts by making use of them to bolster his own opinion. And the opinion of the Council, Galileo adds, is in agreement with the attitude of the Fathers who considered it useless to try to solve the problems of nature, as seems to in the case of St. Augustine who, when confronted with the question as to whether the heavens are fixed or move, answered (*De Genesi ad Litteram*, L.2, c.10):
>
> > To them I answer that these things should be examined with very subtle and demanding arguments to determine truly whether or not it is so; but I do not have the time to undertake and pursue these investigations, nor should such time be available to those whom we desire to instruct for their salvation and for the needs and benefit of the Holy Church (V, 337; trans. By Finocchiaro 1989, 109).[204]

The problem is that, in context, Augustine is not talking about whether the sun revolves around the Earth, or the Earth revolves around the sun. Augustine is concerned only with the question of whether the firmament itself revolves around the Earth or if the stars revolve around the Earth while the firmament remains fixed. Chrysostom posed this very question. He posited that the heavens are immobile, but the sun and stars revolve around a fixed Earth:

> The heaven, for instance, hath remained immoveable, according as the prophet says, 'He placed the heaven as a vault, and stretched it out as a tent over the earth.' But, on the other hand, the sun with the rest of the stars, runs on his course through every day. And again, the earth is fixed, but the waters are continually in motion; and not the waters only, but the clouds,

[203] See Chapter 13 for a list of detailed citations from Augustine and other Fathers on geocentrism.

[204] Annible Fantoli, Galileo: *For Copernicanism and the Church*, translation by George V. Coyne, S. J., second edition, 1996, p. 203.

> and the frequent and successive showers, which return at their proper season.[205]

Rest assured, Augustine has no doubts that either the firmament or the stars and sun are revolving around a stationary Earth. As such, we can then understand the context of *De Genesis ad Litteram* L.2, c. 10 more clearly. Augustine writes:

> With regard to the motion of heaven, certain Christian writers have enquired whether it is in reality stationary or moving [*e.g.*, Chrysostom]. If it is moving, they say, in what sense is it a firmament? But if it is stationary, how do the heavenly bodies that are thought to be fixed in it travel from east to west and the stars of the Wain complete their smaller orbits near the north pole? They present the picture of heaven turning either like a sphere, if we suppose another axis not visible to us extending from another pivotal point, or like a disk, if there is no other axis.

Augustine then states what Galileo quoted above, (although the translation is slightly different in this version):

> My reply is that there is a great deal of subtle and learned enquiry into these questions for the purpose of arriving at a true view of the matter; but I have no further time to go into these questions and discuss them, nor should they have time whom I wish to see instructed for their own salvation and for what is necessary and useful in the Church.

The remaining part of Augustine's paragraph (that neither Galileo nor Fantoli quote from the passage) confirms that Augustine's concern is whether the firmament revolves around a stationary Earth, or the stars revolve around a stationary Earth:

> They must certainly bear in mind that the term "firmament" does not compel us to imagine a stationary heaven: we may understand this name as given to indicate not that it is motionless but that it is solid and that it constitutes an impassable boundary between the waters above and the waters below. Furthermore, if the evidence shows that the heavens actually are immovable, the motion of the stars will not be a hindrance to our acceptance of this fact. The very scholars who have devoted the most exhaustive study to this subject have concluded that if the stars alone were moved while the heavens were motionless, all the known phenomena observed in the motions of the stars might have taken place.[206]

Suffice it to say, the above attempt by Galileo and his modern supporters to commandeer Augustine to their cause is a typical example of how the great saint's words are often twisted to teach Copernicanism when, in fact, Augustine is teaching the exact opposite. Unfortunately, Augustine's respect of science is often an easy target for abuse by those seeking to boost the ideas of modern science (*e.g.*, evolution and heliocentrism). In the process, little attention is paid to Augustine's devotion to Scripture as the final authority on such matters and neither are his warnings heeded against the false claims of science. He writes:

> But since the words of Scripture that I have treated are explained in so many senses, critics full of worldly learning should restrain themselves from attacking as ignorant and uncultured these utterances that have been made to nourish all devout souls….But more dangerous is the error of certain weak brethren who faint away when they hear these irreligious critics learnedly and eloquently discoursing on the theories of astronomy or on any of the questions relating to the elements of this universe. With a sigh, they esteem these teachers as superior to themselves, looking upon them as great men; and they return with disdain to the books which were written for the good of their souls; and, although they ought to drink from these

[205] *Homilies to Antioch*, Homily XII, PG 49, 128

[206] *The Literal Meaning of Genesis* in *Ancient Christian Writers*, editor: Johannes Quasten, translated by John Hammond Taylor, S. J., Vol. 1, NY, Newman Press, 1982, pp. 60-61, from Book 2, Chapter 10, Para. 23: "The motion of heaven and the meaning of the firmament."

> books with relish, they can scarcely bear to take them up.[207]

The Language of Fact versus The Language of Appearance

Before we address the particular Scriptures that are associated with geocentrism, we will tackle a common objection that is levied against using Scripture to teach geocentrism. Both scientists and modern biblical exegetes claim that when Scripture employs language such as "the sun rises" or "the sun sets," it is merely attempting to express the motions of the heavenly bodies in figurative or phenomenal language since a rising or setting of the sun is the view that a person standing on Earth would observe, but it is not the true reality. The astronomer will argue that even though he sees the sun rise over the horizon, he, being a knowledgeable scientist, knows that in reality it is the Earth rotating on its axis that makes it appear as if the sun is rising. Likewise, the biblical exegete will often point to figurative language employed hundreds of times in Scripture (*e.g.*, Psalm 98:8: "Let the floods clap their hands: let the hills be joyful together") and insist that the sun's "rising" is of the same linguistic genre and thus it need not be interpreted literally. The Catholic may even refer to the words of Pope Leo XIII in his teaching about the interpretation of Scripture:

> The unshrinking defense of the Holy Scripture, however, does not require that we should equally uphold all the opinions which each of the Fathers or the more recent interpreters have put forth in explaining it; for it may be that, in commenting on passages where physical matters occur, they have sometimes expressed the ideas of their own times, and thus made statements which in these days have been abandoned as incorrect.[208]

He may also quote Pope Pius XII for the same purpose:

> For of the modes of expression which, among ancient peoples, and especially those of the East, human language used to express its thought, none is excluded from the Sacred Books [The Bible], provided the way of speaking adopted in no wise contradicts the holiness and truth of God, as, with his customary wisdom, the Angelic Doctor already observed in these words: 'In Scripture divine things are presented to us in the manner which is in common use amongst men.' For as the substantial Word of God became like to men in all things, 'except sin,' so the words of God, expressed in human language, are made like to human speech in every respect, except error.[209]

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[207] *The Literal Meaning of Genesis*, Book 1, Chapter 20, Para. 41, Ancient Christian Writers, *ibid*., p. 44.

[208] The 1893 encyclical: *Providentissimus Deus: On the Study of Holy Scripture*, "Natural Sciences," Boston, Pauline Books and Media, p. 24. All in all, Leo XIII reinforced the traditional "literal" approach to Scripture interpretation, as noted in the following statement of the same encyclical: "For Sacred Scripture is not like other books. Dictated by the Holy Spirit, it contains things of the deepest importance, which, in many instances, are most difficult and obscure" (p. 8); "Now we have to meet the Rationalists…who…set down the Scripture narratives as stupid fables and lying stories" (p. 12); "The Church…renewing the decree of Trent declares…the true sense of Holy Scripture…whose place it is to judge of the true sense and interpretation of the Scriptures; and, therefore, that it is permitted to no one to interpret Holy Scripture against such sense or also against the unanimous agreement of the Fathers" (pp. 16-17); "But he must not on that account consider it is forbidden, when just cause exists, to push inquiry and exposition beyond what the Fathers have done; provided he carefully observes the rule so wisely laid down by St. Augustine – not to depart from the literal and obvious sense, except only where reason makes it untenable or necessity requires; a rule to which it is the more necessary to adhere strictly in these times, when the thirst for novelty and unrestrained freedom of thought make the danger of error most real and proximate." (pp. 18-19); "But it is absolutely wrong and forbidden to narrow inspiration to certain parts only of Holy Scripture or to admit that the sacred writer has erred…because (as they wrongly think) in a question of the truth or falsehood of a passage we should consider not so much what God has said as the reason and purpose which He had in mind in saying it – this system cannot be tolerated" (pp. 25-26); "Let them loyally hold that God, the Creator and Ruler of all things, is also the Author of the Scriptures – and that, therefore, nothing can be proved either by physical science or archaeology which can really contradict the Scriptures" (pp. 28-29).

[209] The 1943 encyclical: *Divino Afflante Spiritu: The Promotion of Biblical Studies*, "The Importance of mode

Although we will address this topic in greater depth in Chapter 14, for now we point out that Catholic biblical exegetes who seek to counter the geocentric declarations of past popes and cardinals frequently appeal to the above papal statements for support of their position. They will conclude that both Leo XIII and Pius XII were teaching us that we are to interpret Scripture's references to the movement between the Earth and sun by the model of heliocentrism advocated by modern science. As far as these exegetes are concerned, the case is closed, since the popes did not require us to interpret descriptive phrases such as "the sun rises" in a literal fashion, but wanted us to see them as either ancient expressions of uneducated peoples or phenomenal language from the point of view of an observer on the surface of the Earth. In either case, it is assumed that the popes were accepting heliocentrism and denying geocentrism.

Upon closer examination, however, this conclusion is more an eisegesis of what Leo and Pius actually said than a fair and accurate understanding of their words. First, in each of the above papal citations, neither pontiff makes a specific reference to Scripture's cosmological passages, thus no explicit claims can be made that the popes were referring to the movements of either the sun or the Earth. The popes could have been referring to any number of instances in which Scripture speaks in phenomenal language.[210]

Second, Scripture's phenomenal language (*e.g.*, the "sun rises" or the "sun sets") also applies to the geocentric system. In the geocentric system the sun does not actually "rise" or "set"; rather, it revolves around the Earth. When the geocentrist sees a sunset he does not say: "Oh, what a beautiful revolution of the sun," just as a heliocentrist does not say: "Oh, what a beautiful rotation of the Earth." The geocentrist and the heliocentrist know that the sun "rises" or "sets" only with respect to the Earth's horizon, and therefore, reference to a "rising sun" in Scripture is just as phenomenal in the geocentric system as it is in the heliocentric. On that basis alone neither Leo XIII's nor Pius XII's above directives can be commandeered to support heliocentrism, especially in light of the fact that three previous pontiffs, based on stricter criteria, denied heliocentrism and endorsed geocentrism, as the historical records show quite clearly.[211]

Third, Pius XII's above quotation from the words of the "Angelic Doctor," Thomas Aquinas, namely, "In Scripture divine things are presented to us in the manner which is in common use amongst men," cannot be interpreted as Pius' attempt to promote heliocentrism since it is a fact of history that Aquinas was an avowed geocentrist who never entertained the possibility of heliocentrism.[212] Obviously, then, Thomas could not have intended his insights on biblical interpretation to be used either to deny geocentrism or promote heliocentrism. These insights were merely his general teaching on the various modes of speech employed by the authors of Scripture, which can be applied to many and varied phenomena in nature and everyday life, but certainly not celestial orbits.

Lastly, although it is safe to say that phrases such as "the sun rises" or "the sun sets" are to be considered phenomenal from both the heliocentric and geocentric perspectives, this does not mean that Scripture *always* limits itself to phenomenal language when it addresses the movement of the heavenly bodies. The language of appearance only applies to expressions when appearance is the

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of writing," Boston, Pauline Books and Media, p. 21. Pope Pius XII also added this important warning: "Hence the Catholic commentator, in order to comply with the present needs of biblical studies, in explaining the Sacred Scripture and in demonstrating and proving its immunity from all error, should…determine…to what extent the manner of expression or the literary mode adopted by the sacred writer may lead to a correct and genuine interpretation; and let him be convinced that this part of his office cannot be neglected without serious detriment to Catholic exegesis. Not infrequently – to mention only one instance – when some persons reproachfully charge the Sacred Writers with some historical error or inaccuracy in the recording of facts, on closer examination it turns out to be nothing else than those customary modes of expression and narration peculiar to the ancients…" (pp. 21-21).

[210] *E.g.*, Nm 11:7; 1Sm 28:14; Ez 1:5; 8:2; Dn 8:15; 10:6; Jl 2:4; Am 5:8; Mt 16:3; 28:3; Mk 8:24; Lk 12:56; Ap 4:1; 15:2.

[211] Pope Paul V in 1616; Pope Urban VIII in 1633; and Pope Alexander VII in 1664.

[212] Thomas Aquinas wrote: "The Earth stands in relation to the heaven as the center of a circle to its circumference. But as one center may have many circumferences, so, though there is but one Earth, there may be many heavens" (*Summa Theologica*, "Treatise on the Work of the Six Days," Question 68, Article 4). By "many heavens" Thomas is referring to the three ways in which Scripture uses the word "heaven," *e.g.*, the Earth's atmosphere; the starry cosmos; and the third heaven as God's domain above the firmament.

intended feature. One can easily surmise from language such as "the sun rises" or "the sun sets" that although Scripture may express the appearance of the movement from the perspective of the observer on Earth, nevertheless, Scripture confidently affirms the scientific fact that, of the two bodies, one of them moves and the other does not. In that particular scientific category, Scripture is adamant that it is the sun that moves, not the Earth. Hence, it is the sun that is the circling body that causes the *appearance* of the sun rising or setting over the horizon, not the Earth rotating. As we will see, there are many other passages of Scripture that are much more specific concerning the movement of the sun and the immobility of the Earth.

Official Statements from the Catholic Magisterium on the Inspiration and Inerrancy of Sacred Scripture

The Catholic Church, throughout her two-thousand year history, has been very clear and adamant in her teaching that Scripture contains no error when it speaks on theology, history, science, mathematics or any other discipline or factual proposition. Scripture cannot err because God is its main author:

- **Pius IX**, condemned the following notion: "The prophecies and miracles set forth and recorded in the Sacred Scriptures are the fiction of poets, and the mysteries of the Christian faith the result of philosophical investigations. In the books of the Old and the New Testament there are contained mythical inventions..."[213]

- **Pope Leo XIII:** "It is absolutely wrong and forbidden either to narrow inspiration to certain parts only of Sacred Scripture or to admit that the sacred writer has erred."[214]

- **Pope Pius X**, condemned the notion: "Divine inspiration does not extend to all of Sacred Scriptures so that it renders its parts, each and every one, free from every error."[215]

- **Pope Benedict XV**: "...the divine inspiration extends to all parts of Scripture without distinction, and that no error could occur in the inspired text."[216]

- **Pope Pius XII**, repeats Leo XIII decree: "It is absolutely wrong and forbidden either to narrow inspiration to certain parts only of Sacred Scripture or to admit that the sacred writer has erred."[217]

- **Pope Pius XII**, condemns the notion: "...immunity from error extends only to those parts of the Bible that treat of God or of moral and religious matters."[218]

- **1964 Pontifical Biblical Commission**: "...that the Gospels were written under the inspiration of the Holy Spirit, who preserved their authors from every error."

- **1998 Congregation for the Doctrine of the Faith:** "...the absence of error in the inspired sacred texts..."[219]

- **Pope Leo XIII**: "For the sacred Scripture is not like other books. Dictated by the Holy Spirit, it contains things of the deepest importance, which, in many instances, are most difficult and obscure….For all the books in their entirety...with all their parts, have been written under the dictation of the Holy Spirit."[220]

- **Council of Trent:** "…the purity itself of the Gospel is preserved in the Church, which promised before through the Prophets in the Holy Scriptures…and [the Synod] clearly perceiving that this truth and instruction are contained in the written books and in the unwritten traditions, which have been received by the apostles from the mouth of

[213] *Syllabus of Errors*

[214] *Providentissimus Deus*

[215] *Lamentabili Sani*

[216] *Spiritus Paraclitus*

[217] *Divino Afflante Spiritu*

[218] *Humani Generis*

[219] *Professio Fidei*

[220] *Providentissimus Deus*

Christ Himself, or from the apostles themselves, at the dictation of the Holy Spirit, have come down even to us, transmitted as it were from hand to hand, [the Synod] following the examples of the orthodox Fathers, receives and holds in veneration with an equal affection of piety and reverence all the books both of the Old and of the New Testament, since one God is the author or both, and also the traditions themselves, those that appertain both to faith and to morals, as having been dictated either by Christ's own word of mouth, or by the Holy Spirit, and preserved in the Catholic Church by a continuous succession"."[221]

- **Vatican Council 1**: "If anyone shall not accept the entire books of Sacred Scripture with all their divisions, just as the sacred Synod of Trent has enumerated them, as canonical and sacred, or denies that they have been inspired by God: let him be anathema."

- **1994 Catechism of the Catholic Church**: "Sacred Scripture is the speech of God as it is put down in writing under the breath of the Holy Spirit." …. "God inspired the human authors of the sacred books...it was as true authors that they consigned to writing whatever he wanted written, and no more."[222]

- **Pope Leo XIII**: "It is futile to argue that the Holy Spirit took human beings as his instruments in writing, implying that some error could slip in...For by his supernatural power he so stimulated and moved them to write, and so assisted them while they were writing, that they properly conceived in their mind, wished to write down faithfully, and expressed aptly with infallible truth all those things, and only those things, which He himself ordered; otherwise He could not Himself be the author of the whole of Sacred Scripture."[223]

- **Code of Canon Law** (1983): "Even after ordination to the priesthood, clerics are to pursue sacred studies and are to strive after that solid doctrine founded in sacred scripture, handed on by their predecessors, and commonly accepted by the Church, as set out especially in the documents of councils and of the Roman Pontiffs. They are to avoid profane novelties and pseudo-science.[224]

Scriptural Passages Teaching Geocentrism

Joshua 10:10-14

10And the Lord threw them into a panic before Israel, who slew them with a great slaughter at Gibeon, and chased them by the way of the ascent of Bethhoron, and smote them as far as Azekah and Makkedah.
11And as they fled before Israel, while they were going down the ascent of Bethhoron, the Lord threw down great stones from heaven upon them as far as Azekah, and they died; there were more who died because of the hailstones than the men of Israel killed with the sword.
12Then spoke Joshua to the Lord in the day when the Lord gave the Amorites over to the men of Israel; and he said in the sight of Israel, "Sun, stand thou still at Gibeon, and thou Moon in the valley of Aijalon."
13And the sun stood still, and the moon stayed, until the nation took vengeance on their enemies. Is this not written in the Book of Jashar? The sun stayed in the midst of heaven, and did not hasten to go down for about a whole day.
14There has been no day like it before or since, when the Lord hearkened to the voice of a man; for the Lord fought for Israel.

[221] *Denz., 783*

[222] ¶¶ 81, 106.

[223] *Providentissimus Deus*

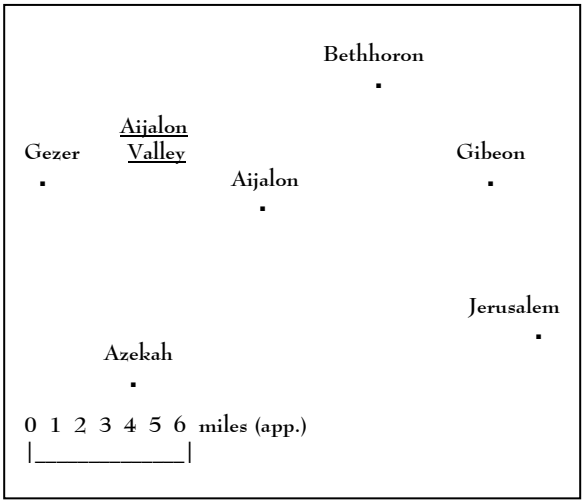
[224] Canon 279.1

One of the more important features of this passage is the involvement of the Lord in both being the cause of the celestial and atmospheric events, as well as the disposition and eventual slaughter of Israel's enemies, in this case, the Amorites. The Lord does three things: (a) he puts the enemies into a panic (vr. 10); (b) he throws down great hailstones (vr. 11); (c) he causes the sun and moon to stand still (vrs. 12-14). As such, divine intervention predominates the passage and thus we must begin the analysis from the fact that we are in the realm of miraculous events far removed from natural occurrences. Once divine intervention is accepted as an integral part of the passage, subsequently it is only a matter of deciding how God accomplished the three miracles.

"Panic" and "hailstones" are not unusual occurrences in themselves, nevertheless, if the Lord is the cause we would expect them to be of severe and enduring effect so as to accomplish the purpose at hand, that is, killing the enemies of Israel. For hailstones to form instantaneously and be large enough to kill, a deliberately calculated divine intrusion had to be accomplished. In Scripture, hail appears to be a common device for divine judgment.[225] Putting opposing armies into a "panic" also seems to be a favorite divine assault.[226]

Apart from the divine intrusion described in the passage, the only other significant feature is that the sun and moon are stopped in their movements through the sky. Since by the passage's own admission there has been no other time in history where such an event has occurred (vr. 14), it makes the event highly unusual even in the realm of miraculous events.

Another distinguishing feature is the detail that is provided regarding the locations of the events. Such detail lends credibility not only to the story itself but also to its accuracy. Five distinct places are mentioned (Aijalon, Azekah, Bethhoron, Gibeon, Makkedah). Historically, Bethhoron was 5 miles WNW of Gibeon, and Azekah was 15 miles SW of Bethhoron. The Aijalon Valley, over which the moon ceased its motion, was between Aijalon and Gezer, the two cities being about 7-8 miles apart. Gibeon was about 11 miles east of Aijalon, and about 15 miles due east from the center of the Aijalon Valley. Gilgal, from which Joshua traveled all night to come to Gibeon, is about 17 miles east of Gibeon. Beyond Gezer directly west about 15 miles is the Mediterranean Sea.



According to the account in Js 10:6-12, it was at Gibeon that Joshua was standing when he made his request to God to stop the sun. The sun was most likely directly overhead, probably near noontime position. This fits the description in Js 10:13 that "the sun stayed in the *midst* of heaven."[227] Joshua also sees the moon, but it is to the west of the sun. Perhaps Joshua made the request to God at midday because after fighting the Amorites from the early morning, he could see by the early afternoon he was not going to have enough time to finish the battle by sundown, especially since he was fighting five different armies. Joshua 10:5 states:

> Then the five kings of the Amorites, the king of Jerusalem, the king of Hebron, the king of Jarmuth, the king of Lachish, and the king of Eglon, gathered their forces, and went up with all their armies and encamped against Gibeon, and made war against it.

Another possibility is that since Gibeon is situated at an elevation of between 2400 and 3000 feet above sea level, the sun, which had been rising from the east, is now positioned directly over the heads of Joshua and his army who are looking downward, WSW, upon the enemy armies. This

[225] Ex 9-10; Ps 18:12; 78:47-48; 105:32; Is 28:2, 17; 30:30; Ez 13:11-13; Ws 5:22; Es 46:6. In the Qumran text 4Qjosa the reading is "stones," whereas the Masoretic text reads "great stones" [אבנים גדלות] and the LXX has "stones of hail" [λίθους τῆς χαλάζης].

[226] Ex 14:24; 23:27; Jg 4:15; 8:12; 1Sm 5:9-11; 7:10; Ps 48:5; Is 31:9; Jr 51:32; Zc 12:4, 13. See also Jb 38:22-23.

[227] "midst" is from the Hebrew חצי (chatsy), meaning "middle" or "half" (Ex 24:6; Js 1:12; 8:33; 12:2).

provides Joshua with a very formidable weapon that is still used often in warfare – the glare of the sun. With the sun directly in their eyes as they look upward ENE toward Joshua's armies, the enemy armies would be severally disadvantaged as they had to deal with partial blindness. Having the sun remain in this position for several hours would be to Joshua's distinct advantage, and thus he calls to God.

As he makes the request for the sun to stand still and sees it answered, Joshua determines that the moon has stopped over the Aijalon Valley. This valley begins about 15 miles due west of Gibeon and extends westward another 15 miles through Gezer until the shore of the Mediterranean. Joshua is in Gibeon which is located in the Judean mountain range. If at Gibeon Joshua is elevated about 2500 feet, he will be able to see westward about 58 miles before the Earth's curvature limits his line of vision.[228] In order to be above the Aijalon Valley in Joshua's line of vision, the moon would be just about 10-30 degrees above the horizon. In fact, the higher Joshua's elevation at Gibeon, the lower in the sky the moon must be in order to be above the Aijalon Valley. If Joshua is seeing the moon about 30 or so degrees above the horizon, then the moon is about 60 degrees from the sun, and the sun is at the 90 degree mark, "in the midst of the sky." At this angle, the moon would not be in full phase, but between the 3rd quarter and full phase, but closer to the former. In the 3rd quarter, the moon is in the middle sky as the sun rises, and it sets in the west when the sun reaches the middle sky. Hence, since Joshua can still see the moon while the sun is in the middle of the sky, the moon's phase must be just prior to the 3rd quarter. All in all, the account corroborates with astronomical facts concerning the occupation of the sun and moon in the midday sky.

Additionally, the passage's veracity is also demonstrated in that it fulfills the required testimony of the Hebrew legal code, *i.e.*, "two or three witnesses."[229] Among the witness are "The Book of Jashar" and the Hebrew Bible. The Book of Jashar is cited because it will serve to stem any doubts about the account's authenticity, since the passage itself admits that the stopping of the sun and moon is one of the most fantastic events ever to occur in the history of mankind. To at least affirm that a second party recorded such an occurrence, anyone familiar at that time with the Book of Jasher could consult the text to authenticate the testimony of the Hebrew Bible. Whether the Book of Jashar exists today is still in debate,[230] but the fact remains that the Hebrew writer puts his testimony of the miraculous event on the line, as it were, allowing it to be checked and verified by any independent party who sought an affirming witness. The *Book of Jashar* is itself authenticated since it is cited in other books of the Hebrew Bible, and thus the veracity of the reference to Jashar in the book of Joshua is affirmed.[231] (There are other such books that are not included in the canonical corpus of the Hebrew Old

[228] If he is elevated at 3000, he can see for 64 nautical miles. See http://www.boatsafe.com/tools/horizon.htm.

[229] Dt 17:6; 19:15; Mt 18:16; 2Co 13:1.

[230] Some orthodox Jews assert that the *Book of Jashar* appears in two ancient rabbinical works and an anonymous Jewish work of the 12th century A.D. The actual title of the book is ספר הישר (sefer hayashar) translated more correctly as "Book of the Righteous." The Hebrew article ה is never put before a proper name, thus "Jashar" is probably a misnomer in today's Bibles. The citation often given for the account in Joshua 10:12-14 is: Yashar 88:63-65, which reads: "[63]And when they were smiting, the day was declining toward evening, and Joshua said in the sight of all the people, Sun, stand thou still upon Gibeon, and thou moon in the valley of Ajalon, until the nation shall have revenged itself upon its enemies. [64]And the Lord hearkened to the voice of Joshua, and the sun stood still in the midst of the heavens, and it stood still six and thirty moments, and the moon also stood still and hastened not to go down a whole day. [65]And there was no day like that, before it or after it, that the Lord hearkened to the voice of a man, for the Lord fought for Israel" (taken from a 1613 A.D. book, J. H. Parry and Co. Salt Lake City, 1887). Another source, *The Book of Jasher* (New York, M. M. Noah and A. S. Gould, 1840, p. 260), says that the word "moments" is from the Hebrew "עתים, literally times; what portion of time, I cannot understand by this term, never used in scripture to express any division of time, so I have translated it 'moments,'" as cited in *The Long Day of Joshua*, Donald Patten, Ronald Hatch and Loren Steinhauer, Pacific Meridian Pub., WA, 1973, p. 183). Nh 9:28 & Jb 24:1 use עתים ("times") from the feminine noun עת. (See also http://www.kivits.com/Jashar1.htm). One source, Timothy Archer, claims that "Sefer haYashar" was found in the Qumram excavations, although only the account found in 2Sm 1:18, not Joshua 10:10-14. Please see the website at: (http://www.strangehorizons.com/2003/20030317/jashar.shtml).

[231] 2Sm 1:18, although in this account the demise of Israel is recorded.

Testament, such as the book of Gad the Seer – 1Ch 29:29).

To round out a possible "third witness" to the event, the Hebrew Bible reiterates the account of the cessation of celestial movement in Habakkuk 3:11: "The sun and moon stood still in their habitation at the light of thine arrows as they sped, at the flash of thy glittering spear." Habakkuk reflects the detail of the Joshua passage in that it mentions both the sun and the moon ceasing their movements. The book of Habakkuk was written in the 7th century B.C. while Joshua was written in the 11th century, thus showing how the tradition survived intact over at least four centuries. Additionally, the event is also recorded in Ecclesiasticus (Sirach) 46:4: "Was not the sun held back by his hand? And did not one day become as long as two?" This Old Testament book was written just prior to the Maccabean revolt, circa 160 B.C., which takes the testimony of Joshua's Long Day transpire at least through a millennium.

Exegetical Details of Joshua 10:10-14

Similar to a few other accounts in the Old Testament, celestial bodies are incorporated into accounts of war in one form or another. The closest to Joshua is Judges 5:20: "From heaven fought the stars, from their courses they fought against Sisera." From the metaphorical wording embedded in the passages, some scholars have concluded that Js 10:10-14 is merely a fictional account of a typical battle in the annals of Israeli history. In their view, the account is merely an embellished story that attributes a decisive victory to the Hebrew God but in reality it was a normally fought battle that lasted at least two days. These scholarly conclusions, of course, discount any divine intrusion taking place in the narrative, which is their academic goal when interpreting such miracle-laden passages. The difficulty for these scholars, however, is that the miraculous intrusion is woven so inextricably within the details of the passage that it is impossible to separate them without destroying the history of the narrative itself. After the "Quest for the Historical Jesus" was undertaken by liberal scholars in the last few centuries, theological academia became quite aware of the fact that arbitrarily separating the miraculous from the historical results in destroying both. This has been the Achilles heel of most of liberal and modernistic scholarship when examining passages such as Joshua 10:10-14.

There are other interpreters who, although recognizing the validity of miracles, seek to minimize the possibility that such events occurred in Joshua 10, usually out of fear of criticism from modern academia. In such cases, appeal is often made to the Hebrew word דמם (*damam*) that appears in reference to the sun: "And the sun *stood still*." Since *damam* also means "silent,"[232] these interpreters posit that Joshua is not saying the sun was moving and then stopped; rather, "silent" is merely a poetic way of describing Israel's victory over the Amorites using celestial metaphors, as if the sun was hush with amazement.

But escape from the literal application is not so easy. Although in many cases "silent" is the preferred translation of *damam*, in actuality, *damam* is chosen because it always ceases the action of the entity in view. For example, if a person is talking, *damam* is used to denote that he has ceased talking, and therefore he is "silent" (*e.g.*, Ps 31:17: "let the wicked be put to shame, let them *be silent* in Sheol"). If an object is moving, *damam* is used to denote that it has stopped its motion (*e.g.*, 1Sm 14:9: "Wait until we come to you, then we will *stand still* in our place, and we will not go up to them"). Whatever the normal activity of the entity in view, *damam* is employed when that activity comes to an end. Hence, if the salient feature of the sun is its movement in the sky so that it can give light upon the land (which function will eventually terminate if the sun moves beyond the immediate locale), *damam* would be the proper word to use if the sun's movement ceased.

Although after Joshua *damam* is not used again in the Hebrew Bible in connection with a heavenly body, it is used with other objects whose chief function is movement. In Jr 47:6, for example, *damam* is used to represent the cessation of a sword's activity: "Ah, sword of the Lord! How long till you are quiet? Put yourself into your scabbard, rest and *be still*!" We know that the salient feature of the sun in Joshua 10:13 is its movement across the sky to give light (as opposed to its heat), for the simple fact that it is coupled with the movement of the moon: "And the sun stood still, and the moon stayed." Hence, the use of *damam* in the case of the

[232] דמם (*damam*) appears 30 times in the Old Testament (RSV), and is understood in the following ways: "silent" (Lv 10:3; Jb 29:21; 31:34; Ps 4:4; 30:12; 31:17; 62:5; 131:2; Jr 47:6; 48:2; Lm 2:10; Ez 24:17; Am 5:13); "cut off" (1Sm 2:9); "stand still" (1Sm 14:9) "still" (Ex 15:16; Jb 30:27; 37:7; Is 23:2; Jr 8:14); "ceasing" (Ps 35:15); "devastated" (Jr 25:37); "destroyed" (Jr 49:26; 51:6); "rest" (Lm 2:18).

sun can only apply to a cessation of its movement, otherwise, it could not be compared to the moon. Moreover, although in the moon's cessation of movement the word chosen is עמד (*amad*),[233] in the latter part of Js 10:13 *amad* appears again to describe the sun's cessation of movement: "The sun stayed (*amad*) in the midst of heaven." Thus, the sun's cessation of movement is reinforced by two similar yet distinct Hebrew words, *damam* and *amad*.

Additionally, two different Hebrew tenses are employed. After Joshua's use in vr. 12 of *damam* in the Qal imperative commanding the sun and moon to "stand still," in vr. 13 the narrator puts *damam* in the Qal imperfect tense to denote that the sun did, indeed, heed the command. Normally, the imperfect tense is a future tense, but because it is introduced here with a *waw*-consecutive it acts like a past tense, thus vr. 13's translation, "stood still." Also in vr. 13, the narrator then changes verbs and tenses to describe the moon's cessation of movement, using *amad* in the perfect tense, which is the Hebrew past tense. Lastly, in vr. 14, the *Book of Jasher* is cited and now *amad* is applied to the sun in the Qal imperfect *waw*-consecutive. The upshot of all these grammatical nuances is that these Hebrew verbs and their alternating tenses show conclusively that the account is interwoven as a cause-effect sequence of events that actually took place as recorded. Poetry is never put in such a format.

Once divine intrusion is accepted as the basis for the account, another issue for consideration is whether the sun itself was stopped (which necessitates that it was previously in motion) or the Earth was stopped in rotation (which necessitates that the sun was not in motion). The most significant piece of evidence in favor of the former interpretation is that even modern heliocentric science (which holds that the Earth rotates on an axis and revolves around the sun), agrees that the moon moves in space. It revolves around the Earth every 28 days or so. That being the case, if behind the actual meaning of Joshua 10:10-14 were the possibility that the Earth was in rotation and thus the passage is attempting to give a phenomenal or 'as it appears' account of the events occurring on that historic day, it would be rather self-defeating for the author to include the cessation of the moon's movement, since both the ancient and modern observer agree that since the moon revolves around the Earth it must be stopped from doing so if it is to be legitimately considered ceasing its movement. Consequently, since in the normal course of events the moon is in constant motion, yet on this particular day its movement ceased, we are forced to conclude that the cause for the moon's cessation of movement was not the Earth that stopped spinning but a force that acted upon both the moon and the sun to stop them from continuing their normal revolution around the Earth. So conspicuous is the moon in this account that the reader may assume that the writer deliberately added the moon so as to forestall interpretations of the passage that might seek to eliminate its literal interpretation. The reason is plain: in the heliocentric system, the Earth rotates, and whereas if the Earth stopped rotating it would make it appear as if the sun stood still, the moon would still revolve around the Earth and appear to be continuing to move while the sun remained still, and thus Joshua's request could not be fulfilled by ceasing the Earth's rotation.[234] Once again, since in the geocentric system both the sun and the moon revolve around the Earth, then both the sun and the moon would need to cease their movement simultaneously to satisfy Joshua's request. As noted previously, the heliocentric system, with its claim of a cessation of the Earth's rotation, cannot satisfy Joshua's request, for from Joshua's perspective on the ground the moon would simply move too far in one day to fulfill the specification in the text that it remained over the valley of Aijalon, which at most stretches for only 15 miles until it hits the Mediterranean Sea.

[233] עמד (*amad*) appears 78 times in the Old Testament. Its preponderant meaning is translated by such words as: "stay," "wait," "remain," "abide," "establish," etc., the most common being "stop" or "stay" (*e.g.*, Gn 19:17; Ex 9:28; Lv 13:23; Dt 10:10; 1Sm 20:38; 30:9; 2Sm 17:17; 2Kg 4:6; 13:18; 15:20; Jr 4:6; Hs 13:13).

[234] The distance from the Earth to the moon is 250,000 miles. Using $2\pi r$ for the circumference of the moon's orbit, the total is 1,570,000 miles the moon travels in 28 days. In one day it travels 56,071 miles, which distance would take it way beyond the valley of Aijalon. In fact, since the Joshua account says that both the sun and the moon could be seen in the sky, this means that the sun and moon were at right angels to one another with the moon being near the extremity of the horizon. That being the case, there is a slim margin of space the moon could occupy in order to remain in the sky if its movement had not been arrested. An extra distance of 56,000 miles would take it beyond the horizon and out of sight.

Historical Evidences for Joshua's Long Day

Several works have sought to corroborate the biblical account of Joshua's long day with other historical accounts in various parts of the world. One source makes the following points:

> In the ancient Chinese writings there is a legend of a long day. The Incas of Peru and the Aztecs of Mexico have a like record, and there is a Babylonian and a Persian legend of a day that was miraculously extended. Another section of China contributes an account of the day that was miraculously prolonged, in the reign of Emperor Yeo. Herodotus recounts that the priests of Egypt showed him their temple records, and that there he read a strange account of a day that was twice the natural length.[235]

Another account is similar:

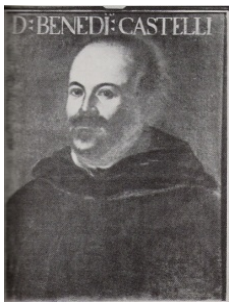
> In the Mexican Annals of Cuauhtitlan (the history of the empire of Culhuacan and Mexico, written in Nahua-Indian in the sixteenth century) it is related that during a cosmic catastrophe that occurred in the remote past, the night did not end for a long time....Sahagun, the Spanish savant who came to America a generation after Columbus and gathered the traditions of the aborigines, wrote that at the time of one cosmic catastrophe the sun rose only a little way over the horizon and remained there without moving; the moon also stood still.[236]

[235] Harry Rimmer, *The Harmony of Science and Scripture*, Eerdmans Publishing Co., 1944, pp. 269-270.

[236] Immanuel Velikovsky, *Worlds in Collision*, New York, Macmillan Company, 1950, pp. 45-46. See also *Joshua's Long Day and the Dial of Ahaz*, C. A. L. Totten, Destiny Publishers, MA, 1890, p. 25. The most extensive treatment of the historical coincidences is Gerardus Bouw's, *Geocentricity*, pp. 60-80, which documents incidents occurring during the same time period in Africa, China, North America, Central and South Americas.

Galileo's Interpretation of Joshua 10
The Letter to Castelli

On December 21, 1613, three years after Galileo had published his formal advocacy of heliocentrism in his book *Siderius nuncius*, he was busy defending his theory in various private letters. One of the more extensive defenses appears in his letter to his personal friend, **Benedetto Castelli**.



In the letter, Galileo gives two answers to Joshua 10:10-14. In the first he claims that it is not necessary or always correct to interpret Scripture in a literal sense. In the second, Galileo claims that even if one were to interpret the passage literally, it is impossible to explain from the geocentric position. Thus he attempts to explain it from the heliocentric model, which we will analyze here. Galileo writes:

> (1)…I come now to a consideration of the particular passage from Joshua which occasioned three comments to the Grand Duchess. And I will seize upon the third, which was presented as mine, as indeed it truly is. But I will add for you some further considerations which I do not believe have been put in writing previously.[237]
>
> (2) Let it be granted and conceded to an adversary for now that the sacred text should be taken in its exact literal meaning; namely, that God was asked by

[237] Original Italian: "In confermazione di che, vengo adesso a considerare il luogo particolare di Giesuè [Joshua], per il quale ell' apportò ad alcuni tre dichiarazioni; e piglio la 3ª, ch' ella produsse come mia, sì some veramente è, m'v' aggiongo alcune condizioni di più, quale non credo haverle detto altra volta" (Favaro, *Galileo E L'Inquisizione*, p. 42). For the rest of Galileo's letter to Castelli we will use the English translation.

Joshua to make the sun stand still and to prolong the day so that he could obtain the victory. And I also ask my adversary to observe the same rule that I observe, that is, that he not bind me but free himself in regard to altering or changing the meaning of the words. I say, then, that this passage most clearly shows the falsity and impossibility of the Aristotelian and Ptolemaic world system, and is also very well accommodated to the Copernican system.

(3) First I ask my adversary if he knows by what motions the sun is moved. If he knows, he must reply that the sun has two motions; namely, an annual motion towards the east and a daily motion towards the west.

(4) Next ask him whether both of these motions, which are different and contrary to each other, belong to the sun and are both proper to it. He must reply "no," for the only proper and special motion of the sun is its annual motion. The other motion is not proper to it, but belongs to the highest heaven, that is, the first sphere, which in its rotation carries along the sun and the other planets and the stellar sphere and which is ordained to give a revolution* around the earth in twenty-four hours by means of a motion, as I have said, which is contrary to the sun's natural and proper motion.

(5) I come then to the third question, and I ask him which of these two motions of the sun causes day and night; namely, its own proper and real motion, or the motion of the first sphere. He must reply that day and night are caused by the motion of the first sphere, and that the proper motion of the sun does not produce day and night but rather the various seasons and the year itself.

(6) Now if the day depends not on the motion of the sun but on the motion of the first sphere, who does not see that, in order to lengthen the day, one needs to make the first sphere stop, and not the sun? Thus if someone understands these first elements of astronomy, does he not also recognize that if God had stopped the motion of the sun, then instead of lengthening the day, he would have shortened it and made it briefer? For since the motion of the sun is contrary to the daily revolution*, then to the degree that the sun moves towards the east, to the same degree it will be slowed down in its motion towards the west. And if the motion of the sun is decreased or annulled, it will move to the west in a proportionally shorter time. This is observable if one looks at the moon, whose daily revolution* is slower than that of the sun in proportion to its own proper motion being faster than that of the sun. Therefore it is absolutely impossible in the system of Ptolemy and Aristotle to stop the motion of the sun and thereby to lengthen the day, as the Scripture states to have happened. Hence either one must say that the motions are not arranged as Ptolemy said, or one must alter the meaning of the words, and say that, when the Scripture says that God stopped the sun, he really wished to say that he stopped the first sphere. But in order to accommodate himself to the capacity of those who are hardly able to understand the rising and setting of the sun, he said the contrary of what he ought to have said as he spoke to humans steeped in the senses.

(7) Let me add that it is not credible that God would have stopped the sun without paying attention to the other spheres. For without any reason he would have changed all the laws, relations, and dispositions of the other stars in respect to the sun, and would have greatly disturbed the whole course of nature. But it is credible that he stopped the whole system of celestial spheres which, after an intervening period of rest, he returned consistently to their functions without any confusion or alteration.

(8) But since we have already agreed not to alter the meaning of the words of the text, we must have recourse to another arrangement of the parts of the world, and then see if it agrees with the bare meaning of the words, taken straightforwardly and

> without hesitation, as to what actually happened.
>
> (9) Now I have discovered and have proven with necessity that the globe of the sun rotates on itself, making one full rotation* in about one lunar month, in exactly the same way that all the other celestial rotations occur. Moreover it is quite probable and reasonable that the sun, as the instrument and highest minister of nature, as if it were the heart of the world, gives not only light, as it clearly does, but also motion to all the planets which revolve around it. Therefore, if in agreement with the position of Copernicus we attribute the daily rotation primarily to the earth, then who does not see that, in order to stop the whole system without any alteration in the remaining mutual relation of the planets but only to prolong the space and time of the daylight, it is sufficient to make the sun stop, exactly as the literal meaning of the sacred text says? Behold then that in this second way it is possible to lengthen the day on earth by stopping the sun, without introducing any confusion among the parts of the world and without altering the words of Scripture.
>
> (10) I have written much more than my indisposition allows. So I will end, offering my services and kissing your hands, petitioning Our Lord for a good holiday and every happiness. Florence, 21 December 1613.[238]

There are several problems with Galileo's arguments. First, Galileo enters the challenge by saying: "the sacred text should be taken in its *exact literal meaning*; namely, that God was asked by Joshua to make the sun stand still." But his interpretation: "if in agreement with the position of Copernicus we attribute the daily rotation primarily to the earth," is not an "exact literal meaning," since Joshua 10:10-14 does not mention the Earth, much less its ceasing of an alleged rotation. The original Italian does not leave much room for Galileo. It states: "…che le parole" ("that the words") "de testo sacro" ("of the sacred text") "s'habbino a prendere nell'senso appunto" ("should be taken in the sense exactly") "che elle suonano" ("that they play out").[239] The only latitude for Galileo is the Italian word *suonono*. It is the third person, plural, present, indicative of the verb *suonare*, which means to play, make music, or chime, ring, beat, sound or seem. If Galileo intended *suonano* as a metaphor for music, he gave himself some leeway regarding what he meant by "the exact sense" of Joshua's text, since he could have meant that whatever interpretation sounds the best is the most proper, that is, the interpretation that best fits the biblical data is what was intended by Joshua. This leeway would allow Galileo to suggest a rotation of the Earth as the proper interpretation since, in his mind, it best "plays out" or "rings true" the available data. But that which best "plays out" the data is in Galileo's case determined by the subjective judgment of the interpreter and is not dependent strictly on a literal rendering of the words. If the literal words say "the sun stopped," then the literal interpretation must incorporate the fact that the sun was moving and suddenly came to a stop. There can be no other literal sense to the words. It is only when one arbitrarily adds the possibility of the 'language of appearance' that it would be possible to claim that the Earth stopped rotating. But using phenomenal language is neither literal language or literal interpretation, it is figurative on both counts. This distinction is true regardless how literal one makes the figures, that is, it is true in spite of Galileo's attempt to use a literal rotation of the Earth to attempt to answer the figurative stoppage of the sun.

Ironically, Galileo reiterated his commitment to the literal meaning of Joshua 10 in paragraph #8 in which he says: "But since we have already agreed not to alter the meaning of the words of the text." The original Italian is: "Ma perchè siamo già convenuti, non dover alterare il senso litterale del testo." A more literal translation of the second half of the sentence is: "not to alter the literal sense of the text." Normally, the "literal sense" is understood to refer to what the words literally say. There is no "meaning" other than the literal data, no matter how absurd it may sound or impossible to accomplish. If, for example, one said: "I jumped to the moon," the only literal sense is that the person squatted down

[238] Translated by Richard Blackwell in *Galileo, Bellarmine and the Bible*, pp. 199-201. Blackwell's use of "rotation" and "revolution" have been corrected when necessary and are noted by an asterisk.

[239] Favaro, *Galileo E L'Inquisizione*, p. 42, my translation.

and sprang up with enough force to land him on the moon. Although in this case the literal sense is certainly impossible to accomplish, still, the sentence can only refer to one action, jumping to the moon. Similarly, "stopping the sun," in the literal sense, can only mean stopping the sun from moving in space. Hence, it seems as though Galileo has limited his options in paragraph #8 and thus he has not followed the rules of his own challenge.

Secondly, Galileo complains that the Ptolemaic or Aristotelian models would have an impossible task of accomplishing the stoppage of the sun because the sun has two movements in the sky, one in which the sun itself actually moves and one in which the sphere housing the sun moves. In the latter, the sun only appears to move, according to Galileo. The former is the annual west-to-east movement of the sun as it makes its 360 degree trek through the zodiac, while the latter is the daily east-to-west movement we see in sunrise and sunset. He writes in paragraph #6:

> For since the motion of the sun is contrary to the daily revolution,* then to the degree that the sun moves towards the east, to the same degree it will be slowed down in its motion towards the west. And if the motion of the sun is decreased or annulled, it will move to the west in a proportionally shorter time.

Galileo claims that, if one is going to interpret Joshua 10 literally, ceasing the sun's movement can only refer to what he deems as the *actual* movement of the sun, the west-to-east movement that it makes against the revolving universal sphere. His argument is that if the "actual" movement of the sun is stopped, it does not lengthen the day, it actually makes it shorter, since: (a) the motion of the universal sphere which carries the sun in its daily revolution has not been stopped and therefore the sun will move at its normal 24-hour pace around the Earth, and (b) the ceasing of the sun's west-to-east movement through the zodiac will make the sun move a little faster in the east-to-west direction, thus defeating Joshua's whole purpose for calling upon God.

Galileo's argument is clever, but it is wrong on all counts. First, the conundrum Galileo manufactures for the geocentric model is accomplished by an arbitrary mixing of the miraculous and the natural. On the one hand, Galileo admits to the miraculous nature of stopping the west-to-east movement of the sun because for him it answers the literal interpretation of Joshua's request. On the other hand, for the sun's east-to-west movement Galileo suddenly wishes to limit the possibilities to the natural realm, thus allowing himself to claim that there would be a contradiction in the geocentric explanation of Joshua 10. Thus in paragraph #7 he writes:

> Let me add that it is not credible that God would have stopped the sun without paying attention to the other spheres. For without any reason he would have changed all the laws, relations, and dispositions of the other stars in respect to the sun, and would have greatly disturbed the whole course of nature.

But as Galileo was warned by Pope Urban VIII in 1633, and as even the converted Galileo himself realized in 1641 when he renounced the heliocentric system,[240] God's omnipotence has no limits. There are innumerable ways God can accomplish the task at hand if and when the normal laws which govern the universe are set aside to make room for God's divine ingenuity.

Second, Galileo conveniently ignores the fact that, if the sphere moves then the sun moves, and if the sphere stops then the sun stops. In contrast to a fixed earth, there is movement and cessation of movement for both the sphere and the sun. For example, as the axle in a wheel rotates 360 degrees at the same time as the rim of the wheel, both the axle and the rim move in relation to the fixed vehicle to which they are housed. In addition, the fact that the moon also ceases its motion and hangs over the valley of Aijalon for close to 48 hours lends credence to the idea that both the sun and the moon are housed in the same sphere. In other words, to stop both the sun and the moon simultaneously, only the sphere in which they are contained needs to be stopped. Hence it is literally true that both the sun and the moon could be stopped, and thus Joshua's request is literally fulfilled. Galileo's attempt to apply the distinction between the sun's proper and improper motion to the literal interpretation of Joshua 10 is obviously erroneous.

Galileo had another argument to counter the traditional interpretation of Joshua 10. In his *Letter to the Grand Duchess Christina* of July 1615, he states:

[240] See Volume I, Chapter 1 of *Galileo Was Wrong: The Church Was Right*.

> But if I am not mistaken, something of which we are to take no small account is that by the aid of this Copernican system we have the literal, open, and easy sense of another statement that we read in this same miracle, that the sun stood still *in the midst of the heavens*. Grave theologians raise a question about this passage, for it seems very likely that when Joshua requested the lengthening of the day, the sun was near setting and not at the meridian. If the sun had been at the meridian, it seems improbable that it was necessary to pray for a lengthened day in order to pursue victory in battle, the miracle having occurred around the summer solstice when the days are longest, and the space of seven hours remaining before nightfall being sufficient. Thus grave divines have actually held that the sun was near setting, and indeed the words themselves seem to say so: *Sun, stand thou still, stand thou still*. For if it had been near the meridian, either it would have been needless to request a miracle, or it would have been sufficient merely to have prayed for some retardation. Cajetan is of this opinion, to which Magellan [Cosme Magalhaens] subscribes, confirming it with the remark that Joshua had already done too many things that day before commanding the sun to stand still for him to have done them in half a day. Hence they are forced to interpret the words *in the midst of the heavens* a little knottily, saying that this means no more than that the sun stood still while it was in our hemisphere; that is, above our horizon. But unless I am mistaken we may avoid this and all other knots if, in agreement with the Copernican system, we place the sun in the "midst" – that is, in the center – of the celestial orbs and planetary rotations, as it is most necessary to do. Then take any hour of the day, either noon, or any hour as close to evening as you please, and the day would be lengthened and all the celestial revolutions stopped by the sun's standing still *in the midst of the heavens*; that is, in the center, where it resides. This sense is much better accommodated to the words, quite apart from what has already been said; for if the desired statement was that the sun was stopped at midday, the proper expression would have been that it "stood still at noonday," or "in the meridian circle," and not "in the midst of the heavens." For the true and only "midst" of a spherical body such as the sky is its center.[241]

Again, Galileo's interpretation is illogical. If the sun were already in the "midst of heaven" by the mere physical fact that it occupies the center of the solar system, then there would be no reason for Joshua to associate the "midst of heaven" with the cessation of movement. Joshua 10:13 says: "And the sun stood still, and the moon stayed….The sun stayed in the midst of heaven, and did not hasten to go down for about a whole day." Stating that the sun was "stayed in the midst of heaven" but with no relation to a cessation of its movement would be superfluous since, in the Copernican system, the sun already occupied the center of the heavens and has never ceased doing so. Moreover, Galileo ignores the impact of the moon on the interpretation of the passage. By using the moon as a reference marker, the passage is defining movement and cessation of movement. That is, a celestial body is in motion before Joshua's command and ceases said motion after his command. If motion and direction toward the horizon is defined and accomplished for the moon, it must also be the same for the sun, otherwise the passage is inconsistent and incongruous. Since in this case the moon must precede the sun in their mutual heading toward the horizon, the moon must stop at some place before it hits the horizon, which means the sun must be some distance further back. The only scientific possibility for that location is in the middle of the day sky or before the midday sky.

Additionally, Galileo is led to his peculiar interpretation because he cannot fathom why Joshua would ask for the sun to cease its travel across the sky at noon time if he could expect at least another half day of sun light to accomplish his task. But although Joshua's request may seem odd from a chronological perspective, it is quite appropriate from a logistical perspective. As we noted earlier, Joshua has no small task on his hands. Five armies surrounded him on this particular day. If after defeating the first army Joshua calculated how long it took to accomplish, he could then calculate how

[241] Translated by Stillman Drake in *Discoveries and Opinions of Galileo*, pp 213-214.

long it would take to defeat the other four armies. Apparently, by midday Joshua had calculated that the job could not be done in the remaining six to nine hours of light available to him. Even at four hours per army (which is a modest estimate considering that battles between two armies, both ancient and modern, might extend into days or weeks rather than hours), the total time of Joshua's battles would extend beyond twenty hours. An extra day would give Joshua another twenty-four hours in addition to the six or nine he had remaining on the first leg of the battles, making a total of thirty to thirty-three hours of battle time to be divided up among five armies, amounting to between six or seven hours per army, which is not an exorbitant amount by any militaristic standards. If we add in the fact that noonday light is much brighter than sunset light and therefore much easier for Joshua to spot the enemy as opposed to having the enemy hiding in dark hues and shadows, it is all the more conducive for him to stop the sun at midday. Also, the heat of the noonday sun would allow no reprieve for the tired and exhausted bodies of an enemy pursued by divine hailstones, whereas the coolness of a setting sun would give them much needed comfort.

Ecclesiasticus (Sirach) 46:3-5

> 3Who before him ever stood so firm?
> For he waged the wars of the Lord.
> 4Was not the sun held back by his hand? And did not one day become as long as two?
> 5He called upon the Most High, the Mighty One, when enemies pressed him on every side.

Here we have another witness to the events which occurred twelve hundred years earlier in the days of Joshua. It confirms that the sun was the moving object that needed to be stopped so that Joshua could complete his task. It confirms that the potential threat comprised a host of surrounding armies who were seeking to trap the Israelites. (Js 10:5 indicates that five kings, each with their separate army, sought to destroy Israel). Sirach puts the information into a series of rhetorical questions, which is his way of indicating that these events are established historical facts that only a fool would deny.

Habakkuk 3:11

> 11The sun and moon stood still in their habitation at the light of thine arrows as they sped, at the flash of thy glittering spear.

The outstanding grammatical feature in this passage is the consistent use of Hebrew singulars, even though there are two celestial bodies in view. First, the lack of a conjunctive between "sun" and "moon" acts as a singular; second, the verb "stood still" (which uses the same word עמד (*amad*) utilized in Js 10:12-13) is in the singular; third, "habitation" is also in the singular. The purpose of the singulars is to treat the occurrence as one celestial phenomenon, perhaps because both the sun and moon ceased their motion as the universe at large stopped revolving altogether.

The recapping of the events of Joshua's time are contextually significant here because it serves to remind the prophet Habakkuk of God's mighty deeds of the past so that Habakkuk can have confidence that God will do the same in the present dire situation at hand. The book of Habakkuk is only three chapters long, but the drama is very intense. The outline is as follows:

- Hk 1:1-1-4: Habakkuk's first question to God: Why do the evil Israelites go unpunished?
- Hk 1:5-1:11: God's answer to Habakkuk: I will use the evil Babylonians to punish them.
- Hk 1:12-2:1: Habakkuk's second question: Why are you using an evil nation to judge Israel?
- Hk 2:2-2:20: God's answer: I will also judge the Babylonians after I use them to judge Israel.
- Hk 3:1-19: Habakkuk remembers all of God's mighty deeds and judgments of the past and has his faith restored.

It is within the last pericope that Habakkuk recounts a number of God's previous mighty deeds, among them being the destruction of Cushan and Midian (Ex 15:14-16) as well as the plagues upon

Egypt and Canaan (Ex 7:19-20; Js 3:16). These are historical events that serve to authenticate God's actions and confirm his promises to Habakkuk that He will bring the same vengeance upon Israel's present oppressor, Babylon. Hence, because the miraculous celestial event of Joshua's day is called upon as a testimony to God's faithfulness, the event is authenticated as a real historical occurrence, otherwise the very attribute of divine faithfulness that Habakkuk is seeking to exonerate would be built on false testimony.

2Kings 20:9-12

9And Isaiah said, "This is the sign to you from the Lord, that the Lord will do the thing that he has promised: shall the shadow go forward ten steps, or go back ten steps?"
10And Hezekiah answered, "It is an easy thing for the shadow to lengthen ten steps; rather let the shadow go back ten steps."
11And Isaiah the prophet cried to the Lord; and he brought the shadow back ten steps, by which the sun had declined on the dial of Ahaz.
12At that time Merodachbaladan the son of Baladan, king of Babylon, sent envoys with letters and a present to Hezekiah; for he heard that Hezekiah had been sick.

2 Chronicles 32:31

31And so in the matter of the envoys of the princes of Babylon, who had been sent to him to inquire about the sign that had been done in the land, God left him to himself, in order to try him and to know all that was in his heart.
32Now the rest of the acts of Hezekiah, and his good deeds, behold, they are written in the vision of Isaiah the prophet the son of Amoz, in the Book of the Kings of Judah and Israel.

Isaiah 38:7-8

7"This is the sign to you from the Lord, that the Lord will do this thing that he has promised:
8Behold, I will make the shadow cast by the declining sun on the dial of Ahaz turn back ten steps." So the sun turned back on the dial the ten steps by which it had declined.

Together these three passages (2Kg 20:9-12; 2Ch 32:31; Is 38:7-8) are important because they specify the same occurrence and treat it as a miraculous event. Not only was the event known in Israel, but the king of Babylon had also heard and thus sent envoys to make an inquiry of the "sign." Similar to the account in Joshua in which two or three witnesses are included in order to authenticate the event as a real occurrence, so here we have the authors of Kings, Chronicles and Isaiah all testifying to the same miraculous event, with a foreign king as an internal witness to the three narratives.

The passages are also significant because they demonstrate that, of the two possible means to turn back the time which was displayed on the sundial of Hezekiah, it is the sun that is turned back in its course, not the Earth which is retarded in rotation. Indeed, Scripture knows nothing about a rotating Earth in order for it to be considered an option in a matter of celestial adjustment. If the Earth were rotating, there would be little reason for the narrator not to mention that it had been retarded by ten steps, since such a rotational reversal would have been just as stupendous as turning back the sun in its course. In fact, considering the disturbances and vibrations a sudden reversal of the Earth's rotation would have caused, it would have been more miraculous to mask such terrestrial effects than it would be for a curtailing of the sun's movement.

Psalm 8:3-6

3When I look at thy heavens, the work of thy fingers, the moon and the stars which thou hast established;
4what is man that thou art mindful of him, and the son of man that thou dost care for him?

> 5Yet thou hast made him little less than God,[242] and dost crown him with glory and honor.
> 6Thou hast given him dominion over the works of thy hands; thou hast put all things under his feet

There is no explicit geocentric information in this Psalm, but the "establishment" of the moon and the stars requires an explanation from the geocentrist in light of the fact that the same word, "establishment" (Hebrew: *kun*) is used of the Earth in passages such as Ps 96:10: "Yea, the world is established, it shall never be moved." If the moon and stars move but the Earth does not, why is the same word "establishment" being used for all three? First we see that Ps 96:10 adds the key phrase that specifies the Earth's immobility ("it shall never be moved"), a phrase that Scripture never applies to the moon, stars or sun. Second, all scientific parties agree that the moon moves, and thus the use of *kun* in this verse is in the more general sense of the Hebrew word.[243] Third, the verbal form of *kun* (כוֹננתה) is chosen specifically for this Psalm. It is a polel perfect in the masculine singular. This is somewhat of a grammatical oddity since the singular is followed by the plural "stars" that is also coupled with the "moon."[244] The oddity is explained by the fact that the singular verb is treating the multitudinous heavenly bodies (the moon and plurality of stars) as one mechanized unit. The intensive verbal form, the polel perfect, is for the purpose of indicating that God has so perfectly measured the distances, motions, and places of the heavenly bodies in the cosmos that they all act as one giant clock with each part functioning precisely as planned and without fail. It is this precision about which the Psalmist is marveling. Hence, the "establishment" of the moon and stars refers to their clockwork precision as they do their particular jobs in the cosmos; whereas the "establishment" of the Earth, due to the Psalmist's addendum that it does not move, refers to the Earth's centrality and immobility around which the moon and stars revolve.

Psalm 19:1-6

> 1The heavens are telling the glory of God; and the firmament proclaims his handiwork.
> 2Day to day pours forth speech, and night to night declares knowledge.
> 3There is no speech, nor are there words; their voice is not heard;
> 4yet their voice goes out through all the earth, and their words to the end of the world. In them he has set a tent for the sun,
> 5which comes forth like a bridegroom leaving his chamber, and like a strong man runs its course with joy.
> 6Its rising is from the end of the heavens, and its circuit to the end of them; and there is nothing hid from its heat.
> 7The law of the Lord is perfect, reviving the soul; the testimony of the Lord is sure, making wise the simple.

In the same familiar manner of Hebrew poetry that is characteristic of the Psalms, vr. 5 first speaks of the sun in metaphorical terms. It is compared to a bridegroom that comes out of his chamber, and a strong man running a race. The purpose of these descriptions is not for mere cosmetic value. These metaphors portray the images of tremendous energy and movement. In fact, there are few images that better represent single-minded determination and vigor than a bridegroom who seeks his bride and an athlete running a race. Both have strong desire firmly in mind and no concern or obstacle can bar them from their appointed goal. One would have to cripple or kill them in order to stop them. So strong are these images that, if the sun did not actually move in a circuit each day, there would be little reason for the Psalmist to employ the metaphors. In fact, the Psalmist uses five distinct words of movement to describe the sun's daily traverse – one describing the background against which the sun moves ("set a tent for the sun"), and four describing

[242] Hebrew here is אלהים (elohim), often translated as "God," but can also refer to angles. RSV, ASV, NAS, NRS translate it here as "God," the KJV and DR as "angels," the NIV as "heavenly beings."

[243] Hebrew כון (*kun*). See footnote on Ps 93:1 and Ps 96:10 for the definition and usage of *kun*.

[244] Hebrew: ירח (moon) וכוֹכבים (and the stars) אשׁר (which) כוֹננתה (you have established). Here the moon is without an article so it is more easily coupled with the stars as one unit.

the sun's movement ("comes forth," "runs its course," "rising" and "circuit").

The addition of "there is nothing hid from its heat" is very significant, since it is a scientific fact that the sun radiates heat. Logically, one scientific fact deserves another. Hence, it follows that the sun's movement must also be a scientific fact, since it would be rather inconsistent to treat one aspect of the sun scientifically and the other unscientifically.

Although vr. 7 is sometimes regarded as the heading of the second section of the Psalm (vrs. 8-14), it is still an important foundation for the truths that are told in vrs. 1-6. The "testimony of the Lord is sure" in all cases. It would certainly be difficult to trust in what the Lord has to say about the spiritual things we cannot see if, indeed, he was not precise about the cosmological objects and movements we can see. In fact, looking back on history, we can safely say that a relativistic interpretation of the above verses has produced a relativism about Scripture in general, which has then led to a relativism of morals.

The accuracy of the account can be noted in the fact that there are only two options for the sun to complete its course. Either it refers to the heliocentric view that believes the sun is traveling around the Milky Way galaxy, or it refers to the geocentric model in which the sun travels around the Earth. Of the two options, we are confined to the latter, since the word "circuit" refers to the time span of one year.[245] In the heliocentric system, the sun travels around the galaxy only once in 250 million years, hence, in that case, the "circuit" of Ps 19:6 could not be completed. Only in the geocentric system wherein the sun travels around the Earth in the period of one year can the passage have any fulfillment and meaning. As it stands, the sun begins its year-long journey at one sign of the zodiac and completes it at the last sign. It is these two points that the Psalmist refers to when he says in vr. 6: "from the end of the heavens…to the end of them."

Of course, some may claim that the Psalmist is speaking "as it appears." Besides the fact that such an interpretation would make the strong imagery superfluous or inappropriate, other passages of Scripture that are more specific about the sun's and moon's movement (*e.g.*, Joshua 10:10-14) and the Earth's non-movement (*e.g.*, Ps 93:1; 96:9-10; 104:5,19) do not, in themselves, allow that option, at least on a grammatical-historical basis.

Galileo's Interpretation of Psalm 19

In a letter to Monsignor Dini on March 23, 1615, Galileo offered an interpretation of Psalm 19 (Psalm 18 in the Vulgate and Douay-Rheims) that was designed to counter the interpretation of Cardinal Robert Bellarmine. Dini told Galileo that Bellarmine was adamant that Psalm 19 afforded no other interpretation than the sun revolving around the Earth. Galileo retorted with the following:

> Now I believe that the passage of the Psalms… "He proceeded as a bridegroom from his chamber and he exalted as a hero in running his course"…I would understand this to be said of the radiating sun, that is, of its light and the above-mentioned spirit which warms and fecundates all material substances and which is most quickly diffused throughout the whole world as soon as it leaves the body of the sun. Every word of the text fits this interpretation exactly. In the word "bridegroom" we have the power to reproduce and make fruitful. "Exalts" refers to the emanations of the sun's rays, which in a way occur by fits and starts, as the meaning clearly shows. "As a hero" or "as a strong man" denotes the efficacious power and activity of penetrating all bodies, together with the highest velocity of motion through immense spaces, for light emanates as though it were instantaneous. The words, "he proceeds from his chamber," confirm that his emanation and motion should be attributed to the light of the sun and not to the body of the sun itself. For the body and globe of the sun is the recipient and "like a chamber" for that light, and it would not be good to say that "the chamber proceeds from a chamber." In what follows, "his progress is from the highest heavens," we have the first derivation and separation of that spirit and light from the highest parts of the heavens, that is, from the stars of the firmament or perhaps from the seats of the

[245] תקופה (*tequphah*) appears four times in the Old Testament. The word literally means "the revolution of the year" (Ex 34:22: "and the feast of ingathering at the year's end"; 2Ch 24:23: "At the end of the year the army of the Syrians came"; 1Sm 1:20: "and in due time Hannah conceived"). Each of these usages is based on the time elapsed in a year.

> most sublime. "And its path goes up to its highest point" refers to the reflection and, as it were, the re-emanation of that light up to that same summit of the world.[246] What follows, "Nor is there any thing which escapes its heat," refers to the vivifying and fecundating heat, which is distinct from the light, and which is much more penetrating through all material substances, even the most dense. For there are many things which fend off and recover from the penetration of light, but from this other power "there is nothing which escapes its heat."[247]

Galileo then goes on to talk about the sunspots he has discovered that seem to indicate that the whole mass rotates. From this he theorizes that all the other celestial bodies rotate, including and especially the Earth. Unbeknownst to Galileo, astronomical science has revealed that only some of the planets rotate, and thus Bellarmine was, by our modern hindsight, correct in disallowing Galileo to make such an unqualified presumption.

Galileo's interpretation of Psalm 19 is precisely what we would expect from someone who, although he might have a devotion to God and Scripture, takes advantage of some of the metaphorical language of the passage so that he can mold it to his preconceived interpretations of the scientific data. The letter to Dini shows quite clearly that Galileo believed Copernicanism was a fact of science.[248] Once he established that premise, it was a rather easy task to apply secondary or alternative meanings to Scripture's words. The same is done today by modern exegetes who have accepted heliocentrism as a scientific fact. Since science, unlike Scripture, usually does not sprinkle metaphors in its celestial descriptions, the public assumes that scientific propositions are precise and unfazed by pride or prejudice, but that Scripture, at least those portions that have a healthy mixture of poetry and prose, are to be molded to conform to one's scientific interpretations, which would then allow a modification to the non-metaphorical words of Scripture so that they, too, can conform. The basic question is, of course: when is Scripture to be interpreted literally and when is it to be interpreted figuratively? Arriving at the answer is sometimes a very difficult process. More contentions in religion, and even within the heart of Christianity, have been caused by whether Scripture is to be interpreted literally or figuratively than probably any other single cause, save man's own blindness caused by sin. Suffice it to say, there must be an ultimate authority on how Scripture is to be interpreted. There really is no other way to solve the problem. As it stands, Bellarmine represented that authority and Galileo himself recognized it. For all his scientific prowess, Galileo knew that the final word rested with the Church, which was guided by the Holy Spirit.

Be that as it may, Galileo's interpretation is rather poor even on a basic exegetical level. For all his attempts at turning the metaphors into representations of the sun's light, Galileo ignores the fact that not once does the passage explicitly refer to the sun's light. Not even the last sentence ("and there is nothing hid from its heat") specifically mentions the sun's light. The addition of "heat" to the passage is more of an afterthought, hence, what emanates from the sun is not the primary focus of the passage. Galileo's attempt to picture light as a strong man running a course is also off the mark. By his own testimony ("for light emanates as though it were instantaneous") light proceeds effortlessly from the sun. There is no labor involved, which is quite opposite the picture we imagine of a runner in a strenuous race against the elements or his opponents.

Additionally, Galileo, perhaps not familiar with the Hebrew of the Old Testament, seems unaware that the word "circuit" (verse 6: "and its circuit to the end of them") refers to the space of one year as opposed to instantaneous emanation.[249] In other words, the Psalmist insists that it takes the sun one

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[246] Original Italian: "Da quello che segue, *a summo caeli egressio eius*, aviamo la prima derivazione e partite di questo spirito e lume dall' altissime parti del cielo, ciò è sin dale stele del frimamento o anco dale sedi più sublimi. *Et occursus eius usque ad summum eius*: ecco la reflessione e, per così dire, la riemanazione dell' istesso lume sino alla medesima sommità del mondo" (*Le Opere di Galileo Galilei*, vol. 5, p. 304).

[247] *Le Opere di Galileo Galilei*, vol. 5, pp. 303-304, as translated by Blackwell in *Galileo, Bellarmine and the Bible*, pp. 214-215.

[248] Galileo states that Copernicanism is "qual è il sapere la vera disposizione delle parti del mondo" ("the knowledge of the true arrangement of the parts of the world") (*Le Opere di Galileo Galile*i, vol. 5, p. 298).

[249] See previous footnote #233 on תקופה (*tequphah*).

year to compete its circuit, whereas to Galileo, due to his interpretation of the Latin Vulgate's "occursus," believes he has room to posit that the sun completes its task instantaneously wherever it is in the universe.

Coupled with the above problem is the beginning of verse 6: "Its rising is from the end of the heavens,") where again Galileo is working off the Latin translation which renders it "a summo caeli egressio eius," and translates literally into English as "to the highest heaven progress his" or more easily "his progress is to the highest heavens."[250] Galileo, appealing to the connotation engendered by the word "progress," is led to think in a metaphysical-type framework, or possibly that the sun's light "progresses" from the stars above it. It is safe to say that neither Galileo nor few, if any, of his contemporaries would have known the actual grammar of the passage, which is somewhat deeper than what our English, or even the Latin, translations can afford us. Saving for the clause "and nothing is hid from its heat," the grammatical structure of Psalm 19:6 [18:7] places "from the end" and "to their ends" at opposite poles of the main clause, and positions "his rising" and "his circuit" as one unit connected by a *waw*-consecutive, which is then placed between the two "end" points noted above.[251] Because a circle has neither beginning nor end, the polarity of "from the end…to their ends" is the colloquial way to describe the dimensions of a circle. If it begins at the ending and ends at the ending, then it has no beginning or ending. It just continues, *ad infinitum*. Within this closed circle, the Psalmist puts both the "rising or going forth" of the sun grammatically adjacent to its "circuit or orbit," thus denoting that the "going forth" is the same as its circuit or orbit that transpires between the two end points, all of which takes place in one year. With the additional fact the passage does not mention the stars as an end point, Galileo's interpretation is high on imagination but rather low on solid evidence.

1Chronicles 16:30

> Tremble before him, all the earth; yea, the world stands firm, never to be moved.

Psalm 93:1-2

> [1]The Lord reigns; he is robed in majesty; the Lord is robed, he is girded with strength. Yea, the world is established; it shall never be moved.
> [2]thy throne is established from of old; thou art from everlasting.

The point of these passages is to portray the Lord's majesty and strength, as a king who wears his royal robes signifies that he reigns supreme over all the land and has subdued all his enemies. One specific display of the Lord's power is that he has established the world so that it cannot move. Like the throne of a king that does not move unless by his order, so the world has been set and will not be moved.

Although the comparison between the strength of God and the stability of the world is quite evident in the passage, there are very few options available regarding the meaning of the "establishment of the world" if one seeks to make a legitimate comparison to God. The world cannot refer to the political machinations of the nations, for they shift quite frequently. It could not refer to the whole universe, since if the universe were moved, to where would it move? The best way the Psalmist's analogy can have its intended effect is if an object exists that is unmoved in the midst of all other objects that are moving. For example, if the Psalmist were referring to an unmoving Earth, then the image displayed by Ps 93:1 would be most accurate, for the Earth would be the only body at rest in the midst of a sea of moving bodies in the heavens. The Earth would be the only foundation point; the only immovable object, and thus the best example to picture of the immutability of God himself. More to the point is that Ps 93:2 adds that God's throne is also "established."[252] Logically, if his throne does not

[250] The Latin Vulgate, which for Psalm 19:6 is Psalm 18:7, has: "a summo caeli egressio eius, et occursus eius usque ad summum eius nec est qui se abscondat a calore eius," of which both clauses are somewhat inadequate in relaying the original Hebrew.

[251] The Hebrew word order is as follows: מקצה (from the end of) השמים (the heavens) מוצאו (his rising, or going forth) ותפוקתו (and his circuit or orbit) על (to) קצותם (their ends).

[252] Ps 93:1 and 93:2 use the same Hebrew word for "established," the word כון (*kun*), which appears over a hundred times in the Old Testament in most of the Hebrew tenses. In vr. 1 it is utilized in the Niphal

move then the world cannot move. The intended imagery would be identical to passages that call the Earth the "Lord's footstool," since footstools are understood to be at rest, not moving.[253]

Some might object that the phrase "shall never be moved" could also be translated as "shall never be shaken." If that is the case, then one could argue that a "shaking of the world" could have some political overtones. This might be true, except for the fact that the political systems of the world are inherently unstable, and thus they would not make a good comparison in displaying the strength and throne of God almighty. Conversely, the physical world, marked as it is by times and seasons that have been repeating themselves in exact precision for eons, is the only possible "world" that could be compared to the infinite stability of God.

In actuality, if the proper translation were "shaken" rather than "moved," this would only enhance the imagery of an immobile Earth, for this interpretation would require that the Earth be so firm in its position that it would not only be prohibited from rotating or revolving, but it would also be prohibited from shaking. As we learned in the science portion of this work, the Earth is held in space by the combined torque of the whole universe. To move the Earth would require that it overcome the combined torque of the universe. Consequently, we can see why this particular Hebrew word (*mōht*) for "move" or "shaken" was chosen, since it includes the Earth's resistance to even the slightest outside movement.[254] If vibration occurs, it will occur within the internal structure of the Earth but not with respect to the Earth's position in space. In fact, the reason earthquakes occur is that the internal movements within the Earth are rubbing against the external forces that are keeping the Earth immobile in space.

The only other detail of Ps 93:1-2 regards the meaning and usage of the word "world." As it stands, the Hebrew consistently uses the term in reference to the earth, not the universe at large.[255] Hence, it is the Earth alone that is kept immobile, not the universe.

Psalm 96:9-11

> [9]Worship the Lord in holy array; tremble before him, all the earth!
> [10]Say among the nations, "The Lord reigns! Yea, the world is established, it shall never be moved; he will judge the peoples with equity."
> [11]Let the heavens be glad, and let the earth rejoice; let the sea roar, and all that fills it;

imperfect and in vr. 2 in the Niphal participle, which is the simplest of the passive tenses. Although *kun* includes the concept of an original founding date (*e.g.*, "the building was established in 1955"), it also includes the concept of stability and longevity (*e.g.*, "the rock of Gibraltar was established"). *Kun* also refers to rest or immobility (Jg 16:26: "and Samson said to the lad who held him by the hand, 'Let me feel the pillars on which the house rests'"; 16:29: "And Samson grasped the two middle pillars upon which the house rested"; Er 3:3: "They set the altar in its place").

[253] Is 66:1; Mt 5:35. In all of these passages the notion of "rest" for the Lord's footstool is emphasized: Is 66:1: "Heaven is my throne and the earth is my footstool; what is the house which you would build for me, and what is the place of *my rest*?"; 1Ch 28:2: "I had it in my heart to build a *house of rest* for the ark of the covenant of the Lord, and for the footstool of our God"; Ps 132:7-8: "Let us go to his dwelling place; let us worship at his footstool! Arise, O Lord, and go to thy *resting place*, thou and the ark of thy might" (see also Ac 7:49). "Rest," of course, refers to motionlessness, which is appropriate in the Earth's case only if it is not moving through space.

[254] Hebrew: מוט (*mōht*) appears 39 times in the Old Testament, 20 in the Psalms. The Qal form appears 13 times, 23 times in the Niphal, and one each in the Hiphil and Hithpael. It can refer to things as simple as slipping with the foot (Dt 32:35; Ps 17:5; 38:16-17) to moving the earth (Ps 82:5; Is 24:19). *Mōht*, in the physical sense, refers to the transition from a state of rest to a state of movement; in the figurative sense, from a state of stability to a state of instability. Of all the words in Hebrew referring to movement (*e.g.*, חפץ, חרץ, נדד, נוע, פוק, רחף, *et al*) מוט (*mōht*) is used when any, even the slightest movement, is in view. Hence, it can refer to a shaking or vibration as well as a change of location.

[255] Hebrew: תבל (*tebel*) appears 38 times in the Old Testament. It is often a poetic synonym of ארץ (*erets*) referring to the "earth" (*e.g.*, 1Sm 2:8; Ps 33:8; 77:18; 90:2; Is 34:1; Lm 4:12), but in non-poetic contexts it sometimes has a larger focus than the physical world and may include the more abstract notions associated with existence, such as the totality of human consciousness (*e.g.*, Is 24:4; 26:9). In the non-poetic passages that *tebel* is used without *erets*, *tebel* always refers to the earth or that which is inhabited by mankind (*e.g.*, 2Sm 22:16; Is 13:11; 14:17, 21; 18:3), not to the universe at large.

Here again the Hebrew כּוּן *kun* and מוֹט *mōht* appear in tandem. Although it would be proper to interpret *kun* ("established") and *mōht* ("moved") as words conveying the idea that the Lord's reign over the nations is such that it will be uninterrupted and always produce justice, the unavoidable dimension of this passage is that the Lord's reign is being compared to the already known fact of the world's immovability, and it is the Hebrew poetic form that brings these two dimensions into comparison. Without the poetic form, the passage could have simply stated: "The Lord's reign is established and it shall never be moved, he will judge the people with equity," and the salient point of the Psalmist would have been accomplished nonetheless. But within the poetic form, the Psalmist is drawing on facts he and other authors have stated elsewhere about the world's establishment and immobility, such as Ps 104:5: "Thou didst set the Earth on its foundations, so that it should never be shaken" or 1Ch 16:30: "tremble before him, all the Earth; yea, the world stands firm, never to be moved." In other words, he is using the scientific fact of the Earth's motionlessness as the basis for the analogy as to why the Lord will always reign and judge with equanimity. Both states will always be true: (1) the Lord will reign with equity, and (2) the world will never move. One verifies and supports the other. If one fails, the other fails also.

We can imagine how difficult it would have been for the Psalmist to prove his point if, indeed, the world was constantly moving through space. If it were a fact that the Earth was moving, the Pslamist would, instead, have had to make a comparison between the stability of the Earth's orbit and the stability of the Lord's reign. In actuality, however, he cannot do so, because previously he had made a comparison between the stability of the Lord's reign and the orbit of the sun (*e.g.*, Ps 19:4-14), and thus it would not be permissible now to compare the Lord's reign to the orbit of the Earth, since obviously both the sun and the Earth cannot be orbiting around each other.[256]

On a theoretical basis, one might object that since the Psalmist regards the sun as orbiting the Earth he could just have easily regarded the Earth as orbiting the sun, since both systems are equivalent, geometrically speaking. But although the geometrical reciprocity between the two celestial models is true, the Psalmist is working from a perspective of propositional truth that will only allow him to appeal to the *actual* celestial model and force him to discount its geometric or mathematical equivalent. That is, since the Psalmist's major point concerns the eternal stability of God's reign, he can only communicate that important truth analogously if he knows which celestial model is actually true, the heliocentric or the geocentric. Any false information will necessarily negate his analogy.

To say it another way, although one could argue that from a relativistic perspective the Psalmist has the option of using the stability of an orbiting Earth as the analog to the Lord's stable reign, the fact remains that he, in the general scope of his Psalmic writings, chooses an immobile Earth (Ps 96:10) and a moving sun (Ps 104:4-6). This choice is significant, since in order to make the analogy he is proposing valid, the Psalmist must base it on an incontrovertible scientific fact. If he chooses the wrong celestial model, his very purpose in creating the analogy is defeated, for the Lord's reign cannot be compared to something fictitious. Either the Earth is fixed and the sun moves around it, or the sun is fixed and the Earth moves around it. Both cannot be true, and the Psalmist must adopt the correct one in order for his analogy to be genuine.

In retrospect, we can see why the Psalmist does not state cosmological truths as mere brute facts. Rather, to make the strongest argument, he purposely compares the immobility of the Earth to the unshakable reign of the Lord, since in serving as witnesses to one another, both must be absolutely true, or, consequently, both are absolutely false. Similar to instances in which God swears to Himself because he can find no one greater to serve as a witness (*cf.* Hb 6:13-18), so here in the Psalms we have the Lord comparing his unflappable divine justice to a divinely-set immovable object.

Some might object, however, that passages such as Ps 82:5 ("They have neither knowledge nor understanding, they walk about in darkness; all the foundations of the earth are shaken") contradict the above conclusion that the Earth does not shake. A careful comparison, however, will show that Ps 82:5 specifies that the "foundations" of the Earth, not the Earth itself, are shaken, while Ps 96:10 says that the *world*, in its totality, will not be shaken or moved.[257]

[256] Moreover, mutual orbiting around a common center of mass will also not satisfy the Psalmist since in that case neither the sun revolves around the Earth nor the Earth revolves around the sun.

[257] The same emphasis on the "foundations" is noted in the following passages: Ps 18:7: "Then the earth reeled and rocked; the foundations also of the mountains

As noted earlier, the "foundations" of the Earth are part of the inner structure of the Earth which lie beneath its surface. The foundations may shake but they will not move the Earth itself out of the position in space God has given it.

Psalm 75:2-4

> 2At the set time which I appoint I will judge with equity.
> 3When the earth totters, and all its inhabitants, it is I who keep steady its pillars. *Selah*
> 4I say to the boastful, "Do not boast," and to the wicked, "Do not lift up your horn."

Here the "tottering" refers to the Earth's land mass, not the Earth's position in space. Although the land mass may totter, and perhaps even vibrate its pillars, ultimately God holds the pillars in position and the Earth's surface remains firm. The Hebrew word for "totters" is מוג (*moog*), which refers mostly to "melting" or some kind of structural weakening.[258] Similar to all the other Psalms that speak in this same way, the movement attributed to the Earth refers to its internal structure, not its spatial position in the cosmos.

Psalm 104:5, 19

> 5Thou didst set the earth on its foundations, so that it should never be shaken.
> 19Thou hast made the moon to mark the seasons; the sun knows its time for setting.

This Psalm makes an important distinction from the other Psalms that speak of the foundations of the Earth shaking, particularly Ps 82:5 ("They have neither knowledge nor understanding, they walk about in darkness; all the foundations of the earth are shaken"). Ps 104:5 is very similar to Ps 96:10: "Yea, the world is established, it shall never be moved," since both passages are speaking about the Earth's position in space. The word for "foundations" in Ps 104:5 is not the normal word used for "foundations of the Earth," but the Hebrew מכון (*mahchon*), which refers to a fixed place.[259] As such, it is referring to the fact that the Earth is positioned in its spatial foundation (*e.g.*, Jb 26:7: "he…hangs the Earth upon nothing") from which it cannot be moved or shaken. Additionally, in contrast to the Earth's spatial immobility, the Psalmist speaks in vr. 19 of both the moon and the sun moving in space to accomplish their particular tasks.

Psalm 119:89-91

> 89For ever, O Lord, thy word is firmly fixed in the heavens.
> 90Thy faithfulness endures to all generations; thou hast established the earth, and it stands fast.
> 91By thy appointment they stand this day; for all things are thy servants.

There are several interesting features to this passage. First, the phrase "stands fast" is from the Hebrew עמד (*amad*), the same word appearing in Joshua 10:12-13 in reference to the sun and moon that *temporarily* had no spatial movement in the sky. But here in Psalm 119 it is applied to the Earth that is *always* without movement. It does not refer merely to the existence of the Earth, since the preponderant usage of *amad* in Hebrew refers to the lack of motion or the deliberate cessation of

trembled and quaked, because he was angry." Similar rationale can be applied to Ps 46:2; 60:2; 68:8; 97:4; 99:1; 104:32.

[258] Hebrew מוג (*moog*), appears 17 times in the Old Testament, mostly as "melt" (*e.g.*, Ex 15:15; Ps 46:6; Am 9:5), sometimes "faint" (*e.g.*, Js 2:9; Jr 49:23). Ps 75:3 is in the Niphal participle ("when the Earth and its inhabitants are melting…").

[259] Hebrew מכון (*mahchon*) appears 17 times in the Old Testament, and refers to a settled and immovable place. In 16 of the references it refers to God's dwelling place that is impenetrable and immovable (*e.g.*, Ex 15:17; 1Kg 8:13, 39, 43, 49; 2Ch 6:2, 30, 33, 39; Er 2:68; Ps 33:14; 89:14; 97:2; Is 4:5; 18:4). The only time God's "place" is moved is in the apostasy (Dn 8:11). The word מכון is applied to the Earth once (Ps 104:5), which states that the Earth is set into its מכון, from which it cannot be shaken or moved. A similar word is מכונה, the feminine form of מכון, which appears 24 times and is normally translated as "stands" or "base" (1Kg 7:27-43).

motion.[260] *Amad* is also the word behind the phrase "they stand" in vr. 91, although it is in the plural since it is referring to both "all generations" and the "Earth." By the same token, the Psalmist is careful not to imply that the "heavens" themselves stand fast like the Earth; rather, the heavens are merely an indication of the general steadfastness of the Lord's word.[261] As was the case in Ps 96:9-11, the Psalmist is comparing the very character of God to the scientific fact of the Earth's motionlessness. One fact supports the other.

Ecclesiastes 1:4-7

> 4A generation goes, and a generation comes, but the earth remains for ever.
> 5The sun rises and the sun goes down, and hastens to the place where it rises.
> 6The wind blows to the south, and goes round to the north; round and round goes the wind, and on its circuits the wind returns.
> 7All streams run to the sea, but the sea is not full; to the place where the streams flow, there they flow again.

In 1579, Didacus à Stunica, in his famous commentary on Job in which he opted for the Copernican system, stated the following about the above passage:

> "that text signifieth no more but this, that although the succession of ages, and generations of men on earth be various, yet the earth itself is still one and the same, and continueth without any sensible variation…and it hath no coherence with its context (as Philosophers show) if it be expounded to speak of the earth's immobility. The motion that belongs to the earth by way of speech is assigned to the sun even by Copernicus himself, and those who are his followers….To conclude, no place can be produced out of Holy Scriptures which so clearly speaks the earth's immobility as this doth its mobility. Therefore this text of which we have spoken is easily reconciled to this opinion. And to set forth the wonderful power and wisdom of God who can indue the frame of the whole earth (it being of monstrous weight by nature) with motion, this our Divine pen-man added: 'And the pillars thereof tremble.' As if he would teach us, from the doctrine laid down, that it is moved from its foundations.[262]

Stunica, whose book was eventually condemned in 1616 along with Galileo's works, sees no problem interpreting the passage the exact opposite of what the face value wording exhibits. He attempts to reverse the role of the sun's movement against the Earth's immobility by appealing to what a tremendous feat it would be, and a point he feels that Solomon himself wishes to stress, for God to move such a heavy object as the Earth around the sun. Hence, according to Stunica, if we should glean any truth about the physical universe from this verse it should be that putting the Earth in motion is a testimony to the great power of God, and therefore Copernicanism is vindicated as more worthy than models advocating a non-moving Earth. Apparently, it didn't occur to Stunica that it would have been an even more tremendous feat for God to move the sun around the Earth, since now we know that it is a million times bigger than the Earth and weighs 333,000 times as much.

Irrespective of Stunica's poor attempt, there are several important features to the passage. First, by making reference to what we now know are scientific facts (*e.g.,* the circuits of the wind and the courses of rivers running into the sea), the context establishes itself as teaching general facts about terrestrial events. That being the case, one can logically assume that the passage is also giving scientific information about the celestial events it addresses, namely, the movement of the sun between the horizons. Although one might object that the language of the 'sun rising' and 'sun going down' is

[260] Hebrew עמד (*amad*) appears over 500 times in the Old Testament, usually denoting the conscious decision of the individual to cease motion and remain in a certain position (*e.g.*, Gn 19:27; 41:46; 2Ch 34:31).

[261] The RSV's "firmly fixed" in Ps 119:89 is the Hebrew נצב (*nahtzab*), a frequently used word in the Old Testament referring to something built or erected with firmness or authority.

[262] Quoted in Thomas Salusbury's *Mathematical Collections and Translations*, London, 1616, pp. 468-470, as cited in Stimson's *The Gradual Acceptance of the Copernican Theory of the Universe*, pp. 44-45.

phenomenal, this does not prove that the sun does not revolve around the Earth in the scientific sense. If the author of the passage is working from knowledge of the scientific fact of the sun's movement, he could describe a revolving sun either from the phenomenal perspective (*e.g.,* sun rising or setting) or from the actual perspective (*e.g.,* the sun revolves around the Earth). Considering that the author knows the scientific facts about the courses of the Earth's winds and rivers, he would most likely know the scientific facts concerning the other objects that traverse the Earth's domain, in this case, the sun. Not only does the author appear familiar with the science of the sun's course, he also knows enough to describe the movement as one requiring much labor.[263] This was the very reason that Cardinal Bellarmine appealed to the "wisdom of Solomon" to defend geocentrism when he confronted Galileo, which we will see in more detail in Chapter 14.

Second, similar to other passages that speak of the Earth's stability, Solomon says that the Earth "remains forever." By itself, we may grant that the clause may be making a mere indicative statement that the Earth exists and remains unchanged while a new population of human beings appears every generation. In the context of a moving sun, however, the implication of the clause tends more toward affirming the truth stated in other passages, namely, that the Earth is motionless in space. The Hebrew word for "remains" is עמד (*amad*), which is the same word employed both by the Psalmist to depict the Earth's motionlessness and by Joshua to describe the cessation of both the sun's and moon's movement (Js 10:13). Moreover, while the sun and moon of Joshua's day ceased their movement temporarily, Solomon tells us that the Earth maintains its celestial *amad*, "forever," from the Hebrew word עולם (*olam*), which can refer to an unending time or a long but indefinite period. In the case of the Earth's state of motionlessness, *olam* is the appropriate word to use since the Earth will remain as it is at least until the end of time, and perhaps continue as such in the New Heaven and New Earth.[264]

Ecclesiasticus (Sirach) 43:1-10

1The pride of the heavenly heights is
the clear firmament, the appearance of
heaven in a spectacle of glory.
2The sun, when it appears, making
proclamation as it goes forth, is a
marvelous instrument, the work of the
Most High.
3At noon it parches the land; and who
can withstand its burning heat?
4A man tending a furnace works in
burning heat, but the sun burns the
mountains three times as much; it
breathes out fiery vapors, and with
bright beams it blinds the eyes.
5Great is the Lord who made it; and at
his command it hastens on its course.
6He made the moon also, to serve in its
season to mark the times and to be an
everlasting sign.
7From the moon comes the sign for
feast days, a light that wanes when it
has reached the full.
8The month is named for the moon,
increasing marvelously in its phases,
an instrument of the hosts on high
shining forth in the firmament of
heaven.
9The glory of the stars is the beauty of
heaven, a gleaming array in the
heights of the Lord.
10At the command of the Holy One
they stand as ordered, they never relax
in their watches.

This passage provides confirmation of the sun's circular course around the Earth. Ecclesiasticus (or Sirach) was written late in Israel's history (circa 180 B.C.). About two-thirds of the original Hebrew of the book has been recovered, the other one-third is dependent on the surviving Greek translation. The time period of its writing is significant for the simple reason that the Greek philosophers during this period were debating amongst themselves whether the

[263] The author uses the Hebrew word שאף (*shaaph*) which refers to the panting or gasping that comes from hard labor. As we noted in the scientific portion of this book, the sun travels in the opposite direction to the rotation of the universe, lagging behind by about one degree per day due to the sheer force of the universe's current, which then makes the sun appear to travel through the zodiac once per year.

[264] *Cf.* Is 65:17; 66:22; 2Pt 3:10-13; Ap 21:1.

Earth was fixed with the sun revolving around it or vice-versa: *e.g.*, the Pythagorean school of heliocentrists: Plato**,** Philolaus, Pliny, Aristarchus, and Seleucus versus the geocentric school of Aristotle, Hipparchus, Theon of Smyrna, Appolonius.[265] The Hebrews maintained their belief in the geocentric cosmos so as to remain in the tradition received from their inspired writings. Identical to the writers which came a millennia or so before him, Sirach makes a seamless presentation of scientific facts, treating the sun as a body which moves with tremendous speed at the same time that he describes it as a marvelous heat-producing machine, both he considers as scientific facts. At no time does any biblical writer treat the sun's movement as unscientific or illusionary or treat its heat as the only firm scientific fact about its nature or task.

Job 9:6-10

> 6who shakes the earth out of its place,
> and its pillars tremble;
> 7who commands the sun, and it does
> not rise; who seals up the stars;
> 8who alone stretched out the heavens,
> and trampled the waves of the sea;
> 9who made the Bear and Orion, the
> Pleiades and the chambers of the south;
> 10who does great things beyond
> understanding, and marvelous things
> without number.

The shaking of the Earth here refers to the land mass of the Earth, since the Hebrew word for "Earth" is אֶרֶץ (*erets*) which can refer to "land" or "Earth." In other words, Job is describing an earthquake. This is confirmed by the fact that it is the "pillars" of the Earth that are specifically stated as "trembling." But if one were to insist that *erets* refers to the whole Earth, this would only strengthen the geocentric argument, since in order for the whole Earth to be shaken out of its place it must have had a place in which it was previously at rest. If the Earth were in orbit and the orbit were disturbed, the appropriate language would be "shaken out of its path" or "shaken out of its course" not "out of its place."

The other geocentric dimensions to the passage are the fact that the sun is viewed as a moving object ("who commands the sun, and it does not rise") and that the constellations ("the Bear and Orion, the Pleiades") produce their respective forms only when viewed from Earth, whereas outside of Earth the forms do not exist.

Job 22:13-14

> 13Therefore you say, "What does God
> know? Can he judge through the deep
> darkness?
> 14Thick clouds enwrap him, so that he
> does not see, and he walks on the vault
> of heaven."

This passage is important because it speaks of "the vault of heaven." The word "vault" is the Hebrew noun חוּג (*chog*), which appears only three times in the Old Testament. The other two references are Pr 8:27 ("circle on the face of the deep") and Is 40:22 ("circle of the Earth"), both of which refer to a "circle" or "circuit." The verbal form appears once in the Qal perfect in Jb 26:10 as "described a circle" (see Jb 26:10 below). The important point to be gleaned from these passages is that the heavens are said to have a circle in which God moves (Jb 22:14) but the Earth has a circle over which God sits (Is 40:22). In the former God is moving, while in the latter he is stationary. Since the Earth does not move, God can remain at rest above it.

Job 26:7-9

> 7He stretches out the north over the
> void, and hangs the earth upon
> nothing.
> 8He binds up the waters in his thick
> clouds, and the cloud is not rent under
> them.
> 9He covers the face of the moon, and
> spreads over it his cloud.

The above verses are part of the answer that Job gives to Bildad the Shuhite who has accused Job of

[265] Other Greeks include: Anaximander, who held to a central Earth surrounded by spherical heavens; Parmenides held to a central Earth with evenly spaced concentric spheres surrounding it; Xenophanes held to a central Earth and stars that moved rectilinearly; Empedocles also held to a central Earth but an infinite universe; whereas Hiketas Heraklides and Ekphantus held that the Earth rotates in a non-moving heavens.

being unjust and therefore deserving of the calamities that God has allowed to come upon him. Bildad's ending words in Jb 25:4-6 are quite stinging:

> 4How then can man be righteous before God? How can he who is born of woman be clean? 5Behold, even the moon is not bright and the stars are not clean in his sight; 6how much less man, who is a maggot, and the son of man, who is a worm!

In his opening response, Job affirms God's greatness by remarking on his creative actions. Similar to the Psalms, Job speaks of environmental phenomena in a scientific sense, yet in simple language (*e.g.*, vr. 8: water accumulates in clouds and yet the cloud does not tear itself apart or drop from the sky because of its weight). The unique dimension that Scripture gives to these events is that God is behind them all and thus they are not mere brute forces of nature. Where the dividing line between God's action and natural events actually exists is not discussed, however. It is just assumed by both the writer and reader that ultimately God is the cause of all we see in nature.

Verse 7 begins the listing of God's astounding feats by stating that he "stretched out the north over the void." The verb "stretched" is a Qal participle (נטה) referring to a past action that was in progress at one time, namely the beginning days of creation in Gn 1:1-2. The word "north" is the normal Hebrew word but there is no article, thus it can serve both as the north direction and as a synecdoche for the heavens.[266] It is the heavens or firmament that Scripture refers to as being "stretched out."[267]

The Earth is understood as separate from the north or heavens. While they are stretched out, the Earth is held motionless. Moreover, the Earth is not said to hang in the heavens, rather, it hangs on "nothing." In fact, Scripture never says that the Earth is in the heavens or is part of the heavens. It is suspended in a neutral position that is not part of the cosmos. This unique position is also immovable, since the word "hangs" denotes that once the Earth is placed in its special position it remains there by God's constant power.[268] Scientifically speaking, we noted earlier that if the Earth is the center of mass for the entire universe, all forces are neutral at the center; and whatever is placed in the center is immovable. As Newton himself put it: "That the center of the system of the world is immovable….This is acknowledged by all, although some contend that the Earth, others that the sun, is fixed in that center."[269] Moreover, if there is no single force holding the Earth in its position then the Earth cannot be revolving around the sun, for in that case the sun's gravity would determine the position of the Earth.

Job 26:10-11

> 10He has described a circle upon the face of the waters at the boundary between light and darkness.
> 11The pillars of heaven tremble, and are astounded at his rebuke.

Proverbs 8:27-30

> 27When he established the heavens, I was there, when he drew a circle on the face of the deep,
> 28when he made firm the skies above, when he established the fountains of the deep,

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[266] The Hebrew sentence is as follows: נטה (he stretched) צפון (north) על־תהו (over the void). The coupling of "north" and the heavens is also noted in Is 14:13: "I will ascend to heaven…in the recesses of the north."

[267] Jb 9:8: "who alone stretched out the heavens"; Ps 104:2: "he stretched out the heavens like a tent"; Is 42:5: "who created the heavens and stretched them out"; Is 45:12: "it was my hands that stretched out the heavens" (see also Is 40:22; 51:13; Jr 10:12; 51:15; Zc 12:1).

[268] "hangs": Hebrew: תלה, Qal participle representing a continuing action. It would seem from the grammatical form chosen for Jb 26:7 that God continually works to keep the Earth in its immobile position. "Nothing" is the common Hebrew word בלי, (*beli*) meaning "without," combined in construct form with the indefinite pronoun מה (*mah*), meaning "anything" or "aught."

[269] Isaac Newton, *Philosophiae Naturalis Principia Mathematica*, Book 3, "The System of the World," Proposition X. In Proposition XI Newton adds: "That the common center of gravity of the Earth, the sun, and all the planets, is immovable. For that center either is at rest or moves uniformly forwards in a right line; but if that center moved, the center of the world would move also, against the Hypothesis."

[29]when he assigned to the sea its limit, so that the waters might not transgress his command, when he marked out the foundations of the earth,
[30]then I was beside him, like a master workman; and I was daily his delight, rejoicing before him always.

As is the case with most of the wisdom literature of the Old Testament, the writers have a knack for putting scientific truths in poetical form with just the right amount of rhythmical cadence. To express such profound truths with such an economy of words that never lose their aesthetic or alliterative appeal is truly the mark of good writing. Moreover, the common man can easily confirm these truths since, for example, he is quite aware that the sea stops at the shore line; that the tides go in and out like clockwork; and that the water/land boundary is so precisely marked that all life on Earth is sustained by its delicate balance.

The truth that is expressed both in Jb 26:10: ("a circle upon the face of the waters between the boundary of light and darkness") and Pr 8:27: ("he drew a circle on the face of the deep") is spoken from a geocentric perspective. The "circle" would correspond to either the equatorial line separating the hemispheres of the Earth (and its corresponding lines of latitude), or the meridian line separating east from west (and its corresponding lines of longitude). When one half of the Earth is light, the other half is dark. In this sense, the Earth can be viewed as a spherical grid that can extend itself outward to point to every sector of the universe, and it could only do so if it was in the exact center of the universe and at the immobile fixed point upon which all coordinates are based.

Wisdom 7:15-22

[15]May God grant that I speak with judgment and have thought worthy of what I have received, for he is the guide even of wisdom and the corrector of the wise.
[16]For both we and our words are in his hand, as are all understanding and skill in crafts.
[17]For it is he who gave me unerring knowledge of what exists, to know the structure of the world and the activity of the elements;
[18]the beginning and end and middle of times, the alternations of the solstices and the changes of the seasons,
[19]the cycles of the year and the constellations of the stars,
[20]the natures of animals and the tempers of wild beasts, the powers of spirits and the reasonings of men, the varieties of plants and the virtues of roots;
[21]I learned both what is secret and what is manifest,
[22]for wisdom, the fashioner of all things, taught me.

The author states that God has given him knowledge of the inner workings of the cosmos. But it is not just mere knowledge, it is "unerring knowledge."[270] Part of the unerring information he knows is the "structure of the world," which we might assume contains the data of whether or not the Earth is the center of the universe's structure. If the "knowledge" contained information that the Earth was in the center and was immobile yet this was not a scientific fact, then it could not be considered "unerring." Knowledge that contains no error must be factual and cannot be excused by appeals to phenomenology. If the details of the cosmos that he knows unerringly include such things as "the activity of the elements," "the alterations of the solstices," "the changes of the seasons," and the "constellations of the stars," surely it must contain the data of whether these seasons and solstices are caused by the universe rotating around the Earth or the Earth rotating and revolving within the universe. As it stands, the writer of Wisdom who claims to have "unerring knowledge" gives us no evidence of moving Earth; but consistently refers to the heavenly bodies as those that move, *e.g.*, Ws 13:2: "the circle [or circuit] of the stars."

1Esdras 4:34 (apocryphal)

[34]The earth is vast, and heaven is high, and the sun is swift in its course, for it makes the circuit of the heavens and returns to its place in one day.

[270] Greek: γνῶσιν ἀψευδῆ, literally, "knowledge without falsity."

Here the sun's daily movement in a 360 degree circuit is given in stark detail. It is treated as a scientific fact. It is buttressed by two other scientific facts, namely, the Earth's vastness and the height of the heavens above the Earth (*cf.* Jr 31:37; Jb 38:33).

Passages Purported to Support Heliocentrism

Job 38:12-14

> 12"Have you commanded the morning since your days began, and caused the dawn to know its place,
> 13that it might take hold of the skirts of the earth, and the wicked be shaken out of it?
> 14 It is changed like clay under the seal, and it is dyed like a garment.

Far from supporting a moving Earth, this passages actually strengthens the argument against it. Prior to God's "shaking" or "changing" of the Earth, the writer assumes that the Earth's normal state is one without any disturbing motions. Even in the highly metaphorical language employed by this writer, he specifies that it is only when the wicked reach a point of divine judgment that God even considers setting aside the Earth's normal state and separating the wicked from the Earth by shaking it. There is certainly nothing in this passage which suggests that the normal state for the Earth is one of movement (*e.g.*, rotation and revolution). Even the words used in the metaphor do not necessarily denote a disturbing movement, since the word "changed" is from the Hebrew word that preponderantly refers to an internal change rather than a change of position in space.[271]

Psalm 82:5

> They have neither knowledge nor understanding, they walk about in darkness; all the foundations of the earth are shaken.

Psalm 99:1

> The Lord reigns; let the peoples tremble! He sits enthroned upon the cherubim; let the earth quake!

As we noted previously in the analysis of Ps 96:10 above, these two Psalms are speaking about the disruptions that occur inside the Earth intermittently, not the cessation of an assumed rotation on an axis or revolution around the sun.

Isaiah 13:13

> Therefore I will make the heavens tremble, and the earth will be shaken out of its place, at the wrath of the Lord of hosts in the day of his fierce anger.

Isaiah 24:19-23

> 19 The earth is utterly broken, the earth is rent asunder, the earth is violently shaken.
> 20 The earth staggers like a drunken man, it sways like a hut; its transgression lies heavy upon it, and it falls, and will not rise again.
> 21 On that day the Lord will punish the host of heaven, in heaven, and the kings of the earth, on the earth.
> 22 They will be gathered together as prisoners in a pit; they will be shut up in a prison, and after many days they will be punished.
> 23 Then the moon will be confounded, and the sun ashamed; for the Lord of hosts will reign on Mount Zion and in Jerusalem and before his elders he will manifest his glory.

Once again, identical to Jb 38:14, the two Isaiah passages assume that the normal state for the Earth is one of non-motion and non-vibration, the precise scientific requirements for geocentrism. It is only an extraordinary event that could alter that state of rest. In this case, the language is obviously apocalyptic and thus points to one specific day in which the cosmos will be disrupted from its normal course.

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[271] "changed": Hebrew: תתהפך, to turn or transform. The root word הפך appears over 75 times in the Old Testament, mostly in the Qal tense signifying an "overthrowing" or changing of form (*e.g.*, Lv 13:3; Dt 29:23). Only in the Hithpael participle does it refer to an actual movement, which occurs 3 times (Gn 3:24; Jg 7:13; Jb 37:12).

Job 37:18

The Constitution of the Firmament

Can you, like him, spread out the skies, hard as a molten mirror?

During the seventeenth-century investigations of the Congregation of the Holy Office into the Copernican theory, a Carmelite friar by the name of Fr. Paolo Foscarini was censured in 1615 (prior to the Galileo case) for his heliocentric cosmology. Little known is the fact that he was also censured for his belief that the heavens were "very thin and tenuous." Among other things, the censor stated:

> On page 45 he says that the heavens are very thin and tenuous, not solid and dense. This is clearly contrary to Job 37* 'Together with this you have created the heavens which are most solid and spread out like the air.' This cannot be explained as an appearance (as the author indicates) because the solidity of the heavens is not apparent to us.[272]

Obviously, the Catholic censor was treating Job 37:18 the same way the Catholic Church was treating the geocentric verses – they were taken at face value and considered factual truth, regardless of what subject matter they addressed. Here we see that even the particulate constitution of the space constituting all of the heavens is not considered a trivial and obscure point that can be ignored. It is regarded with the utmost divine authority and the basis for rejecting Foscarini's whole approach to Scripture. The battle ground here, as we will see in Chapter 14, is: can Scripture be trusted to give us factual information about the cosmos in addition to its already accepted infallible authority on faith and morals? The answer of the Catholic Church of the 17th century was an unequivocal and unqualified 'affirmative,' as it was for the sixteen centuries prior.

Accordingly, Job 37:18 has some very interesting features that support the censor's contention against Foscarini. The Hebrew sentence reads as follows: תרקיע ("can you beat out or spread out") עמו ("with him") לשחקים ("the sky, the heavens") חזקים ("hard") כראי ("like a mirror") מיצק ("cast"). The first word, תרקיע, is a verb appearing twelve times in the Hebrew bible and normally means "to spread or stretch out."[273] It is very similar to the noun רקיע, which is translated as "firmament" in Genesis and the Psalms.[274]

The word לשחקים ("the sky, the heavens") is from the root שחק and appears twenty-one times as either "sky";[275] "clouds"[276] "heavens,"[277] or even "dust,"[278] with a notable difference between "sky" and "clouds."[279] All in all, it carries the idea of a finely-grained substance that fills the sky, and by extension, the rest of the space of the firmament.

The word חזקים ("hard") appears over forty times and is translated as "strong" (Ex 13:9); "mighty" (Ex 32:11); "hard" (Ez 3:9). The word מיצק ("cast") is from the root יצק and is translated variously as "cast" (Ex 25:12); "pour" (Lv 2:1); "forms" (Jb 38:38); "firm" (Jb 41:23-24); "attached to" (Ps 41:8); "molten" (1Kg 7:16). The literal meaning is that the sky, heavens or firmament, is not a tenuous, vaporous entity. Although ostensibly it is transparent and pliable, on another level (implied is the subatomic level), Jb 37:18 indicates the heavens are composed of an extremely dense material substance. At the beginning of creation it was expanded to fill the firmament, or perhaps became the firmament once it was expanded. As we noted in Volume I of *Galileo Was Wrong: The Church Was Right*, modern science has corroborated these

[272] The censor's document is titled: *Judicium de spistola F. Pauli Foscarini de mobilitate terrae* (Lerner in *The Church and Galileo*, p. 24) and the text is provided by Richard J. Blackwell in *Galileo, Bellarmine and the Bible*, pp. 253-254. We have changed "Tobit 37" to Job 37 since Blackwell, or from whomever he copied it, apparently misread the original Latin.

[273] Ex 39:3; Nm 16:39; 17:4; 2Sm 22:43; Jb 37:18; Ps 136:6; Is 40:19; 42:5; 44:24; Jr 10:9; Ez 6:11; 25:6.

[274] Gn 1:6-8, 14-17, 20; Ps 19:1.

[275] Dt 33:26; 2Sm 22:12; Jb 37:18; Ps 18:11; 77:17; 108:4; Is 45:8; Jr 51:9.

[276] Jb 35:5; 36:28; 37:21; 38:37; Ps 36:5; 57:10; 78:23; Pr 3:20; 8:28.

[277] Ps 68:34; 89:6, 37.

[278] Is 40:15.

[279] 2Sm 22:12; Ps 18:11.

biblical truths with a plethora of scientific data showing that space is not a vacuum but is filled with an extremely fine but extremely dense particulate matter.

The firmament, רקיע, constitutes the entire space between the Earth's surface and the edge of the universe, and into which the stars and other heavenly bodies are placed. This is in distinction to other Hebrew words, such as רוח (*reyach*), which refer to "space" (*e.g.*, Gn 32:17, not to be confused with רוח (*ruach* = spirit, *e.g.*, Gn 1:2; Ex 13:10)) or רחוק (*rachoq*), which refers to spatial distance,[280] words that the Hebrew writer did not choose to describe the substance of the heavens. Accordingly, many biblical translators have utilized the English word "firmament" (or its foreign equivalent) for the Hebrew רקיע in order to denote a firm but pervasive substance to represent the constitution of the heavens.[281] In other passage *raqia* appears as "hammered";[282] while in others it is "stamped";[283] as compared to "beaten" or "crushed" in 2Sm 22:43.

Essentially, Scripture tells us that the heavens are both flexible and rigid. Apparently, Foscarini's censor, by nothing more than a simple declaration from Holy Writ, accepted the dual nature of the firmament, one nature observable and the other unobservable, with the latter nature being one in which "the solidity of the heavens is not apparent to us." Conversely, a solid-shell model of the firmament, which is popular among more traditional Protestant biblicists, ignores these atmospheric and celestial dimensions, and consequently, does not do proper justice to the Scriptural language.[284]

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[280] Joshua 3:4; Ps 22:2.

[281] Gn 1:14, 15, 17, 20; Ps 19:2; 150:1; Ez 1:22-26; 10:1; Dn 12:3.

[282] Ex 39:3; Nm 17:3; Jr 10:9.

[283] Ez 6:11; 25:6.

[284] See "Is the raqiya' (firmament) a solid dome?" at answersingenesis.org/docs/4169.asp, James Holding versus Paul Seely, first published in *Technical Journal* 13(2):44-51, 1999.

"We, however, who extend the accuracy of the Spirit to the merest jot and tittle, will never admit the impious assertion that even the smallest matters were dealt with haphazardly by those who have recorded them."

Gregory of Nazianzus [285]

[285] *Orations*, II.

Chapter 13

The Consensus of Church Fathers and Medieval Theologians on:

Geocentrism

On April 12, 1615, Robert Cardinal Bellarmine wrote a personal letter to Fr. Paolo Antonio Foscarini, who had been advocating the heliocentric view for some time. In the letter Bellarmine states:

> Second, I say that, as you know, the Council prohibits interpreting Scripture against the common consensus of the Holy Fathers; and if Your Reverence wants to read not only the Holy Fathers, but also the modern commentaries on Genesis, the Psalms, Ecclesiastes, and Joshua, you will find all agreeing in the literal interpretation that the sun is in heaven and turns around the earth with great speed, and that the earth is very far from heaven and sits motionless at the center of the world. Consider now, with your sense of prudence, whether the Church can tolerate giving Scripture a meaning contrary to the Holy Fathers and to all the Greek and Latin commentators.

Cardinal Bellarmine was referring to the ecumenical **Council of Trent** which stated the following decree regarding the authority of the consensus of the Fathers of the Church on the interpretation of Scripture:

> Furthermore, in order to restrain petulant spirits, It decrees, that no one, relying on his own skill, shall, in matters of faith, and of morals pertaining to the edification of Christian doctrine, wresting the sacred Scripture to his own senses, presume to interpret the said sacred Scripture contrary to that sense which holy mother Church, whose it is to judge of the true sense and interpretation of the holy Scriptures, hath held and doth hold; or even contrary to the unanimous consent of the Fathers; even though such interpretations were never intended to be at any time published. Contraveners shall be made known by their Ordinaries, and be punished with the penalties by law established.[286]

The teaching of the supreme authority of the consensus of the Fathers of the Church was reiterated in the same infallible form by **Vatican Council I** in 1870:

> But, since the rules which the holy Synod of Trent salutarily decreed concerning the interpretation of Divine Scripture in order to restrain impetuous minds, are wrongly explained by certain men, We, renewing the same decree, declare this to be its intention: that, in matters of faith and morals pertaining to the instruction of Christian Doctrine, that must be considered as the true sense of Sacred Scripture which Holy Mother Church has held and holds, whose office it is to judge concerning the true understanding and interpretation of the Sacred Scriptures; and, for that reason, no one is permitted to interpret Sacred Scripture itself contrary to this sense, or even contrary to the unanimous agreement of the Fathers.[287]

Pope Leo XIII confirmed the words of Cardinal Bellarmine and the Councils in his encyclical ***Providentissimus Deus***:

> …and, most of all, that they may understand that God has delivered the Holy Scriptures to the Church, and that in reading and making use of His Word, they must follow the Church as their guide and their teacher. St. Irenaeus long since laid down, that where the *charismata* of God were, there the truth was to be learnt, and that Holy Scripture was safely interpreted by those who had the Apostolic succession. His teaching, and that of other Holy Fathers, is taken up by the Council of the Vatican, which, in renewing the decree of Trent declares its "mind" to be this – that "in things of faith and morals, belonging to the building up of Christian

[286] Council of Trent, Session IV.

[287] Vatican Council I, Chapter II, Denz. 1788.

doctrine, that is to be considered the true held and is held by our Holy Mother the Church, whose place it is to judge of the true sense and interpretation of the Scriptures; and therefore that it is permitted to no one to interpret Holy Scripture against such sense or also against the unanimous agreement of the Fathers." By this most wise decree the Church by no means prevents or restrains the pursuit of Biblical science, but rather protects it from error, and largely assists its real progress.

The Professor of Holy Scripture, therefore, amongst other recommendations, must be well acquainted with the whole circle of Theology and deeply read in the commentaries of the Holy Fathers and Doctors, and other interpreters of mark. This is inculcated by St. Jerome, and still more frequently by St. Augustine, who thus justly complains: "If there is no branch of teaching, however humble and easy to learn, which does not require a master, what can be a greater sign of rashness and pride than to refuse to study the Books of the divine mysteries by the help of those who have interpreted them?" The other Fathers have said the same, and have confirmed it by their example, for they "endeavored to acquire the understanding of the Holy Scriptures not by their own lights and ideas, but from the writings and authority of the ancients, who in their turn, as we know, received the rule of interpretation in direct line from the Apostles." The Holy Fathers "to whom, after the Apostles, the Church owes its growth – who have planted, watered, built, governed, and cherished it," the Holy Fathers, We say, are of supreme authority, whenever they all interpret in one and the same manner any text of the Bible, as pertaining to the doctrine of faith or morals; for their unanimity clearly evinces that such interpretation has come down from the Apostles as a matter of Catholic faith. The opinion of the Fathers is also of very great weight when they treat of these matters in their capacity of doctors, unofficially; not only because they excel in their knowledge of revealed doctrine and in their acquaintance with many things sense of Holy Scripture which has been which are useful in understanding the apostolic Books, but because they are men of eminent sanctity and of ardent zeal for the truth, on whom God has bestowed a more ample measure of His light. Wherefore the expositor should make it his duty to follow their footsteps with all reverence, and to use their labors with intelligent appreciation.

In 1965, **Vatican Council II** reiterated the Church's teaching on the authority of the Fathers:

> This tradition which comes from the Apostles develop in the Church with the help of the Holy Spirit. For there is a growth in the understanding of the realities and the words which have been handed down. This happens through the contemplation and study made by believers, who treasure these things in their hearts (Lk 2:19,51) through a penetrating understanding of the spiritual realities which they experience, and through the preaching of those who have received through episcopal succession the sure gift of truth. For as the centuries succeed one another, the Church constantly moves forward toward the fullness of divine truth until the words of God reach their complete fulfillment in her.
>
> The words of the holy fathers witness to the presence of this living tradition, whose wealth is poured into the practice and life of the believing and praying Church.[288]
>
> The bride of the incarnate Word, the Church taught by the Holy Spirit, is concerned to move ahead toward a deeper understanding of the Sacred Scriptures so that she may increasingly feed her sons with the divine words. Therefore, she also encourages the study of the holy Fathers of both East and West and of sacred liturgies.[289]

[288] *Dei Verbum*, Ch. 2, 8.

[289] *Dei Verbum*, Ch. 6, 23.

…faithful to the truth which we have received from the apostles and Fathers of the Church, in harmony with the faith which the Catholic Church has always professed.[290]

Following the study of Sacred Scripture, the Holy Fathers, the doctors and liturgy of the Church, and under the guidance of the Church's magisterium…[291]

The knowledge of the sacred minister ought to be sacred because it is drawn from the sacred source and directed to a sacred goal. Especially is it drawn from reading and meditating on the Sacred Scriptures, and it is equally nourished by the study of the Holy Fathers and other Doctors and monuments or tradition.[292]

…the words and deeds which God has revealed, and which have been set down in Sacred Scripture and explained by the Fathers and by the magisterium.[293]

The Fathers of the Church proclaim without hesitation…[294]

This doctrine is contained in the word of God and it was constantly proclaimed by the Fathers of the Church.[295]

Salient Points of the Church Fathers' Consensus on Geocentrism

- The Fathers never say the Earth moves.
- The Fathers always say the Earth is at rest at the center of the universe.
- The Fathers never say the sun is the center of the universe.
- The Fathers never say the sun does not move around the Earth, even in their scientific analysis of the cosmos.
- The Fathers always say the Earth is the center of the universe.
- The Fathers always say the sun moves in the same way as the moon moves.
- The Fathers recognize that some of the Greeks held that the Earth revolves and rotates, but they do not accept either of those teachings.
- The Fathers accept the Chaldean, Egyptian and Greek teaching that the Earth is at the center of the universe and does not move.
- The Fathers hold that the Earth was created first, by itself, and only afterward the sun, moon and stars. The only deviation from this is St. Augustine who, in one of his views, held that all the heavenly bodies were created at the same time.
- The Fathers hold that light was created after the Earth, but this light preceded the light of the sun and stars, with the exception of Augustine notwithstanding.

The Fathers on the Geocentric Cosmos

Nota Bene: Many of the hundreds of citations from the Fathers regarding the motion of the sun have not been included in this list, due to the redundancy it would create. Only those quotes from the Fathers which have the most logical and comparative relevance have been listed. The names of the Fathers are listed in alphabetical order.

Ambrose: Worthy surely was he to stand forth as a man who might stay the course of the river, and who might say: "Sun, stand still," and delay the night and lengthen the day, as though to witness his victory. Why? a blessing denied to Moses, he alone was chosen to lead the people into the promised land. A man he was, great in the wonders he wrought by

[290] *Unitatis Redintegratio*, Ch. 3, II, 24.

[291] *Lumen Gentium*, Ch. 8, IV, 67.

[292] *Presbyterorum Ordinis*, Ch. 3, 3, 19.

[293] *Ad Gentes*, Ch. 3, 22.

[294] *Ad Gentes*, Ch. 1, 3.

[295] *Dignitatis Humanae*, Introduction, 10.

faith, great in his triumphs. The works of Moses were of a higher type, his brought greater success. Either of these then aided by divine grace rose above all human standing. The one ruled the sea, the other heaven.[296]

Ambrose: But they say that the sun can be said to be alone, because there is no second sun. But the sun himself has many things in common with the stars, for he travels across the heavens, he is of that ethereal and heavenly substance, he is a creature, and is reckoned amongst all the works of God. He serves God in union with all, blesses Him with all, praises Him with all. Therefore he cannot accurately be said to be alone, for he is not set apart from the rest.[297]

Anatolius of Alexandria: Eudemus relates in his Astrologies that Enopides found out the circle of the zodiac and the cycle of the great year. And Thales discovered the eclipse of the sun and its period in the tropics in its constant inequality. And Anaximander discovered that the earth is poised in space, and moves round the axis of the universe. And Anaximenes discovered that the moon has her light from the sun, and found out also the way in which she suffers eclipse. And the rest of the mathematicians have also made additions to these discoveries. We may instance the facts – that the fixed stars move round the axis passing through the poles, while the planets remove from each other round the perpendicular axis of the zodiac.[298]

Aphrahat: For the sun in twelve hours circles round, from the east unto the west; and when he has accomplished his course, his light is hidden in the night-time, and the night is not disturbed by his power. And in the hours of the night the sun turns round in his rapid course, and turning round begins to run in his accustomed path.[299]

Archeleus: When the light had been diffused everywhere, God began to constitute the universe, and commenced with the heaven and the earth; in which process this issue appeared, to wit, that the midst, which is the locality of earth covered with shadow, as a consequence of the interpositions of the creatures which were called into being, was found to be obscure, in such wise that circumstances required light to be introduced into that place, which was thus situated in the midst.[300]

Arnobius: The moon, the sun, the earth, the ether, the stars, are members and parts of the world; but if they are parts and members, they are certainly not themselves living creatures.[301]

Athanasius: For the Sun is carried round along with, and is contained in, the whole heaven, and can never go beyond his own orbit, while the moon and other stars testify to the assistance given them by the Sun…But the earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, being bound fast at the center of the universe.[302]

Athanasius: For who that sees the circle of heaven and the course of the sun and the moon, and the positions and movements of the other stars, as they take place in opposite and different directions, while yet in their difference all with one accord observe a consistent order, can resist the conclusion that these are not ordered by themselves, but have a maker distinct from themselves who orders them? Or who that sees the sun rising by day and the moon shining by night, and waning and waxing without variation exactly according to the same number of days, and some of the stars running their courses and with orbits various and manifold, while others move without wandering, can fail to perceive that they certainly have a creator to guide them?[303]

For by a nod and by the power of the Divine Word of the Father that governs and presides over all, the heaven revolves, the stars move, the sun shines, the

[296] *Duties of the Clergy*, Bk II, Ch XX, 99.

[297] Exposition of the Christian Faith, Bk V, Ch II.

[298] *The Paschal Canon*, XVII. Anaximander believed "The Earth…is held up by nothing, but remains stationary owing to the fact that it is equally distant from all other things." (As obtained from Aristotle's *De Caelo*, 295b32, cited in Popper's *Conjectures and Refutations*, p. 138. Anaximander, however, understood the Earth to be in the shape of a drum rather than a globe.)

[299] *Demonstrations*, 24.

[300] *Disputation with Manes*, 22.

[301] *Arnobius Against the Heathen*, Book 3, 350.

[302] *Against the Heathen*, Part 1, No. 27.

[303] *Against the Heathen*, Bk 1, Part III, 35.

moon goes her circuit, and the air receives the sun's light and the aether his heat, and the winds blow: the mountains are reared on high, the sea is rough with waves, and the living things in it grow, the earth abides fixed..."[304]

Athenagoras: To Him is for us to know who stretched out and vaulted the heavens, and fixed the earth in its place like a center. [305]

Augustine: Let not the philosophers, then, think to upset our faith with arguments from the weight of bodies; for I don't care to inquire why they cannot believe an earthly body can be in heaven, while the whole earth is suspended on nothing. For perhaps the world keeps its central place by the same law that attracts to its center all heavy bodies.[306]

Augustine: For an eclipse of the sun had also happened; and this was attributed to the divine power of Romulus by the ignorant multitude, who did not know that it was brought about by the fixed laws of the sun's course.[307]

Augustine: This he said either of those things of which he had just been speaking, the succession of generations, the orbit of the sun, the course of rivers, or else of all kinds of creatures. that are born and die.[308]

Augustine: What is there so arranged by the Author of the nature of heaven and earth as the exactly ordered course of the stars? What is there established by laws so sure and inflexible? And yet, when it pleased Him who with sovereignty and supreme power regulates all He has created, a star conspicuous among the rest by its size and splendor changed its color, size, form, and, most wonderful of all, the order and law of its course! Certainly that phenomenon disturbed the canons of the astronomers, if there were any then, by which they tabulate, as by unerring computation, the past and future movements of the stars, so as to take upon them to affirm that this which happened to the morning star (Venus) never happened before nor since. But we read in the divine books that even the sun itself stood still when a holy man, Joshua the son of Nun, had begged this from God until victory should finish the battle he had begun; and that it even went back, that the promise of fifteen years added to the life of king Hezekiah might be sealed by this additional prodigy. But these miracles, which were vouchsafed to the merits of holy men, even when our adversaries believe them, they attribute to magical arts; so Virgil, in the lines I quoted above, ascribes to magic the power to "Turn rivers backward to their source, And make the stars forget their course."[309]

Augustine: Who else save Joshua the son of Nun divided the stream of the Jordan for the people to pass over, and by the utterance of a prayer to God bridled and stopped the revolving sun? Who save Samson ever quenched his thirst with water flowing forth from the jawbone of a dead ass? Who save Elias was carried aloft in a chariot of fire?[310]

Augustine: I desire to know the power and nature of time, by which we measure the motions of bodies, and say (for example) that this motion is twice as long as that. For, I ask, since "day" declares not the stay only of the sun upon the earth, according to which day is one thing, night another, but also its entire circuit from east even to east, according to which we say, "So many days have passed" (the nights being included when we say "so many days," and their spaces not counted apart), since, then, the day is finished by the motion of the sun, and by his circuit from east to east, I ask, whether the motion itself is the day, or the period in which that motion is completed, or both? For if the first be the day, then would there be a day although the sun should finish that course in so small a space of time as an hour. If the second, then that would not be a day if from one sunrise to another there were but so short a period as an hour, but the sun must go round four-and-twenty times to complete a day. If both, neither could that be called a day if the sun should run his entire round in the space of an hour; nor that, if, while the sun stood still, so much time should pass as the sun is accustomed to accomplish his whole course in from

[304] *Against the Heathen*, Bk 1, Part III, 44.

[305] *Why the Christians do not Offer Sacrifices*, Ch XIII.

[306] *City of God*, Bk XIII, Ch 18.

[307] *City of God*, Bk III, Ch 15.

[308] *City of God*, Bk XII, Ch 13.

[309] *City of God*, Book XXI, Ch 8.

[310] *Tractates*, XCI, Ch XV, 24-25, 2.

morning to morning. I shall not therefore now ask, what that is which is called day, but what time is, by which we, measuring the circuit of the sun, should say that it was accomplished in half the space of time it was wont, if it had been completed in so small a space as twelve hours; and comparing both times, we should call that single, this double time, although the sun should run his course from east to east sometimes in that single, sometimes in that double time. Let no man then tell me that the motions of the heavenly bodies are times, because, when at the prayer of one the sun stood still in order that he might achieve his victorious battle, the sun stood still, but time went on. For in such space of time as was sufficient was that battle fought and ended. I see that time, then, is a certain extension. But do I see it, or do I seem to see it? Thou, O Light and Truth, wilt show me.[311]

Basil: There are inquirers into nature who with a great display of words give reasons for the immobility of the earth...It is not, they go on, without reason or by chance that the earth occupies the center of the universe...Do not then be surprised that the world never falls: it occupies the center of the universe, its natural place. By necessity it is obliged to remain in its place, unless a movement contrary to nature should displace it. If there is anything in this system which might appear probable to you, keep your admiration for the source of such perfect order, for the wisdom of God. Grand phenomena do not strike us the less when we have discovered something of their wonderful mechanism. Is it otherwise here? At all events let us prefer the simplicity of faith to the demonstrations of reason.[312]

Basil: If the sun, subject to corruption, is so beautiful, so grand, so rapid in its move-meat, so invariable in its course; if its grandeur is in such perfect harmony with and due proportion to the universe: if, by the beauty of its nature, it shines like a brilliant eye in the middle of creation; if finally, one cannot tire of contemplating it, what will be the beauty of the Sun of Righteousness?[313]

Basil: From thence the sun, returning to the summer solstice, in the direction of the North, gives us the longest days. And, as it travels farther in the air, it burns that which is over our heads, dries up the earth, ripens the grains and hastens the maturity of the fruits of the trees.[314]

Basil: It will not lead me to give less importance to the creation of the universe, that the servant of God, Moses, is silent as to shapes; he has not said that the earth is a hundred and eighty thousand furlongs in circumference; he has not measured into what extent of air its shadow projects itself whilst the sun revolves around it, nor stated how this shadow, casting itself upon the moon, produces eclipses.[315]

Basil: In the midst of the covering and veil, where the priests were allowed to enter, was situated the altar of incense, the symbol of the earth placed in the middle of this universe; and from it came the fumes of incense.[316]

Basil: Like tops, which after the first impulse, continue their evolutions, turning upon themselves when once fixed in their center; thus nature, receiving the impulse of this first command, follows without interruption the course of ages, until the consummation of all things.[317]

Basil: In the Beginning God made the Heaven and the Earth. **3.** Do not then imagine, O man! that the visible world is without a beginning; and because the celestial bodies move in a circular course, and it is difficult for our senses to define the point where the circle begins, do not believe that bodies impelled by a circular movement are, from their nature, without a beginning. Without doubt the circle (I mean the plane figure described by a single line) is beyond our perception, and it is impossible for us to find out where it begins or where it ends; but we ought not on this account to believe it to be without a beginning. Although we are not sensible of it, it really begins at some point where the draughtsman has begun to draw it at a certain radius from the

[311] *Confessions*, Bk XI, Ch XXIII, 30.

[312] *Nine Homilies on the Hexameron*, 10.

[313] *Homilies*, 6.

[314] *Homilies*, 6, 8.

[315] *Homilies*, IX.

[316] *The Mystic Meaning of the Tabernacle*, Bk V, Ch VI; Clement of Rome, *Stromata*, Bk V.

[317] *Homilies*, V, 10.

center. Thus seeing that figures which move in a circle always return upon themselves, without for a single instant interrupting the regularity of their course, do not vainly imagine to yourselves that the world has neither beginning nor end. "For the fashion of this world passeth away" and "Heaven and earth shall pass away." The dogmas of the end, and of the renewing of the world, are announced beforehand in these short words put at the head of the inspired history. "In the beginning God made." That which was begun in time is condemned to come to an end in time. If there has been a beginning do not doubt of the end. Of what use to men are geometry, the calculations of arithmetic, the study of solids and far-famed astronomy, this laborious vanity, if those who pursue them imagine that this visible world is co-eternal with the Creator of all things, with God Himself; if they attribute to this limited world, which has a material body, the same glory as to the incomprehensible and invisible nature; if they cannot conceive that a whole, of which the parts are subject to corruption and change, must of necessity end by itself submitting to the fate of its parts? But they have become "vain in their imaginations and their foolish heart was darkened. Professing themselves to be wise, they became fools." Some have affirmed that heaven co-exists with God from all eternity; others that it is God Himself without beginning or end, and the cause of the particular arrangement of all things.

8. If I ask you to leave these vain questions, I will not expect you to try and find out the earth's point of support. The mind would reel on beholding its reasonings losing themselves without end. Do you say that the earth reposes on a bed of air? How, then, can this soft substance, without consistency, resist the enormous weight which presses upon it? How is it that it does not slip away in all directions, to avoid the sinking weight, and to spread itself over the mass which overwhelms it? Do you suppose that water is the foundation of the earth? You will then always have to ask yourself how it is that so heavy and opaque a body does not pass through the water; how a mass of such a weight is held up by a nature weaker than itself. Then you must seek a base for the waters, and you will be in much difficulty to say upon what the water itself rests.

9. Do you suppose that a heavier body prevents the earth from failing into the abyss? Then you must consider that this support needs itself a support to prevent it from failing. Can we imagine one? Our reason again demands yet another support, and thus we shall fall into the infinite, always imagining a base for the base which we have already found. And the further we advance in this reasoning the greater force we are obliged to give to this base, so that it may be able to support all the mass weighing upon it. Put then a limit to your thought, so that your curiosity in investigating the incomprehensible may not incur the reproaches of Job, and you be not asked by him, "Whereupon are the foundations thereof fastened?" If ever you hear in the Psalms, "I bear up the pillars of it" see in these pillars the power which sustains it. Because what means this other passage, "He hath founded it upon the sea" if not that the water is spread all around the earth? How then can water, the fluid element which flows down every declivity, remain suspended without ever flowing? You do not reflect that the idea of the earth suspended by itself throws your reason into a like but even greater difficulty, since from its nature it is heavier. But let us admit that the earth rests upon itself, or let us say that it rides the waters, we must still remain faithful to thought of true religion and recognize that all is sustained by the Creator's power. Let us then reply to ourselves, and let us reply to those who ask us upon what support this enormous mass rests, "In His hands are the ends of the earth." It is a doctrine as infallible for our own information as profitable for our hearers.[318]

Basil: The philosophers of Greece have made much ado to explain nature, and not one of their systems has remained firm and unshaken, each being overturned by its successor. It is vain to refute them; they are sufficient in themselves to destroy one another.[319]

John Cassian: He was a man who, after the close of his life had been decreed and the day of his death determined by the Lord's sentence, prevailed by a single prayer to extend the limits set to his life by fifteen years, the sun returning by ten steps, on which it had already shone in its course towards its setting, and by its return dispersing those lines which the shadow that followed its course had already marked, and by this giving two days in one to the whole world, by a stupendous miracle contrary to the fixed laws of nature. Yet after signs so great and

[318] *Nine Homilies of the Hexaemeron*, Homily I.

[319] *Nine Homiles of the Hexameron*, Homily 3, 2.

so incredible, after such immense proofs of his goodness, hear the Scripture tell how he was destroyed by his very successes.[320]

Chrysostom: "For they who are mad imagine that nothing stands still, yet this arises not from the objects that are seen, but from the eyes that see. Because they are unsteady and giddy, they think that the Earth turns round with them, which yet turns not, but stands firm. The derangement is of their own state, not from any affection of the element."[321]

Chrysostom: Dost thou not see how God is daily blasphemed and mocked by believers and unbelievers, both in word and in deed? What then? Has He for this extinguished the sun, or stayed the course of the moon? Has He crushed the heavens and uprooted the earth? Has He dried up the sea? Has He shut up the fountains of waters, or confounded the air? Nay, on the contrary, He makes His sun to rise, His rain to descend, gives the fruits of the earth in their seasons, and thus supplies yearly nourishment to the blasphemers, to the insensible, to the polluted, to persecutors; not for one day or two, but for their whole life. Imitate Him then, emulate Him as far as human powers admit. Can thou not make the sun arise?[322]

Chrysostom: And what took place at a later period were few and at intervals; for example, when the sun stood still in its course, and started back in the opposite direction. And this one may see to have occurred in our case also. For so even in our generation, in the instance of him who surpassed all in ungodliness, I mean Julian, many strange things happened. Thus when the Jews were attempting to raise up again the temple at Jerusalem, fire burst out from the foundations, and utterly hindered them all.[323]

Chrysostom: And again, David saith of the sun, that "he is as a bridegroom coming out of his chamber, and rejoiceth as a giant to run his course." Seest thou how he places before thee the beauty of this star, and its greatness? For even as a bridegroom when he appears from some stately chamber, so the sun sends forth his rays under the East; and adorning the heaven as it were with a saffron-colored veil, and making the clouds like roses, and running unimpeded all the day; he meets no obstacle to interrupt his course. Beholdest thou, then, his beauty?[324]

Chrysostom: For He not only made it, but provided also that when it was made, it should carry on its operations; not permitting it to be all immoveable, nor commanding it to be all in a state of motion. The heaven, for instance, hath remained immoveable, according as the prophet says, "He placed the heaven as a vault, and stretched it out as a tent over the earth." But, on the other hand, the sun with the rest of the stars, runs on his course through every day. And again, the earth is fixed, but the waters are continually in motion; and not the waters only, but the clouds, and the frequent and successive showers, which return at their proper season.[325]

Chrysostom: [Referring to the end of the world]: For the heaven shall be disturbed and the earth shall be shaken from its foundations by reason of the fury of the wrath of the Lord of Sabaoth, in the day when His wrath shall come upon us." And again "windows" he saith "shall be opened from the Heaven, and the foundations of the earth shall be shaken, the earth shall be mightily confounded, the earth shall be bent low, it shall be perplexed with great perplexity, the earth shall stagger grievously like the drunkard and the reveller; the earth shall shake as a hut, it shall fall and not be able to rise up again: for iniquity has waxed mighty therein. And God shall set His hand upon the host of the Heaven in the height in that day, and upon the kingdoms of the earth, and He shall gather together the congregation thereof into a prison, and shall shut them up in a stronghold." And Malachi speaking concordantly with these said" Behold the Lord almighty cometh, and who shall abide the day of His coming or who shall stand when He appeareth? for He cometh like a refiner's fire, and like fullers soap: and He shall sit refining and purifying as it were silver, and as it were gold."[326]

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[320] *Twelve Books on the Institutes*, Bk XI, Ch X.

[321] *Homily on Titus*, III.

[322] *Homilies on First Timothy*, Homily VI.

[323] *Homilies on Matthew*, Homily IV.

[324] *Homilies to Antioch*, Homily X.

[325] *Homilies to Antioch*, Homily XII.

[326] *Letters to Theodor*, Letter I, 12.

Chrysostom: Consider of how great value is the righteous man. Joshua the son of Nun said, "Let the sun stand still at Gibeon, the moon at the valley of Elom," and it was so. Let then the whole world come, or rather two or three, or four, or ten, or twenty worlds, and let them say and do this; yet shall they not be able. But the friend of God commanded the creatures of his Friend, or rather he besought his Friend, and the servants yielded, and he below gave command to those above. Seest thou that these things are for service fulfilling their appointed course? This was greater than the [miracles] of Moses. Why (I ask)? Because it is not a like thing to command the sea and the heavenly [bodies]. For that indeed was also a great thing, yea very great, nevertheless it was not at all equal [to the other]. Why was this? The name of Joshua [JESUS], was a type. For this reason then, and because of the very name, the creation reverenced him. What then! Was no other person called Jesus? [Yes]; but this man was on this account so called in type; for he used to be called Hoshea. Therefore the name was changed: for it was a prediction and a prophecy. He brought in the people into the promised land, as JESUS [does] into heaven; not the Law; since neither did Moses [bring them in], but remained without.[327]

Chrysostom: Therefore it was, that Joshua, the son of Nun, said, "Let the sun stand still in Gibeon, and the moon over against the valley of Ajalon." And again the prophet Isaiah made the sun to retrace his steps, under the reign of Hezekiah; and Moses gave orders to the air, and the sea, the earth, and the rocks. Elisha changed the nature of the waters; the Three Children triumphed over the fire. Thou seest how God hath provided for us on either hand; leading us by the beauty of the elements to the knowledge of His divinity; and, by their feebleness, not permitting us to lapse into the worship of them.[328]

Clement of Rome: The sun and moon, with the companies of the stars, roll on in harmony according to His command, within their prescribed limits, and without any deviation.[329]

Clement of Rome: the Creator, long-suffering, merciful, the sustainer, the benefactor, ordaining love of men, counselling purity, immortal and making immortal, incomparable, dwelling in the souls of the good, that cannot be contained and yet is contained, who has fixed the great world as a centre in space, who has spread out the heavens and solidified the earth.[330]

Clement of Rome: For it is manifest even to the unbelieving and unskilful, that the course of the sun, which is useful and necessary to the world, and which is assigned by providence, is always kept orderly; but the courses of the moon, in comparison of the course of the sun, seem to the unskilful to be inordinate and unsettled in her waxings and wanings. For the sun moves in fixed and orderly periods: for from him are hours, from him the day when he rises, from him also the night when he sets; from him months and years are reckoned, from him the variations of seasons are produced; while, rising to the higher regions, he tempers the spring; but when he reaches the top of the heaven, he kindles the summer's heats: again, sinking, he produces the temper of autumn; and when he returns to his lowest circle, he bequeaths to us the rigour of winter's cold from the icy binding of heaven.[331]

Cyril of Jerusalem: And he, who could not hope to live because of the prophetic sentence, had fifteen years added to his life, and for the sign the sun ran backward in his course. Well then, for Hezekias' sake the sun turned back but for Christ the sun was eclipsed, not retracing his steps, but suffering eclipse, and therefore shewing the difference between them, I mean between Hezekias and Jesus.[332]

Cyril of Jerusalem: The earth, which bears the same proportion to the heaven as the center to the whole circumference of a wheel, for the earth is no more than this in comparison with the heaven: consider then that this first heaven which is seen is less than the second, and the second than the third, for so far Scripture has named them..."[333]

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[327] *Homily on the Epistle to the Hebrews*, Homily VIII.

[328] *Homily to Antioch*, Homily X.

[329] *First Epistle to the Corinthians*, Ch XX.

[330] *Homily* II, Ch XLV.

[331] *Pseudo-Clementine*, Bk VIII, Ch XLV

[332] *Catechetical Lectures*, II, 15.

[333] *Catechetical Lectures*, VI, 3.

Ephraim the Syrian: The sun in his course teaches thee that thou rest from labour.[334]

Eusebius: The vast expanse of heaven, like an azure veil is interposed between those without, and those who inhabit his royal mansions: while round this expanse the sun and moon, with the rest of the heavenly luminaries (like torch-bearers around the entrance of the imperial palace), perform, in honor of their sovereign, their appointed courses; holding forth, at the word of his command, an ever-burning light to those whose lot is cast in the darker regions without the pale of heaven.[335]

Eusebius: To whom he has permitted the contemplation of celestial objects, and revealed the course and changes of the sun and moon, and the periods of the planets and fixed stars.[336]

Eusebius: Even so one and the same impression of the solar rays illumines the air at once, gives light to the eyes, warmth to the touch, fertility to the earth, and growth to plants. The same luminary constitutes the course of time, governs the motions of the stars, performs the circuit of the heavens, imparts beauty to the earth, and displays the power of God to all: and all this he performs by the sole and unaided force of his own nature.[337]

Gregory Nazianzus: But who gave him motion at first? And what is it which ever moves him in his circuit, though in his nature stable and immovable, truly unwearied, and the giver and sustainer of life, and all the rest of the titles which the poets justly sing of him, and never resting in his course or his benefits? How comes he to be the creator of day when above the earth, and of night when below it? Or whatever may be the right expression when one contemplates the sun?[338]

Gregory Nazianzus: The sun is extolled by David for its beauty, its greatness, its swift course, and its power, splendid as a bridegroom, majestic as a giant; while, from the extent of its circuit, it has such power that it equally sheds its light from one end of heaven to the other, and the heat thereof is in no wise lessened by distance.[339]

Gregory of Nyssa: "This is the book of the generation of heaven and earth," saith the Scripture, when all that is seen was finished, and each of the things that are betook itself to its own separate place, when the body of heaven compassed all things round, and those bodies which are heavy and of downward tendency, the earth and the water, holding each other in, took the middle place of the universe; while, as a sort of bond and stability for the things that were made, the Divine power and skill was implanted in the growth of things, guiding all things with the reins of a double operation (for it was by rest and motion that it devised the genesis of the things that were not, and the continuance of the things that are), driving around, about the heavy and changeless element contributed by the creation that does not move, as about some fixed path, the exceedingly rapid motion of the sphere, like a wheel, and preserving the indissolubility of both by their mutual action, as the circling substance by its rapid motion compresses the compact body of the earth round about, while that which is firm and unyielding, by reason of its unchanging fixedness, continually augments the whirling motion of those things which revolve round it, and intensity is produced in equal measure in each of the natures which thus differ in their operation, in the stationary nature, I mean, and in the mobile revolution; for neither is the earth shifted from its own base, nor does the heaven ever relax in its vehemence, or slacken its motion.[340]

Gregory of Nyssa: But, boasting as they do that they know these things, let them first tell us about the things of inferior nature; what they think of the body of the heavens, of the machinery which conveys the stars in their eternal courses, or of the sphere in which they move; for, however far speculation may proceed, when it comes to the uncertain and incomprehensible it must stop. For though any one say that another body, like in fashion (to that body of the heavens), fitting to its circular shape, checks its velocity, so that, ever turning in its

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[334] *On Admonition and Repentance*.

[335] *Oration of Constantine*, Ch 1.

[336] *Oration of Constantine*, Ch VI.

[337] *Oration of Constantine*, Ch XII.

[338] *Orations*, XXVIII, XXX.

[339] *Funeral Orations for St. Basil*, 66.

[340] *On the Making of Man*, 30, 1, 1.

course, it revolves conformably to that other upon itself, being retained by the force that embraces it from flying off at a tangent, yet how can he assert that these bodies will remain unspent by their constant friction with each other? And how, again, is motion produced in the case of two co-equal bodies mutually conformed, when the one remains motionless (for the inner body, one would have thought, being held as in a vice by the motionlessness of that which embraces it, will be quite unable to act); and what is it that maintains the embracing body in its fixedness, so that it remains unshaken and unaffected by the motion of that which fits into it?[341]

Gregory of Nyssa: And how does earth below form the foundation of the whole, and what is it that keeps it firmly in its place? What is it that controls its downward tendency? If any one should interrogate us on these and such-like points, will any of us be found so presumptuous as to promise an explanation of them? No! the only reply that can be given by men of sense is this: that He Who made all things in wisdom can alone furnish an account of His creation. For ourselves, "through faith we understand that the worlds were framed by the word of God," as saith the Apostle.[342]

Gregory of Nyssa: "...the vault of heaven prolongs itself so uninterruptedly that it encircles all things with itself, and that the earth and its surroundings are poised in the middle, and that the motion of all the revolving bodies is round this fixed and solid center..."[343]

Gregory of Nyssa: And when you look at the waning and waxing moon you are taught other truths by the visible figure of that heavenly body, *viz*. that it is in itself devoid of light, and that it revolves in the circle nearest to the earth, and that it is lit by light from the sun; just as is the case with mirrors, which, receiving the sun upon them, do not reflect rays of their own, but those of the sun, whose light is given back from their smooth flashing surface. Those who see this, but do not examine it, think that the light comes from the moon herself. But that this is not the case is proved by this; that when she is diametrically facing the sun she has the whole of the disc that looks our way illuminated; but, as she traverses her own circle of revolution quicker from moving in a narrower space, she herself has completed this more than twelve times before the sun has once traveled round his; whence it happens that her substance is not always covered with light.[344]

Gregory Thaumaturgos: And the life of men weareth away, as day by day, and in the periods of hours and years, and the determinate courses of the sun, some are ever coming, and others passing away. And the matter is like the transit of torrents as they fall into the measureless deep of the sea with a mighty noise. And all things that have been constituted by God for the sake of men abide the same: as, for instance, in that man is born of earth, and departs to earth again; that the earth itself continues stable; that the sun accomplishes its circuit about it perfectly, and rolls round to the same mark again; and that the winds in like manner, and the mighty rivers which flow into the sea, and the breezes that beat upon it, all act without forcing it to pass beyond its limits, and without themselves also violating their appointed laws.[345]

Hippolytus: When Hezekiah, king of Judah, was still sick and weeping, there came an angel, and said to him: "I have seen thy tears, and I have heard thy voice. Behold, I add unto thy time fifteen years. And this shall be a sign to thee from the Lord: Behold, I turn back the shadow of the degrees of the house of thy father, by which the sun has gone down, the ten degrees by which the shadow has gone down," so that day be a day of thirty-two hours. For when the sun had run its course to the tenth hour, it returned again. And again, when Joshua the son of Nun was fighting against the Amorites, when the sun was now inclining to its setting, and the battle was being pressed closely, Joshua, being anxious lest the heathen host should escape on the descent of night, cried out, saying, "Sun, stand thou still in Gibeon; and thou moon, in the valley of Ajalon," until I vanquish this people. And the sun stood still, and the moon, in their places, so that day was one of twenty-four hours. And in the time of Hezekiah the moon

[341] *Answer to Eunomius' Second Book.*

[342] *Answer to Eunomius' Second Book.*

[343] *On the Soul and Resurrection*.

[344] *On the Soul and Resurrection.*

[345] *On Ecclesiastes*, Ch 1, 2.

also turned back along with the sun, that there might be no collision between the two elemental bodies, by their bearing against each other in defiance of law. And Merodach the Chaldean, king of Babylon, being struck with amazement at that time, for he studied the science of astrology, and measured the courses of these bodies carefully – on learning the cause, sent a letter and gifts to Hezekiah, just as also the wise men from the east did to Christ.[346]

Hippolytus: We find in the commentaries, written by our predecessors, that day had thirty-two hours. For when the sun had run its course, and reached the tenth hour, and the shadow had gone down by the ten degrees in the house of the temple, the sun turned back again by the ten degrees, according to the word of the Lord, and there were thus twenty hours. And again, the sun accomplished its own proper course, according to the common law, and reached its setting. And thus there were thirty-two hours.[347]

Hippolytus: For what richer beauty can there be than that of the circle of heaven? And what form of more blooming fairness than that of earth's surface? And what is there swifter in the course than the chariot of the sun? And what more graceful car than the lunar orb? And what work more wonderful than the compact mosaic of the stars? And what more productive of supplies than the seasonable winds? And what more spotless mirror than the light of day? And what creature more excellent than man?[348]

Hippolytus: [Refuting the view of the Greek Ecphantus]: "And that the earth in the middle of the cosmical system is moved round its own center towards the east."[349]

Irenaeus: The sun also, who runs through his orbit in twelve months, and then returns to the same point in the circle.[350]

Jerome: In Exodus we read that the battle was fought against Amalek while Moses prayed, and the whole people fasted until the evening. Joshua, the son of Nun, bade sun and moon stand still, and the victorious army prolonged its fast for more than a day.[351]

Jerome: The moon may dispute over her eclipses and ceaseless toil, and ask why she must traverse every month the yearly orbit of the sun. The sun may complain and want to know what he has done that he travels more slowly than the moon.[352]

John Damascene: For it is night when the sun is under the earth, and the duration of night is the course of the sun under the earth from its rising till its setting.[353]

Justin Martyr: The former, after he had been named Jesus (Joshua), and after he had received strength from His Spirit, caused the sun to stand still.[354]

Justin Martyr: And again, when the land was given up to you with so great a display of power, that you witnessed the sun stand still in the heavens by the order of that man whose name was Jesus (Joshua), and not go down for thirty-six hours, as well as all the other miracles which were wrought for you as time served; and of these it seems good to me now to speak of another, for it conduces to your hereby knowing Jesus, whom we also know to have been Christ the Son of God, who was crucified, and rose again, and ascended to heaven, and will come again to judge all men, even up to Adam himself.[355]

Mathetes: By whom He made the heavens, by whom he enclosed the sea within its proper bounds, whose ordinances all the stars faithfully observe, from whom the sun has received the measure of his daily course to be observed, whom the moon obeys, being commanded to shine in the night, and whom the stars also obey, following the moon in her

[346] Fragments, I, *Discourse on Hezekiah*. Hippolytus' reference to "twenty-four hours" refers to the second leg of the forty-eight hour period of that unique long day.

[347] Fragments, III, *Discourse on Hezekiah.*

[348] *Discourse on the Holy Theophany*, 1.

[349] *The Prooemium*, Ch XIII.

[350] *Against Heresies*, Bk I, Ch XVII, 1.

[351] *Against Jovinianus*, Bk 2.

[352] *Against the Pelagians*, Bk I, 1, 9.

[353] *The Orthodox Faith*, Bk 2, Ch 7.

[354] *Dialogue with Trypho*, Ch CXIII.

[355] *Dialogue with Trypho*, Ch CXXXII.

course; by whom all things have been arranged, and placed within their proper limits.[356]

Methodius: And, of a truth, it seemed worth while to inquire also about the sun, what is the manner of his being set in the heaven; also what is the orbit he traverses; also whither it is that, after a short time, he retires; and why it is that even he does not go out of his proper course: but he, too, as one may say, is observing a commandment of a higher power, and appears with us just when he is allowed to do so, and departs as if he were called away.[357]

Methodius: Resuming then, let us first lay bare, in speaking of those things according to our power, the imposture of those who boast as though they alone had comprehended from what forms the heaven is arranged, in accordance with the hypothesis of the Chaldeans and Egyptians. For they say that the circumference of the world is likened to the turnings of a well-rounded globe, the earth having a central point. For its outline being spherical, it is necessary, they say, since there are the same distances of the parts, that the earth should be the center of the universe, around which, as being older, the heaven is whirling. For if a circumference is described from the central point, which seems to be a circle, for it is impossible for a circle to be described without a point, and it is impossible for a circle to be without a point, surely the earth consisted before all, they say, in a state of chaos and disorganization.[358]

Tertullian: In Exodus, was not that position of Moses, battling against Amalek by prayers, maintained as it was perseveringly even till "sunset," a "late Station?" Think we that Joshua the son of Nun, when warring down the Amorites, had breakfasted on that day on which he ordered the very elements to keep a Station? The sun "stood" in Gibeon, and the moon in Ajalon; the sun and the moon "stood in station until the People was avenged of his enemies, and the sun stood in the mid heaven." When, moreover, (the sun) did draw toward his setting and the end of the one day, there was no such day beforetime and in the latest time (of course, (no day) so long), "that God," says (the writer), "should hear a man" – (a man,) to be sure, the sun's peer, so long persistent in his duty – a Station longer even than late.[359]

Memoirs of Edessa: For look at the sun, and the moon, and the signs of the zodiac, and all the other creatures which are greater than we in some points, and see how individual freedom has been denied them, and how they are all fixed in their course by decree, so that they may do that only which is decreed for them, and nothing else. For the sun never says, I will not rise at my appointed time; nor the moon, I will not change, nor wane, nor wax; nor does any one of the stars say, I will not rise nor set.[360]

Alphonsus Ligouri (d 1787): "Let us observe the sun, which with great speed goes around the Earth, and without ever varying its course." (*Verità della Fede*, Cap III, 548, Latin: "Osserviamo il sole, che con velocissimo moto gira la terra, e senza mai variare il suo corso divide deversamente…")

The Consensus of Church Fathers and Medieval Theologians on:

The Length of the Day in Genesis 1 as a 24-Hour Period

Of the Fathers which commented on Genesis 1, the majority specify that they understand the "day" as a 24-hour period, the portion of a week, or some other specific or literal designation which is not a long period of time.[361]

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[356] *To Diognetes*, Ch 7.

[357] *Concerning Free Will.*

[358] *Banquet of the Ten Virgins*, Discourse VIII, Ch XIV.

[359] *On Fasting*, Ch X.

[360] *Book of the Laws*.

[361] One author noted his exasperation in finding anything but a literal interpretation in the Fathers, stating: "It was too speculative and difficult to appeal to the majority, who preferred to believe that the six days were really periods of time" (F. E. Robbins, *The Hexaemeral Literature*. University of Chicago, 1911, p. 22). Similarly, Stanley Jaki admits: "As I reviewed one after another the great commentaries on Genesis 1, I could not help feeling how close their authors were time and again to an interpretation which is strictly literal and yet at the same time puts that marvelous story at safe remove from any comparison with science, old and new" (*Genesis 1 Through the Ages*, p. xii).

Basil: "Thus were created the evening and the morning. Scripture means the space of a day and a night.…If it therefore says 'one day,' it is from a wish to determine the measure of day and night, and to combine the time that they contain. Now twenty-four hours fills up the space of one day – we mean of a day and of a night."[362]

Gregory of Nyssa: Gregory confirms the views of Basil on the details of the Creation in the following passage: "Before I begin, let me testify that there is nothing contradictory in what the saintly Basil wrote about the creation of the world since no further explanation is needed. They should suffice and alone take second place to the divinely inspired Testament. Let anyone who hearkens to our attempts through a leisurely reading be not dismayed if they agree with our words. We do not propose a dogma which gives occasion for calumny; rather, we wish to express only our own insights so that what we offer does not detract from the following instruction. Thus let no one demand from me questions which seem to fall in line with common opinion either from holy Scripture or explained by our teacher. My task is not to fathom those matters before us which appear contradictory; rather, permit me to employ my own resources to understand the text's objective. With God's help we can fathom what the text means which follows a certain defined order regarding creation. 'In the beginning God created the heavens and the earth' [Gn 1:1], and the rest which pertains to the cosmogenesis which the six days encompass."[363]

Ambrose: "But Scripture established a law of twenty-four hours, including both day and night, should be given the name of day only, as if one were to say the length of one day is twenty-four hours in extent."[364] "In the beginning of time, therefore God created heaven and earth. Time proceeds from this world, not before the world. And the day is a division of time, not its beginning."[365] "But now we seem to have reached the end of our discourse, since the 6th day is completed and the sum total of the work has been concluded."[366]

Victorinus: "The Creation of the World: In the beginning God made the light, and divided it in the exact measure of twelve hours by day and by night, for this reason, doubtless, that day might bring over the night as an occasion of rest for men's labours; that, again, day might overcome, and thus that labour might be refreshed with this alternate change of rest, and that repose again might be tempered by the exercise of day. "On the fourth day He made two lights in the heaven, the greater and the lesser, that the one might rule over the day, the other over the night."[367]

Ephrem the Syrian: "'In the beginning God created the heaven and the earth,' that is, the substance of the heavens and the substance of the earth. So let no one think that there is anything allegorical in the works of the six days. No one can rightly say that the things that pertain to these days were symbolic."[368]

Theophilus: "Of this six days' work no man can give a worthy explanation and description of all its parts...on account of the exceeding greatness and riches of the wisdom of God which there is in the six days' work above narrated."[369]

Irenaeus: "For in as many days as this world was made, in so many thousand years shall it be concluded….For the day of the Lord is as a thousand years; and in six days created things were completed: it is evident, therefore, that they will come to an end at the sixth thousand year."[370]

Among the Fathers, several of them show the same chronology in their eschatological view, that is, that, prophetically speaking, a day equates to one thousand years. Regardless whether the Fathers' view of a six-millennium span for the world is

[362] *Hexameron* 2, 8.

[363] *Hexaemeron*, PG 44:68-69, translated by Richard McCambly. Eustathius (270-337), Bishop of Antioch, called Basil's commentary on Genesis 1 an "overall great commentary" (PG 18, cols 705-707).

[364] *Hexameron* 1:37, FC 42:42.

[365] *Hexameron* 1:20, FC 42:19.

[366] *Hexameron* 6:75, FC 42:282.

[367] *On the Creation of the World*, NPNF1, vol. 7, pp. 341-343.

[368] *Commentary on Genesis,1:1*, FC 91:74

[369] *Autolycus* 2,12.

[370] *Against Heresies* 5, 28, 3.

correct, the only important fact for our purposes is that the 'day = 1000 years' schema confirms the Fathers' belief that a day in Genesis 1 is less than one thousand years, and more specifically, that the day is precisely 24-hours. In other words, these Fathers did not believe that a day of Genesis was 1000 years. Their formula is certainly not 1000 years in Genesis 1 = 1000 years of the earth's longevity; rather, a single day of 24 hours in Genesis = 1000 years of the earth's longevity.[371]

Lactantius: "God completed the world and this admirable work of nature in the space of six days, as is contained in the secrets of Holy Scripture, and consecrated the seventh day.…For there are seven days, by the revolutions of which in order the circles of years are made up.…Therefore, since all the works of God were completed in six days, the world must continue in its present state through six ages, that is, six thousand years...For the great day of God is limited by a circle of a thousand years, as the prophet shows, who says, 'In Thy sight, O Lord, a thousand years are as one day.' And as God labored during those six days in creating such great works, so His religion and truth must labor during these six thousand years."[372]

Here we notice how Lactantius, as other Fathers, believes in a six-thousand year time-span for the existence of the present heaven and earth. In order to arrive at this calculation, Lactantius must first understand the days of Genesis as twenty-four hour periods, which can then, by application of the "prophets" words, be an analogical prediction to the time of the demise of the Creation.

Methodius: "For you seem to me, O Theophila, to have discussed those words of the Scripture amply and clearly, and to have set them forth as they are without mistake. For it is a dangerous thing wholly to despise the literal meaning, as has been said, and especially of Genesis, where the unchangeable decrees of God for the constitution of the universe are set forth, in agreement with which, even until now, the world is perfectly ordered, most beautifully in accordance with a perfect rule, until the Lawgiver Himself having re-arranged it, wishing to order it anew, shall break up the first laws of nature by a fresh disposition. But, since it is not fitting to leave the demonstration of the argument unexamined – and, so to speak, half-lame – come let us, as it were completing our pair, bring forth the analogical sense, looking more deeply into the Scripture; for Paul is not to be despised when he passed over the literal meaning, and show that the word extend to Christ and the Church.[373]

Clement of Alexandria: "For the creations on the different days followed in a most important succession; so that all things brought into existence might have honor from priority, created together in thought, but not being of equal worth. Nor was the creation of each signified by the voice, inasmuch as the creative work is said to have made them at once. For something must needs have been named first. Wherefore those things were announced first, from which came those that were second, all things being originated together from one essence by one power."[374]

One can get a clearer picture of how literally Clement interprets Scriptural numbers in Book 1, Ch. 21 of the *Stromata*. There he enumerates a long series of chronological data. For our purposes, Clement specifies the length of time from Adam to Noah's Flood to the very day:

Clement: "From Adam to the deluge are comprised two thousand one hundred and forty-eight years, four days."[375]

[371] Although it is true that Augustine had at one time adopted the day = 1000 years schema, yet believed that the days of Genesis were figurative, that is, accomplished in one instant rather than over six days, he later rejected the day = 1000 years schema. He writes: "...and they allege that this period may be defined six thousand years, as of six days. Nor have they heeded the words, 'are but as one day which is past by' for, when this was uttered, not a thousand years only had passed, and the expression, 'as a watch in the night,' ought to have warned them that they might not be deceived by the uncertainty of the seasons: for even if the six first days in which God finished His works seemed to give some plausibility to their opinion, six watches, which amount to eighteen hours, will not consist with that opinion." (On the Psalms, Psalm 90, NPNF, vol. 8, p. 442).

[372] *Institutes* 7, 14

[373] *Banquet of the Ten Virgins*, Discourse III, Ch 2.

[374] *Stromata*, Book VI, Ch 16.

[375] Stromata, Book 1, Ch. 21 (ANF, Vol. 2, p. 332).

This would necessarily mean that Clement would have considered the first day of the above enumeration as beginning on the sixth day of creation, which would mean that the seventh day would be the second day, and so on.

Epiphanius: "Adam, who was fashioned from the earth on the sixth day and received breath, became a living being (for he was not, as some suppose, begun on the fifth day, and completed on the sixth; those who say have the wrong idea), and was simple and innocent, without any other name."[376]

Julius Africanus: "For the Jews, deriving their origin from them as descendants of Abraham, having been taught a modest mind, and one such as becomes men, together with the truth by the spirit of Moses, have handed down to us, by their extant Hebrew histories, the number 5,500 years as the period up to the advent of the Word of salvation, that was announced to the world in the time of the sway of the Caesars."[377]

In the same fragment, Julius explains that he understands the numbers of Genesis literally.

Julius Africanus: "Adam, when 230 years old, begets Seth; and after living another 700 years he died, that is, a second death (Fragment III); God decreed to destroy the whole race of the living by a flood, having threatened that men should not survive beyond 120 years.…For the space of time meant was 100 years up to the flood in the case of the sinners of that time; for they were 20 years old (Fragment IV); Noe was 600 years old when the flood came on. From Adam, therefore, to Noe and the flood, are 2262 years."[378]

Cyril of Jerusalem: "**In six days** God made the world.…The sun, however resplendent with bright beams, yet was made to give light to man, yea, all living creatures were formed to serve us: herbs and trees were created for our enjoyment...The sun was formed by a mere command, but man by God's hands."[379] "...but the earth is from the waters: and before the whole six days' formation of the things that were made, the Spirit of God moved upon the face of the water. The water was the beginning of the world..."[380]

Hippolytus: "But it was right to speak not of the 'first day,' but of 'one day,' in order that by saying 'one,' he might show that it returns on its orbit, and, while it remains one, makes up the week....On the first day God made what He made out of nothing."[381]

Hippolytus also critiques the Greek philosophers for allegorizing the days of Genesis. He writes:
Hippolytus: "When, therefore, Moses has spoken of 'the six days in which God made heaven and earth'...Simon, in a manner already specified, giving these and other passages of Scripture a different application from the one intended by the holy writers, deifies himself. When, therefore, the followers of Simon affirm that there are three days begotten before sun and moon, they speak enigmatically."[382]

Hippolytus, as did some of the other Fathers who believed that the world would end in 6,000 years, shows his belief in a literal six days of creation by equating them with the 6,000 years. He writes: "Since, then, in six days God made all things, it follows that 6,000 years must be fulfilled."[383]

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[376] *Panarion* 1:1, translated by Phillip R. Amidon.

[377] Extant Fragments, III, 1.

[378] Fragment V.

[379] *Catechetical Lectures* 12, 5.

[380] *Catechetical Lectures*, 3, 5.

[381] Genesis 1:5, 1:6; ANF, vol. 5, p. 163.

[382] *Refutation of All Heresies*, Book VI, Ch IX

[383] Expressing a similar idea is the Donatist bishop, Tyconius: "Moreover, just as the whole time is reckoned in the first part of any time period, so also the last hour is reckoned as a whole day, or what is left of a thousand years is reckoned as a thousand years. The world's age is six days, that is, six thousand years. In what is left of the sixth day, that is, of these 1000 years, the Lord was born, suffered and rose again." (*The book of Rules*, 5); and Firmicus Maternus: "For after long ages, in the last reaches of time, that is, almost at the end of the week of the centuries, the Word of God commingled Itself with human flesh, to save mankind, to conquer death, to link the frailty of the human body with divine immortality." (*The Error of the Pagan Religions*, 25:3). Hilary of Poitiers (315-367) does the same in *Commentary on Matthew* 17:1; 20:6; and *Tractatus* 1, 41; 2, 10 on his belief that the world would last 6000 years.

Chrysostom: "Acknowledging that God could have created the world 'in a single day, nay in a single moment,' he chose 'a sort of succession and established things by parts'...so that, accurately interpreted by that blessed prophet Moses, we do not fall in with those who are guided by human reasonings."[384]

Athanasius: "For as to the separate stars or the great lights, not this appeared first, and that second, but in one day and by the same command, they were all called into being. And such was the original formation of the quadrupeds, and of birds, and fishes, and cattle, and plants; thus too has the race made after God's Image come to be, namely men; for though Adam was formed out of earth, yet in him was involved the succession of the whole race."[385]

We notice that Athanasius specifies that on the day the stars were made they were not made separately; rather, "in one day and by the same command, they were all called into being..." The same, of course, would be true on the fifth day when, as Athanasius says, "the quadrupeds, and of birds, and fishes, and cattle..." were made. By the words, "same command" Athanasius is not saying that the stars and animals were created together, but that each category of creation was made in one day by a specific command on that day. This is confirmed also in II, 49 as he says, "for it was not first one and then another, but all at once were constituted after their kinds." "Kinds" refers to the specific creatures being made, as Athanasius goes on to say in the remainder of the context.

Athanasius: "We begin the holy fast on the fifth day...and adding to it according to the number of those six holy and great days, which are the symbol of the creation of the world, let us rest and cease from fasting on the tenth day of the same...on the holy sabbath of the week."[386]

The other Fathers who comment on Genesis 1 do not specify the length of a day.[387] There is only one patristic witness, however, who specifically and explicitly held that the days of Genesis were figurative. Origen, who is considered on the lower rung of patristic authority, had, because of his influence from the Greek Philo, interpretations of Scripture that were consistently prone to allegory at the expense of the literal meaning.

Origen: "Now who is there, pray, possessed of understanding, that will regard the statement as appropriate, that the first day, and the second, and the third, in which also both evening and morning are mentioned, existed without sun, and moon, and stars – the first day even without a sky. And who is found so ignorant as to suppose that God, as if He had been a husbandman, planted trees in paradise....The same style of Scriptural narrative occurs abundantly in the Gospels, as when the devil is said to have placed Jesus on a lofty mountain, that he might show Him from thence all the kingdoms of the world.…And many other instances similar to this will be found in the Gospels by any one who will read them with attention, and will observe that in those narratives which appear to be literally recorded, there are inserted and interwoven things which cannot be admitted historically, but which may be accepted in a spiritual signification."[388]

Augustine: Although Augustine entertained a six day creation in the early part of *The Literal Meaning of Genesis* (published in 400 A.D.), he felt there were too many difficulties with it and he ended up favoring a one-day creation in which everything was created simultaneously. In his book *Retractationes*, Augustine remarked on his original effort to form a literal interpretation of Genesis 1 in his work *Genesis Against the Manicheans*, written in 388 A.D. He intended Genesis 1 to be a literally interpreted but with the resignation, "there are more questions

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[384] PG, *Homily* 3, col 35.

[385] *Discourse Against the Arians*, Discourse II, 48.

[386] *Easter Letter*, 10

[387] Conspicuously absent from this long list of Fathers is Jerome, a contemporary of Augustine, and one of the Church's greatest exegetes of Scripture. Unfortunately, even though he had a superior knowledge of the original Hebrew, Jerome did not offer any detailed discussion on the six-day creation in Genesis 1. The only remarks come from his essay titled *Hebraic Questions about Genesis* which includes only four short remarks on Genesis 1 (that "in the beginning" referred to Christ; the *ruach* hovering referred to the Holy Spirit; a remark about the gathering of waters; and that the seventh day was not a complete day of rest).

[388] *De Principiis*, Book IV, Ch 1; ANF, v. 4, p. 365.

raised than answers found and of the answers found not many have been established for certain."[389]

One of his Augustine's chief difficulties regarded the creation of the angels, since neither Genesis 1 or 2 specified *when* they were created. For his own reasons, many of them due to his penchant for Platonism and his fearlessness to ask how things came to be as they are, Augustine felt obliged to include the angels somewhere in the Genesis 1 narrative.[390] Thus he postulated that the creation of Light in Genesis 1:3 referred to the angels.[391] He writes:

> What then is the meaning of the repetition in the case of the other works? Perhaps we have here an indication that on the first day, the day on which the light was made, under the term "light" is revealed the creation of spiritual and intellectual creatures, by which we understand all the holy angels and virtues....It is no wonder that when the holy angels were formed by the first creation of light, God first showed them that He was going to create the works to follow. And indeed they would not have known the mind of God except in so far as He Himself had revealed it to them.[392]

Using this as his anchor, Augustine proceeds to interpret the rest of Genesis 1. He then reasons that, since Genesis 1 does not mention the "night" in any of its days, this suggests that the focus is on the "day." He writes:

> The angels...have been made to share in the truth. Through all six days, therefore, no mention is made of night, but after the evening and morning there is one day; again after evening and morning, another day.…These days have their nights, but it is the days, not the nights, that are described. For night belongs to day, not day to night, when the holy angels of heaven refer their knowledge of creatures in themselves to the honor and love of Him in whom they contemplate the eternal reasons by which creatures were made.[393]

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[389] Various evolutionists who reference the Fathers hold that Augustine actually believed in evolution. Eldon J. Gardner of Utah State University writes: "St. Augustine...favored an allegorical interpretation of the book of Genesis in the Bible and openly promoted an evolutionary concept as opposed to special creation" (*History of Life Science*, Burgess, 1960, p. 93). Henry Fairfield Osborn of Columbia University and the American Museum of Natural History writes that Augustine "sought a naturalistic interpretation of the Mosaic record...and taught that in the institution of nature we should not look for miracles but for the laws of nature" (*From the Greeks to Darwin*, 2nd ed. Charles Scribner and Sons, 1929, p. 11). In the college textbook *Principles of Organic Evolution*, evolutionist Arthur Ward Lindsay of Dennison University writes: "...several of the church fathers expressed ideas of organic evolution even though the trend of ecclesiastical thought led more readily into other lines of reasoning." He claims that Gregory of Nyssa, Basil, Augustine and Aquinas "expressed belief in the symbolic nature of the Biblical story of creation and in their comments made statements clearly related to the concept of evolution" (C. V. Mosby, 1952, p. 21). Hugh Ross, a Christian theistic evolutionist, cites the same personalities in his book *The Fingerprint of God*, 2 nd ed. (Promise, 1991, pp. 141ff). W. R. Thompson, Ph.D., a Catholic Creationist, who wrote a now famous 14-page introduction to a 1955 edition of Darwin's *Origin of Species* which challenged evolution's credibility, writes: "As early as 1921, Canon H. de Dolodot in *La Darwinisme*, issued under the auspices of the University of Louvain, cites St. Augustine as holding as certain the theory of absolute natural evolution of living being to the human body itself."

[390] One of Augustine's favorite verses was Wisdom 11:20 "But you have disposed all things by measure and number and weight." He writes: "Now we are seeking to know whether the Creator, who has ordered all things in measure, and number, and weight, has assigned to the waters not just one proper place around the earth, but another also above the heavens, a region which has been spread around and established beyond the limits of the air" (*Confessions*, Bk 2, Ch 1, 2).

[391] On this question, Aquinas cites Basil, Strabus and Bonaventure: "The empyrean heaven rests only on the authority of Strabus and Bede, and also of Basil; all of whom agree in one respect, namely, in holding it to be the place of the blessed. Strabus and Bede say that as soon as it was created it was filled with angels; and Basil (Hom. 2 in *Hexaemeron*) says: 'Just as the lost are driven into the lowest darkness, so the reward for worthy deeds is laid up in the light beyond this world, where the just shall obtain the abode of rest.'" *Summa Excursion*, Creation in Six Days, Ques. 66, Art. 3. Zwingli was the only other exegete to hold that the light of Genesis 1:3 referred to the angels.

[392] *Literal Meaning of Genesis*, Bk. 2, Ch 8, Nos.16-18.

He says very much the same in the *City of God* written some two decades later:

> ...which is the name given to the sky between the waters above and those beneath, that is the second day; when in the knowledge of the earth, and the sea, and all things that grow out of the earth, that is the third day; when in the knowledge of the greater and less luminaries, and all the stars, that is the fourth day; when in the knowledge of all animals that swim in the waters and that fly in the air, that is the fifth day; when in the knowledge of all animals that live on the earth, and of man himself, that is the sixth day.[394]

From this he reasons that all creation was made simultaneously. He writes:

> Hence, we can no longer take "day" to mean the form of the work created and "evening" its completion and "morning" the beginning of another work in the account of creation...But that day, which God has made, recurs in connection with His works not by a material passage of time but by spiritual knowledge, when the blessed company of angels contemplate from the beginning in the Word of God the divine decree to create...Finally, they refer this knowledge of the creature to the praise of eternal Truth, where they had beheld the form of the work to be produced, and this is the meaning of the statement that it was morning. Thus, in all the days of creation there is one day, and it is not to be taken in the sense of our day, which we reckon by the course of the sun.[395]

It is apparent that Augustine more of less forces himself to reject the passage of six literal days due to his self-imposed requirement to include the angels in Genesis 1. Whether inadvertently or by design, the angels become Augustine's central focus in Genesis 1, since everything that is made is arranged for their contemplation. In effect, once the angels are included in Genesis 1:3, everything else in the chapter must fit in, and Augustine does his best to make them fit.

Although Augustine had a penchant for mixing spiritual and literal interpretations in his biblical exegesis,[396] his attempt at such a methodology in Genesis 1 is very unusual, as even he admits. Even though Augustine makes a concerted effort to fashion a literal interpretation of Genesis, throughout the discourse he slips into many spiritual interpretations, often catching himself, after long spiritual descriptions, to get back on track with the literal interpretation. Because of the difficulties that Augustine imagined with a strict literal interpretation of Genesis, whether by design or habit, the spiritual interpretations become somewhat of a controlling factor in his understanding, the most prominent, of course, is his conclusion to interpret the light of Genesis as a reference to angels. As such, Augustine is isolated from all the rest of the Fathers. It can be safely concluded that Augustine did not get his interpretation of Genesis 1 from Tradition. In fact, no Father before Augustine had an overriding concern about *when* the angels were created, and Scripture itself did not seem to share the concern.

As the anomalies in Augustine's view mount, his interpretation becomes increasingly difficult to accept. In Scripture, man's creation is specified with the words "and let us make man in our image," as well as being reiterated throughout Scripture (Gn 5:1; Dt 4:32; Is 45:12; Ec 7:29; Jm 3:9). If, as Augustine claims, the angels are the focus of the first verses of Genesis 1, then why would the text not just mention the word "angels" as even Genesis 1:26 mentions the word "man" when man is created?

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[393] *Literal Meaning of Genesis*, Bk 4, Ch 25, No. 42.

[394] *City of God*, Bk XI, Ch 7.

[395] *Ibid*, Ch 26, No. 43.

[396] Augustine writes: "Brethren, I must tell you, and teach you according to my poor abilities, which the Lord giveth me for your benefit, and must convey to you what ye may hold as a rule in the interpretation of all Scripture. Everything that is said or done is to be understood either in its literal signification, or else it signifies something figuratively; or at least contains both of these at once, both its own literal interpretation, and a figurative signification also" (*Sermons*, xxxix). "Wherefore, though light and darkness are to be taken in their literal signification in these passages of Genesis in which it is said, "God said, Let there be light, and there was light," and "God divided the light from the darkness," yet, for our part, we understand these two societies of angels, the one enjoying God, the other swelling with pride..." (*City of God*, Bk XI, Ch 33).

What is to be gained for the ancient writer by being so cryptic, especially when everything else in the chapter is called by its common name? Moreover, "light" is never specifically identified with angels in Scripture. If there is mention of luminous bodies as representing angels (Jb 38:7), men and God are also signified as such (2Pt 1:19; Ap 22:16; Ml 4:2), and thus, spiritually speaking, there is no distinction for the angels in regard to light. In addition, Scripture makes no issue of "angelic contemplation." All in all, Augustine's self-imposed "angelic" interpretation puts a tremendous strain on the rest of Genesis 1's details, and it appears that it is a burden that the text simply cannot bear.

But Augustine has another "proof text" for his view. He begins by posing the following question:

> But if the angelic mind can grasp simultaneously all that the sacred text sets down separately in an ordered arrangement according to causal connection, were not all these things also made simultaneously, the firmament itself, the waters gathered together and the bare land that appeared, the plants and trees that sprang forth, the lights and the stars that were established, the living creatures in the water and on the earth? Or were they rather created at different times on appointed days?[397]

Then Augustine brings his proof text:

> In this narrative of creation [Genesis 1-2] Holy Scripture has said of the Creator that He completed His works in six days; and elsewhere, without contradicting this, it has been written of the same Creator that He created all things together. It follows, therefore, that He, who created all things together, simultaneously created these six days, or seven, or rather the one day six or seven times repeated.[398]

We notice that Augustine is not quite sure how the simultaneity of creation works itself out numerically. Be that as it may, Augustine's citation of "...and elsewhere...it has been written...He created all things together" is referring to Sirach (Ecclesiasticus) 18:1. The Greek of the Septuagint reads: ὁ ζῶν εἰς τὸν αἰῶνα ἔκτισεν τὰ πάντα κοινῇ ("He who lives forever has created all things in common"). The word in question is κοινῇ (koine), which normally means "in common" or "without exception." But the Latin Vulgate from which Augustine read had translated κοινῇ with the words *omnia simul* in the sentence, "qui vivit in aeternum creavit *omnia simul* Deus solus iustificabitur et manet invictus rex in aeternum."[399] The clause *omnia simul* means "at one time" or "altogether," but this is obviously a questionable translation of the Greek κοινῇ. Sirach 18:1, at least in the original Greek, is not saying that creation was made simultaneously or altogether, but of all that was made the Lord created it all, without exception. The context of the passage certainly bears this out.[400]

The reason this mistake may have happened is that Augustine's knowledge of Greek was at an elementary level. When he was beginning his commentary on Genesis in 401 A.D., his abilities in Greek were poor.[401] It wasn't until Augustine was an old man that he had a modest reading ability of Greek. Unfortunately, Augustine was limited to the Vulgate's translation of Sirach 18:1, and thus he misinterpreted the meaning of the verse. Hence, his "proof text" cannot hold the weight Augustine put on it.[402]

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[397] *Literal Meaning of Genesis*, Bk. 4, Ch. 33, No 51.

[398] *Literal Meaning of Genesis*, Bk 4, Ch 33, No 52.

[399] The Douay-Rheims, which translates the Latin Vulgate, reads: "He that liveth for ever created all things together."

[400] "He who lives for ever created the whole universe; the Lord alone will be declared righteous...To none has he given power to proclaim his works; and who can search out his mighty deeds? Who can measure his majestic power? And who can fully recount his mercies? It is not possible to diminish or increase them, nor is it possible to trace the wonders of the Lord" (Sirach 18:1-6, RSV).

[401] *Ancient Christian Writers*, ed. Johannes Questen, et al, Vol. 1, New York: Newman Press, 1982, p. 5.

[402] Another possibility for the Vulgate's choice of *simul* for κοινός is that there is a slight semantic overlap between the two words. This usually happens when time and material things are inadvertently interchanged. For example, although *simul's* common meaning focuses on time (and thus it is usually translated as "at the same time" or "simultaneous"), it could also be confused with the idea of physical solidarity. If, for example, the people of a city stand together against an opposing army, it could be said that the people are both: (a) standing together, at the same time, against the army, and (b) standing together

But Augustine has yet another proof text that he feels is his strongest argument. Referring to Genesis 2:4-9 he writes:

> Since by the terms "heaven" and "earth" the sacred writer...wished us to understand here the whole of creation, we might ask why he added, 'and every green thing of the field'? I believe that he put the matter in this way in order to emphasize what day he spoke of when he said, 'When day was made...But when we recall the order in which creatures were made, we find that all the grass of the field was created on the third day, before the sun was made (for it was made on the fourth day)...When, therefore, we hear, 'When day was made, God made heaven and earth, and all the grass of the field,' we are admonished to think of that day which may perhaps be a corporeal thing consisting in some sort of light unknown to us, or a spiritual thing made up of the united company of angels.[403]

He concludes:

> Now perhaps we have here a confirmation of what we tried to show in the previous book, that God created everything at one time. The earlier narrative [Genesis 1] stated that all things were created and finished on six successive days, but now [Genesis 2] to one day everything is assigned, under the terms "heaven" and "earth," with the addition also of "plants." If, therefore, as I have already said, "day" were understood in its ordinary sense, the reader would be corrected when he recalled that God had ordered the earth to produce the green things of the field before the establishment of that day that is marked by the sun. Hence, I do not now appeal to another book of Holy Scripture to prove that God created all things together [Sirach 18:1]. But the very next page following the first narrative of creation testifies to this when it tell us, 'When day was made, God made heaven and earth and every green thing of the field. Hence you must understand that this day was seven times repeated, to make up the seven days.[404]

in solidarity against the army. Hence, the entire citizenry's simultaneous standing against the enemy will overlap in meaning with their common solidarity as one united group against the enemy. Naturally, if all the citizens did not stand together simultaneously against the enemy, it could not be said that they were "all together" in their opposition against the enemy. Barring such an example of semantic overlap, time is normally understood as a separate entity from space. Indeed, the normal meaning of "simul" deals with time, not commonality. The Latin Vulgate demonstrates that κοινός' normal meaning is "in common," since out of 59 uses of κοινός and its derivatives, only three are translated "simul" by the Vulgate (Sirach 18:1; Sirach 50:17; and Susanna 1:14), and in those three instances, it is due precisely to the semantic "overlap" described above. An examination of the other two instances besides Sirach 18:1 will illustrate this crucial point. The Catholic Revised Standard Version of Sirach 50:17 reads: "Then all the people together (koine/simul) made haste and fell to the ground upon their faces." This verse offers a perfect illustration of the semantic overlap between "simul" and "koine." The people "all made haste" (physically and spatially, as one, "common" physical grouping, "all together"). But they also necessarily made haste "at once," that is, "at one time." It is important to note, however, that when the people "fell to the ground," they did not fall at the same precise instant. Like the members of any crowd acting on a common impulse, the members of this crowd fell to the ground at more or less the same time. In a similar sense the creation of all things took place "at once" – with relative simultaneity – but not "at the same precise instant." Susanna 1:14 illustrates the same phenomenon. The Catholic Revised Standard Version reads: "And then together (simul/koine) they arranged for a time when they could find her alone." Here two men, as one physical group, jointly, "in common" ("all together"), arranged something. But they also arranged something "at the same time." In light of these examples one could say that *simul* in Sirach 18:1 was not so much a mistranslation of κοινός as it was a translation susceptible to misinterpretation through a narrowing of the semantic field. In light of the two other places in the Vulgate where κοινός is translated as *simul*, it is logical to conclude that *simul* in Sirach 18:1 was also meant to join together the two meanings of physical entirety and temporal simultaneity. For an Old Testament author (or translator) who believed in the six days of creation, this is hardly surprising, since God did create the universe in its entirety and at one time, the hexameron.

[403] *Literal Meaning of Genesis*, Bk 5, Ch 2, No. 4.

[404] *Literal Meaning of Genesis*, Bk 5, Ch 3, No 6.

Here again, however, not knowing any of the Hebrew language, Augustine makes conclusions that are simply not supported by the original text.[405] The specific phrasing of Gn 2:4 "***in*** the day," from the Hebrew ביום *beyom*, creates a Hebrew idiom meaning "when God made," and thus, on strict grammatical grounds, this would disallow Gn 2:4's "day" from disqualifying Gn 1:5's "day" from being a twenty-four-hour day.

In addition, whenever the Hebrew *yom* ("day") is used with an ordinal number in Scripture, it never refers to an indefinite or long period of time. In Genesis 1, there are six ordinal numbers enumerated: "the first day...the second day...the third day..." and so on until the sixth day. In contrast, Gn 2:4's "day" does not have an ordinal number attached to it, which would eliminate it from comparison to Genesis 1.

Further, Augustine's objection can be answered by focusing on the particular words used in Genesis 2 that are not used in Genesis 1. Gn 2:5 refers to the "shrub" (שִׂיח) of the field, but this word does not appear in Gn 1:11-12 or 1:29-30.[406] Rather, Gn 1:11-12 refers to the "herb" (עֵשֶׂב)[407] and the "tree producing fruit" (עֹשֶׂה פְּרִי).[408] Hence, the first distinction between Gn 1:11-12 and Gn 2:5 is that the former indicates only two kinds of vegetation, whereas Gn 2:5 adds a third. Apparently, the two plants of Gn 1:11-12 served as food for Adam and Eve described in Gn 1:29-30.

Secondly, Gn 2:5 specifies that "not ***every*** herb of the field had yet sprung up," which would mean there were some that had sprung up on the third day of creation, and some which sprung up on or after the sixth day of creation.

Thirdly, Gn 2:5 says the "shrubs" and "herbs" had not yet "sprung up" or "produced" (יִצְמַח) which contrasts with the "growth" (דָּשָׁא) of Gn 1:11-12. The word יִצְמַח (*tsemach*) refers to a budding for the next generation,[409] while דָּשָׁא (*dashah*) refers to an original sprouting of the first generation of fruits. Hence, Adam and Eve's food, on the first day of their creation, was the original fruit of the two plants in Gn 1:11-12, while the "shrubs" and the budding plants of Gn 2:5 would have to wait until the appropriate time for growth.

All in all, the reason we can levy these critiques on Augustine's view of Genesis is that he invited such criticism himself. In *The Literal Meaning of Genesis* he writes:

> Whoever, then, does not accept the meaning that my limited powers have been able to discover of conjecture but seeks in the enumeration of the days of creation a different meaning, which might be understood not in a prophetical or figurative sense, but literally and more aptly, in interpreting the works of creation, let him search and find a solution with God's help. I myself may possibly discover some other meaning more in harmony with the words of Scripture. I certainly do not advance the interpretation given above in such a way as to imply that no better one can ever be found, although I do maintain that Sacred Scripture does not tell us that God rested after feeling weariness and fatigue.[410]

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[405] In answering an Objection, neither does Aquinas seem to catch the difference between the Greek and Latin, but still manages to give an adequate answer by making a distinction in the word *creation*: "Objection 2: Further, it is said (Ecclesasticus 18:1): "He that liveth for ever, created all things together." But this would not be the case if the days of these works were more than one. Therefore they are not many but one only. Reply to Objection 2: God created all things together so far as regards their substance in some measure formless. But He did not create all things together, so far as regards that formation of things which lies in distinction and adornment. Hence the word creation is significant" (*Summa Theologica*, Bk 1, Ques. 74, Art 2).

[406] שִׂיח (siach) is used four times in the OT to refer to some type of plant (*cf.* Gn 2:5; 21:15; Jb 30:4, 7), yet a plant that does not produce fruit, but some other kind of edible product, *e.g.*, vines.

[407] עֵשֶׂב (eseb) appears in also in Gn 2:5; 3:18; 9:3; Ex 9:22,25; Dt 11:15, et al. This may refer to plants that produced grains, such as wheat, corn, etc.

[408] פְּרִי (peri) is used also in Gn 1:29; 30:2; Ex 10:15; Lv 23:40; et al.

[409] This meaning can be seen, for example, in Jb 38:27; Ps 85:12; 104:14; *cf.* Gn 41:6; Ex 10:5; Lv 13:37; Dt 29:22; Jg 16:22; 2Sm 10:5; Ps 132:17, et al.

[410] Bk 4, Ch 28, No 45.

In *The City of God*, he is a bit more cautious about his view:

> But simultaneously with time the world was made, if in the world's creation change and motion were created, as seems evident from the order of the first six or seven days. For in these days the morning and evening are counted, until, on the sixth day, all things which God then made were finished, and on the seventh the rest of God was mysteriously and sublimely signalized. What kind of days these were it is extremely difficult, or perhaps impossible for us to conceive, and how much more to say![411]

At many points we find Augustine still vacillating between the literal and spiritual interpretation. For example, regarding the light of the first day he writes in *The City of God*:

> And first of all, indeed, light was made by the word of God, and God, we read, separated it from the darkness, and called the light Day, and the darkness Night; but what kind of light that was, and by what periodic movement it made evening and morning, is beyond the reach of our senses; neither can we understand how it was, and yet must unhesitatingly believe it. For either it was some material light, whether proceeding from the upper parts of the world, far removed from our sight, or from the spot where the sun was afterwards kindled; or under the name of light the holy city was signified, composed of holy angels and blessed spirits, the city of which the apostle says, 'Jerusalem which is above is our eternal mother in heaven.'[412]

At times Augustine seems far from his spiritual interpretation, as it seems here in the *Confessions* (400 AD), written a year before *The Literal Meaning of Genesis*:

> For very wonderful is this corporeal heaven, of which firmament, between water and water, the second day after the creation of light, Thou saidst, Let it be made, and it was made. Which firmament Thou calledst heaven, that is, the heaven of this earth and sea, which Thou madest on the third day, by giving a visible shape to the formless matter which Thou madest before all days.[413]

In other works, Augustine applies his spiritual interpretation in other directions:

> In the creation God finished His works in six days, and rested on the seventh. The history of the world contains six periods marked by the dealings of God with men. The first period is from Adam to Noah; the second, from Noah to Abraham; the third, from Abraham to David; the fourth, from David to the captivity in Babylon; the fifth, from the captivity to the advent of lowliness of our Lord Jesus Christ; the sixth is now in progress, and will end in the coming of the exalted Savior to judgment. What answers to the seventh day is the rest of the saints, not in this life, but in another.[414]

While we do not have a statement from Augustine that he viewed the days of Genesis as twenty-four-hour periods, Augustine does stipulate that he believes the days of the Flood to be twenty-four hour days:

> It is plain that the day then was what it now is, a space of four-and-twenty hours, determined by the lapse of day and night; the month then equal to the month now, which is defined by the rise and completion of one moon; the year then equal to the year now, which is completed by twelve lunar months, with the addition of five days and a fourth to adjust it with the course of the sun. It was a year of this length which was reckoned the six hundredth of Noah's life, and in the second month, the twenty-seventh day of the month, the flood began, a flood which, as is recorded, was caused by heavy rains

[411] *City of God*, Bk XI, Ch 6.

[412] *City of God*, Bk XI, Ch 7.

[413] *Confessions*, Bk XII, Ch 8.

[414] *Contra Faustus*, 400 AD, Bk XII, 8.

> continuing for forty days, which days had not only two hours and a little more, but four, and-twenty hours, completing a night and a day. And consequently those antediluvians lived more than 900 years, which were years as long as those which afterwards Abraham lived 175 of, and after him his son Isaac 180, and his son Jacob nearly 150, and some time after, Moses 120, and men now seventy or eighty, or not much longer, of which years it is said, "their strength is labor and sorrow.[415]

All in all, as regards evolutionary theory, Augustine cannot come to its aid. For whether the Creation was created in Augustine's "one day," or over six twenty-four-hour days, the fact remains that Augustine believed all of creation came from nothing and occurred instantaneously, in a single moment, not over a long period of time. If anything, Augustine's "day" is infinitesimally less than twenty-four hours, not infinitesimally more.

The Midieval Theologians

Aquinas: "It is necessary to say that God brings things into being from nothing...(ST, I, Q 45, a 2, ad 2); Creation does not mean the building up of a composite thing from pre-existing principles but it means that the composite is created so that it is brought into being at the same time with all its principles.[416]

Aquinas: Reply to Objection #7: "The words 'one day' are used when day is first instituted, to denote that one day is made up of twenty-four hours. Hence, by mentioning 'one,' the measure of one natural day is fixed. Another reason may be to signify that a day is completed by the return of the sun to the point from which it commenced its course. And yet another, because at the completion of a week of seven days, the first day returns which is one with the eighth day. The three reasons assigned above are those given by Basil [Homily 2 in *Hexameron*].[417]

Aquinas: Reply to Objection #5: "According to Augustine (*De Genesi Contra Manichaeos*), primary matter is meant by the word earth, where first mentioned, but in the present passage it is to be taken for the element itself. Again it may be said with Basil (*Homily 4 in Hexaemeron*), that the earth is mentioned in the first passage in respect of its nature, but here in respect of its principal property, namely, dryness. Wherefore it is written: "He called the dry land, Earth." It may also be said with Rabbi Moses, that the expression, "He called," denotes throughout an equivocal use of the name imposed. Thus we find it said at first "He called the light Day": for the reason that later on **a** period of twenty-four hours is also called day, where it is said "there was evening and morning, one day."[418]

> But it [the cosmos] was not made from something; otherwise the matter of the world would have preceded the world...Therefore, it must be said that the world was made from nothing.[419]

As for the issue of the majority of Fathers having a different view of the Creation days than Augustine, Aquinas tries to find a middle road, but appears to end up siding with the former due to the need to explain how the substance obtained its different forms. He explains that the different forms could only come about on successive days:

Aquinas: "On the contrary, It is written (Genesis 1), 'The evening and the morning were the second day…the third day,' and so on. But where there is a second and third there is more than one. There was not, therefore, only one day. I answer that, on this question Augustine differs from other expositors.

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[415] *City of God*, Bk 15, Ch 14. As some of the other Fathers believed, Augustine also held that the world in his day was less than 6,000 years old: "...according to Scripture, less than 6000 years have elapsed since He began to be..."(*City of God*, Bk 12, Ch 12).

[416] *Summa Theologica*, I, Q 45, a 4, ad 2.

[417] *Summa Theologica*, Bk 1, Question 74, Art 3. Objection #7: "Further, 'first,' not 'one,' corresponds to 'second' and 'third.' It should therefore have been said that, 'The evening and the morning were the first day,' rather than 'one day.'"

[418] *Summa Theologica*, Bk 1, Ques. 69, Art 1Objection #5: "Further, the earth is given its name at its first creation by the words, "In the beginning God created heaven and earth." Therefore the imposition of its name on the third day seems to be recorded without necessity."

[419] *Ibid*., *Summa Theologica*, Q. 46, art. 2, 248-249.

His opinion is that all the days that are called seven, are one day represented in a sevenfold aspect (*De Genesi ad literam* iv, 22; *De Civitate* Dei xi, 9; *Ad Orosium* xxvi); while others consider there were seven distinct days, not one only. Now, these two opinions, taken as explaining the literal text of Genesis, are certainly widely different. For Augustine understands by the word day, the knowledge in the mind of the angels, and hence, according to him, the first day denotes their knowledge of the first of the Divine works, the second day their knowledge of the second work, and similarly with the rest. Thus, then, each work is said to have been wrought in some one of these days, inasmuch as God wrought in some one of these days, inasmuch as God wrought nothing in the universe without impressing the knowledge thereof on the angelic mind; which can know many things at the same time, especially in the Word, in Whom all angelic knowledge is perfected and terminated. So the distinction of days denotes the natural order of the things known, and not a succession in the knowledge acquired, or in the things produced. Moreover, angelic knowledge is appropriately called day, since light, the cause of day, is to be found in spiritual things, as Augustine observes *(De Genesi ad literam* iv, 28). In the opinion of the others, however, the days signify a succession both in time, and in the things produced.

If, however, these two explanations are looked at as referring to the mode of production, they will be found not greatly to differ, if the diversity of opinion existing on two points, as already shown (Q67, A1; Q69, A1), between Augustine and other writers is taken into account. First, because Augustine takes the earth and the water as first created, to signify matter totally without form; but the making of the firmament, the gathering of the waters, and the appearing of dry land, to denote the impression of forms upon corporeal matter. But other holy writers take the earth and the water, as first created, to signify the elements of the universe themselves existing under the proper forms, and the works that follow to mean some sort of distinction in bodies previously existing, as also has been shown (Q67, A1, 4; Q69, A1). Secondly, some writers hold that plants and animals were produced actually in the work of the six days; Augustine, that they were produced potentially. Now the opinion of Augustine, that the works of the six days were simultaneous, is consistent with either view of the mode of production. For the other writers agree with him that in the first production of things matter existed under the substantial form of the elements, and agree with him also that in the first instituting of the world animals and plants did not exist actually. There remains, however, a difference as to four points; since, according to the latter, there was a time, after the production of creatures, in which light did not exist, the firmament had not been formed, and the earth was still covered by the waters, nor had the heavenly bodies been formed, which is the fourth difference; which are not consistent with Augustine's explanation. In order, therefore, to be impartial, we must meet the arguments of either side.

Reply to Objection 1: On the day on which God created the heaven and the earth, He created also every plant of the field, not, indeed, actually, but "before it sprung up in the earth," that is, potentially. And this work Augustine ascribes to the third day, but other writers to the first instituting of the world.

Reply to Objection 2: God created all things together so far as regards their substance in some measure formless. But He did not create all things together, so far as regards that formation of things which lies in distinction and adornment. Hence the word creation is significant.

Reply to Objection 3: On the seventh day God ceased from making new things, but not from providing for their increase, and to this latter work it belongs that the first day is succeeded by other days.

Reply to Objection 4: All things were not distinguished and adorned together, not from a want of power on God's part, as requiring time in which to work, but that due order might be observed in the instituting of the world. Hence it was fitting that different days should be assigned to the different states of the world, as each succeeding work added to the world a fresh state of perfection.

Reply to Objection 5: According to Augustine, the order of days refers to the natural order of the works attributed to the days.[420]

Alcuin (735-804): Known as the greatest scholar of his age, taught in Charlemagne's Court school. He wrote nine Scriptural commentaries and revised the Latin Vulgate. He was a firm believer in a literal six-

[420] *Summa Theologica*, Bk 1, Ques. 74, Art. 2.

day *ex nihilo* creation. He wrote: "God created out of nothing the heaven, the earth, the angels, light, air, water and the soul of man."[421]

Rabanus Maurus Magnentius (776-856): student of Alcuin, Abbot of Fulda and Archbishop of Mainz. Highly regarded for his Scriptural and patristic knowledge. Most of his works are exegetical; his commentaries include almost the entire book of the Old and New Testament. He was a firm believer in a literal six-day creation, descriptions of which can be found in *Commentariorum in Genesin libri quatror*, PL 107, col. 449f.

Peter Lombard (c. 1100-1160): Lombard, along with many of his contemporaries, held to an *ex nihilo* creation; the special creation of Adam and Eve, and that "the Catholic faith believes that there was one principle, one cause of all things, namely God." Moreover, Lombard affirmed the "essentially hexameral plan" of creation, holding that God: "creates the angels and the unformed matter *simul* and *ex nihilo*. Then, in the work of six days, he produces individual creatures out of the unformed matter.... The days referred to in Genesis are to be understood literally as lasting twenty-four hours."[422] He writes: "Moses says that the world was made by God as a creator, and he avoided the error of certain men who supposed that many first principles existed without a first principle."[423]

Thierry of Chartres (d. 1150): The famous teacher at Paris and Chartres whose *Heptateuchon* is one of the chief sources of our knowledge regarding studies in the first half of the twelfth century. He utilized the first translations of Arabic sources in astronomy and mathematics. He was a firm believer in an *ex nihilo*, six-day creation.

Peter Abelard (1079-1142): One of the greatest intellectuals of the entire Middle Ages who studied under the School of Chartres and later under Anselm of Laon. He believed in an *ex nihilo*, six-day creation.[424]

Hugh of St. Victor (1096-1141): According to Adolf Harnack, he was one of "the most influential theologians of the twelfth century." A great admirer of Augustine, and although steeped in Platonism, allegorical thought and mysticism, he maintained a belief in a literal six-day creation.[425]

Nicholas of Lyra (1270-1340): Professor at the Sorbonne, famous for his meticulous and literal exegesis; decrying the mystical interpretations of some of his predecessors; believed in a literal six-day creation in Genesis 1. Nicholas, although siding with Augustine's literal interpretations, rejected the same's allegorical interpretations of Genesis 1.

Denis the Carthusian (d. 1471): the famed *Doctor Ecstaticus*, wrote in his *Enarratio in Genesim*: "Everything was created in six days in which a threefold work is illustrated, that is, creation, distinction, and ornamentation."

St. Lorenzo of Brindisi (1559-1619): a true child prodigy, it was said that Lorenzo knew the entire original text of the Bible, Hebrew and Greek, which was understood to be of supernatural origin. His beatification included the words: "Vere inter sanctos Ecclesiae doctores adnumerari potest" (Truly among holy church doctors he numbers with the mighty). He celebrated Mass often in ecstasies. He wrote commentaries only on Genesis and Ezekiel. Of Genesis 1, which he believed was a literal six-day creation, he wrote: "I have found Moses worthy of respect above all in what relates to his cosmopeia or cosmogenesis."

The Consensus of Church Fathers and Medieval Theologians on:

The Firmament of Genesis 1:6-9

The Fathers and Middle Age theologians also struggled to understand the firmament. **Augustine**, for example, seeking a scientific answer to the firmament, writes:

> Now we are seeking to know whether the Creator, who has ordered all things in measure, and number, and weight, has assigned to the waters not just one proper

[421] *Interrogationes et responsiones in Genesin*, PL 107, cols 519-521.

[422] Marcia Colish, *Peter Lombard*, Leyden: E. J. Brill, 1994, vol. 1, 330-331; 337, 340-341.

[423] *Opera omnia,* vol. 2, PL 192, col 676.

[424] PL 178, cols. 738-745; 784.

[425] PL 167, col. 191.

> place around the earth, but another also above the heavens, a region which has been spread around and established beyond the limits of air.
>
> What is the firmament? Is it that heaven which extends beyond the entire realm of air and above the air's farthest heights, where the lights and the stars are set on the fourth day? Or is the air itself called the firmament? This is the question that must concern us here.[426]

After offering his suggestions as to the nature of the firmament, he resolutely concluded:

> With this reasoning some of our scholars attack the position of those who refuse to believe that there are waters above the heavens while maintaining that the star whose path is in the height of the heaves is cold. Thus they would compel the disbeliever to admit that water is there not in a vaporous state but in the form of ice. But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater that all human ingenuity.[427]

Apparently, Augustine did not hold to the "water canopy" theory, since he says that the water above the heavens "does exist," not "did exist," showing he believed they still occupied the same location in space in the fifth century AD when he was writing the above paragraph. Augustine is more detailed in the following quote: "...for on it the firmament was made between the waters above and beneath, and was called "Heaven," in which firmament the stars were made on the fourth day."[428]

> For very wonderful is this corporeal heaven, of which firmament, between water and water, the second day after the creation of light, you said, Let it be made, and it was made. Which firmament you called heaven, that is, the heaven of this earth and sea, which Thou made on the third day, by giving a visible shape to the formless matter which you made before all days.[429]

Thomas Aquinas, agreeing with Augustine that the present existence of the firmament could not be doubted due to the authority of Scripture, uses a similar argument in one of his *Replies to Objections*, citing Basil as the source of the idea. He writes:

> Reply to Objection 2: The solution is clear from what has been said, according to the last two opinions. But according to the first opinion, Basil gives two replies (Hom. 3 in *Hexaemeron*). He answers first, that a body seen as concave beneath need not necessarily be rounded, or convex, above. Secondly, that the waters above the firmament are not fluid, but exist outside it in a solid state, as a mass of ice, and that this is the crystalline heaven of some writers.
>
> Reply Objection 3: According to the third opinion given, the waters above the firmament have been raised in the form of vapors, and serve to give rain to the earth. But according to the second opinion, they are above the heaven that is wholly transparent and starless. This, according to some, is the primary mobile, the cause of the daily revolution of the entire heaven, whereby the continuance of generation is secured. In the same way the starry heaven, by the zodiacal movement, is the cause whereby different bodies are generated or corrupted, through the rising and setting of the stars, and their various influences. But according to the first opinion these waters are set there to temper the heat of the celestial bodies, as Basil supposes (Hom. 3 in *Hexaemeron*). And Augustine says (*De Genesi ad literam* ii, 5) that some have considered this to be proved by the extreme cold of Saturn

[426] *Confessions*, Bk 2, Ch 1-2.

[427] *The Literal Meaning of Genesis*, Bk 2, Ch. 5, No 9.

[428] *City of God*, Bk XI, Ch 9.

[429] *Confessions*, Bk XII, Ch 8.

> owing to its nearness to the waters that are above the firmament.[430]

Various Fathers and medieval theologians offered other opinions on the firmament.

Ambrose: "These are the heavens which declare the glory of God, these are His handiwork which the firmament proclaims. For not worldly enticements, but the grace of the divine working, raised them to the firmament of the most sacred Passion, and long before by the testimony of their character and virtues bore witness of them, that they continued steadfast against the dangers of this world."[431]

Aphrahat: From these things be thou persuaded that this earth, in which the children of Adam are sown, and the firmament that is over men, (even) that firmament which is set to divide the upper heavens from the earth and this life, shall pass away, and wear out, and be destroyed. And God will make a new thing for the children of Adam, and they shall inherit inheritances in the Kingdom of Heaven.[432]

Archelaus: "Then the living Spirit created the world; and bearing in himself three other powers, he came down and brought off the princes, and settled them in the firmament, which is their body, (though it is called) the sphere. Then, again, the living Spirit created the luminaries, which are fragments of the soul, and he made them thus to move round and round the firmament..."[433]

Athanasius: "And all the visible creation was made in six days: in the first, the light which He called day; in the second the firmament; in the third, gathering together the waters....And God set them in the firmament of the heaven, to give light upon the earth, and to rule over the day and over the night....And the firmament is to divide between waters and waters, and to be a place to set the stars in."[434]

Basil: "For the deep is nothing else than a huge quantity of water whose limit man cannot comprehend. In the beginning, indeed, the water lay all over the surface of the earth. And first God created the firmament to divide the water above the firmament from the water below the firmament. For in the midst of the sea of waters the firmament was established at the Master's decree. And out of it God bade the firmament arise, and it arose. Now for what reason was it that God placed water above the firmament? It was because of the intense burning heat of the sun and ether. For immediately under the firmament is spread out the ether, and the sun and moon and stars are in the firmament, and so if water had not been put above it the firmament would have been consumed by the heat."[435]

Basil: "'And God called the firmament heaven.' The nature of light belongs to another, and the firmament only shares it on account of its resemblance to heaven. We often find the visible region called heaven, on account of the density and continuity of the air within our ken, and deriving its name 'heaven' from the word which means to see. It is of it that Scripture says, 'The fowl of the air,' 'Fowl that may fly...in the open firmament of heaven'"[436]

Basil: "Now we must say something about the nature of the firmament, and why it received the order to hold the middle place between the waters. Scripture constantly makes use of the word 'firmament' to express extraordinary strength. 'The Lord in firmament and refuge'; 'I have strengthened the pillars of it'; 'Praise him in the firmament of his power.' The heathen writers thus call a strong body one which is compact and full, to distinguish it from the mathematical body. A mathematical body is a body which exists only in the three dimensions, breadths depth, and height. A firm body, on the contrary, adds resistance to the dimensions. It is the custom of Scripture to call firmament all that is strong and unyielding. It even uses the word to denote the condensation of the air: He, it says, who strengthens the thunder. Scripture means by the

[430] *Summa Theologica*, Bk 1, Ques. 68. Art 2.

[431] Letter XXII. Ambrose held that the firmament was solid, sustained by God's power. See *Saint Ambrose: Hexameron, Paradise, and Cain and Abel*, trans. J. J. Savage (Wash, DC: Catholic University, 1961), pp. 11-16.

[432] *The Demonstrations*, 24.

[433] *Disputation with the Heresiarch Manes*, 6.

[434] *Discourse Against the Arians*, No. 2, Ch 16; 17.

[435] *Exposition of the Orthodox Faith*, Bk 2, Ch 9.

[436] *Homilies*, 3. Cited also by Aquinas.

strengthening of the thunder, the strength and resistance of the wind, which, enclosed in the hollows of the clouds, produces the noise of thunder when it breaks through with violence. Here then, according to me, is a firm substance, capable of retaining the fluid and unstable element water; and as, according to the common acceptation, it appears that the firmament owes its origin to water, we must not believe that it resembles frozen water or any other matter produced by the filtration of water; as, for example, rock crystal, which is said to owe its metamorphosis to excessive congelation, or the transparent stone which forms in mines. This pellucid stone, if one finds it in its natural perfection, without cracks inside, or the least spot of corruption, almost rivals the air in clearness. We cannot compare the firmament to one of these substances. To hold such an opinion about celestial bodies would be childish and foolish; and although everything may be in everything, fire in earth, air in water, and of the other elements the one in the other; although none of those which come under our senses are pure and without mixture, either with the element which serves as a medium for it, or with that which is contrary to it; I, nevertheless, dare not affirm that the firmament was formed of one of these simple substances, or of a mixture of them, for I am taught by Scripture not to allow my imagination to wander too far a field. But do not let us forget to remark that, after these divine words 'let there be a firmament,' it is not said 'and the firmament was reader' but, 'and God made the firmament, and divided the waters.' Hear, O ye deaf! See, O ye blind! Who, then, is deaf? He who does not hear this startling voice of the Holy Spirit. Who is blind? He who does not see such clear proofs of the Only begotten. 'Let there be a firmament.' It is the voice of the primary and principal Cause. 'And God made the firmament.' Here is a witness to the active and creative power of God.[437]

Basil: "'In the firmament of heaven,' that is to say, as we have said before, in that part of the air called *ouranos* [Greek] heaven, from the word *oran*, which means to see; called firmament, because the air which extends over our heads, compared to the aether, has greater density, and is thickened by the vapors which exhale from the earth."[438]

Basil: "Therefore we read: 'Let there be a firmament in the midst of the waters, and let it divide life waters from the waters.' I have said what the word firmament in Scripture means. It is not in reality a firm and solid substance which has weight and resistance; this name would otherwise have better suited the earth. But, as the substance of superincumbent bodies is light, without consistency, and cannot be grasped by any one of our senses, it is in comparison with these pure and imperceptible substances that the firmament has received its name."[439]

Basil: "For although, as Moses teaches, each act of creation had its proper order; the making the firmament solid, the laying bare of the dry land, the gathering together of the sea, the ordering of the stars..."[440]

Clement of Rome: "as also He decked the visible firmament with stars, to which also He assigned their paths and arranged their courses."[441]

"And now the water which was within the world, in the middle space of that first heaven and earth, congealed as if with frost, and solid as crystal, is distended, and the middle spaces of the heaven and earth are separated as by a firmament of this sort; and that firmament the Creator called heaven, so called by the name of that previously made: and so He divided into two portions that fabric of the universe, although it was but one house."[442]

Cyril of Jerusalem: "For God said, Let there be a firmament in the midst of the water. God spake once for all, and it stands fast, and falls not. The heaven is water, and the orbs therein, sun, moon, and stars are of fire: and how do the orbs of fire run their course in the water? But if any one disputes this because of the opposite natures of fire and water, let him remember the fire which in the time of Moses in Egypt flamed amid the hail, and observe the all-wise workmanship of God."[443]

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[437] *Ibid*.

[438] *Homilies*, 8.

[439] *Homilies*, 7.

[440] *On the Trinity*, Bk XII.

[441] *Homilies*, III, Ch XXXIII.

[442] *Recognitions of Clement*, Bk 1, Ch XXVII.

[443] *Catechetical Lectures*, 9, 5.

Ephraim the Syrian: "Let the second day, sing praise to the Birth of the second Son, and His voice which first commanded the firmament and it was made, divided the waters that were above, and gathered the seas that were under."[444]

Gregory of Nyssa: "So likewise, in the case of heaven and the firmament, though one nature is signified by each of these words, their difference represents one or other of its peculiar characteristics, in looking at which we learn one thing by the appellation "heaven," and another by 'firmament.' For when speech would define the limit of sensible creation, beyond which it is succeeded by the transmundane void apprehended by the mind alone, in contrast with the intangible and incorporeal and invisible, the beginning and the end of all material subsistences is called the firmament. And when we survey the environment of terrestrial things, we call that which encompasses all material nature, and which forms the boundary of all things visible, by the name of heaven."[445]

Hilary of Poitiers: "For although, as Moses teaches, each act of creation had its proper order; the making the firmament solid."[446]

Hippolytus: "For there has been a separation made between water and water; and there is water, that below the firmament of the wicked creation, in which earthly and animal men are washed; and there is life-giving water, (that) above the firmament, of the Good One, in which spiritual (and) living men are washed; and in this Elohim washed Himself."[447]
Hippolytus: "But that the circle of the sun is twenty-seven times larger than the moon, and that the sun is situated in the highest (quarter of the firmament); whereas the orbs of the fixed stars in the lowest."[448]

Hippolytus: "...and that the stars, coursing (the firmament) as shooting sparks, arise out of the motion of the pole."[449]

Hippolytus: "The first and only (one God), both Creator and Lord of all, had nothing coequal with Himself; not infinite chaos, nor measureless water, nor solid earth, nor dense air, not warm fire, nor refined spirit, nor the azure canopy of the stupendous firmament."[450]

Irenaeus: "For as the heaven which is above us, the firmament, the sun, the moon, the rest of the stars, and all their grandeur, although they had no previous existence, were called into being."[451]

Jerome: "Must not every one reject and despise such special pleading as that by which Origen says of the waters that are above the firmament that they are not waters, but heroic beings of angelic power, and again of the waters that are over the earth--that is, below the firmament that they are potencies of the contrary sort, that is, demons?"[452]

Jerome: "'...the righteous shall shine as the stars; and the wise, that is the learned, as the firmament.' You can see, therefore, how great is the difference between righteous ignorance and instructed righteousness. Those who have the first are compared with the stars, those who have the second with the heavens. Yet, according to the exact sense of the Hebrew, both statements may be understood of the learned, for it is to be read in this way: "They that be wise shall shine as the brightness of the firmament; and they that turn many to righteousness as the stars forever and ever."[453]

Jerome: "A firmament is constructed between heaven and earth, and to this is allotted the name heaven, in the Hebrew *shamayim* or 'what comes out of the waters,' and the waters which are above the heavens are parted from the others to the praise of God. Wherefore also in the vision of the prophet Ezekiel there is seen above the cherubim a crystal stretched forth, that is, the compressed and denser waters. The first living beings come out of the waters; and believers soar out of the layer with wings to heaven. Man is formed out of clay and God

[444] *Hymns*, 19.

[445] *Answer to Eunomius' Second Book.*

[446] *On the Trinity*, Bk XII.

[447] *Refutation of All Heresies*, Bk V, Ch 22.

[448] *Ibid*.

[449] *Ibid*., Ch. VII.

[450] *Ibid*., Ch XXVIII.

[451] *Against Heresies*, Bk II, Ch XXXIV.

[452] Letter LI, from Epiphanius.

[453] Letter LIII to Paulinus.

holds the mystic waters in the hollow of his hand."[454]

Jerome: "The sun has its own splendor, the moon tempers the darkness of the night; and the five heavenly bodies which are called planets traverse the sky in different tracks and with different degrees of luminousness. There are countless other stars whose movements we trace in the firmament. Each has its own brightness."[455]

John Damascene: "But further, God called the firmament also heaven, which He commanded to be in the midst of the waters, setting it to divide the waters that are above the firmament from the waters that are below the firmament. And its nature, according to the divine **Basilius** [Basil] who is versed in the mysteries of divine Scripture, is delicate as smoke. Others, however, hold that it is watery in nature, since it is set in the midst of the waters: others say it is composed of the four elements: and lastly, others speak of it as a fifth body, distinct from the four elements."[456]

John Damascene: "The heaven of heaven, then, is the first heaven which is above the firmament. So here we have two heavens, for God called the firmament also Heaven. And it is customary in the divine Scripture to speak of the air also as heavens, because we see it above us."[457]

John Damascene: "For in the midst of the sea of waters the firmament was established at the Master's decree. And out of it God bade the firmament arise, and it arose. Now for what reason was it that God placed water above the firmament? It was because of the intense burning heat of the sun and ether. For immediately under the firmament is spread out the ether, and the sun and moon and stars are in the firmament, and so if water had not been put above it the firmament would have been consumed by the heat."[458]

Justin Martyr: "And so also, of the heaven which was created, he thought that the heaven which was created and which he also called the firmament."[459]

Lactantius: "In that place he looked up to heaven, by which name we now call it, and that which was above the world which was called the firmament."[460]

Novation: "Although it may be reared with immense piles of stones, the mountain crests are loftier; and although the fretted roofs glitter with gold, they will be surpassed by the brightness of the starry firmament."[461]

Novation: "Nevertheless also, in higher regions; that is, above even the firmament itself, regions which are not now discernible by our eyes, He previously ordained angels, he arranged spiritual powers, He put in command thrones and powers, and founded many other infinite spaces of heavens, and unbounded works of His mysteries...a crystal covering being thrown over all things; that is, the heaven covering all things, which at the command of God had been consolidated into a firmament."[462]

Origin: "The star that was seen in the east we consider to have been a new star, unlike any of the other well-known planetary bodies, either those in the firmament above or those among the lower orbs."[463]

Origin: "Thus, for instance, there is the true light, and another heaven beyond the firmament, and a Sun of righteousness other than the sun we see."[464]

Origin: "Now, when it is said that all things were made by Him, and that in Him were all things created, both things in heaven and things on earth, there can be no doubt that also those things which are in the firmament, which is called heaven, and in

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[454] Letter LXIX to Oceanus.

[455] *Against the Pelagians*, Bk 1, 16

[456] *Exposition of the Orthodox Faith*, Bk II, Ch 6.

[457] *Ibid*., Bk II, Ch. 6.

[458] *Ibid*., Bk II, Ch 9.

[459] *To the Greeks*, Ch XXX.

[460] *Divine Institutes*, Bk I, Ch XI.

[461] *On the Public Shows*, 9.

[462] *On the Trinity*, Ch I; VIII

[463] *Against Celsus*, Preface, Ch LVIII.

[464] *Against Celsus*, Bk VII, Ch XXXI.

which those luminaries are said to be placed, are included amongst the number of heavenly things."[465]

Rufinus: "I would first, with your leave, draw your attention to this firmament which our eyes behold, and ask you to explain, if you can, the nature of this visible luminary, how that celestial fire generates from itself the brightness of light."[466]

Tertullian: "In like manner with respect to the heaven, it informs us first of its creation – 'In the beginning God made the heaven:' it then goes on to introduce its arrangement; how that God both separated 'the water which was below the firmament from that which was above the firmament,' and called the firmament heaven, – the very thing He had created in the beginning."[467]

Theophilus: "And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament. And God called the firmament Heaven....In the very beginning, therefore, of the history and genesis of the world, the holy Scripture spoke not concerning this firmament [which we see], but concerning another heaven, which is to us invisible, after which this heaven which we see has been called 'firmament,' and to which half the water was taken up that it might serve for rains, and showers, and dews to mankind. And half the water was left on earth for rivers, and fountains, and seas. "[468]

The Consensus of Church Fathers and Medieval Theologians on:

A Spherical Earth

Because of certain phrases in the Bible (*e.g.*, "four corners of the earth") some maintain the Bible is following ancient Babylonian, Hindu, Egyptian and early Greek ideas of a flat earth surrounded by a dome, but that is not the case. In actuality, these fallacious ideas were the result of the lack of both divine revelation and scientific study. The biblical testimony and the Hebrews who interpreted it understood the Earth as spherical. As regards the other ancient peoples, not until the Greeks noticed in the 6th century B.C. that lunar eclipses caused circular shadows on the moon did they suspect the earth was spherical.

As for the Fathers of the Church, the following facts are evident:

- The Fathers of the Church knew of eclipses, how they were formed, and the implications for the shapes of the heavenly bodies.

Basil: "The eclipse of the moon, on the other hand, is due to the shadow the earth casts on it when it is a fifteen days' moon and the sun and moon happen to be at the opposite poles of the highest circle, the sun being under the earth and the moon above the earth. For the earth casts a shadow and the sun's light is prevented from illuminating the moon, and therefore it is then eclipsed."[469]

- The Fathers understood that the heavens were wrapped around the entire earth, calibrating it in increments of a sphere of 360 degrees.

Basil: "The circle of the zodiac has an oblique motion and is divided into twelve sections called zodia, or signs: each sign has three divisions of ten each, *i.e.* thirty divisions, and each division has sixty very minute subdivisions. The heaven, therefore, has three hundred and sixty-five [sic] degrees: the hemisphere above the earth and that below the earth each having one hundred and eighty degrees."[470]

[465] *De Principiis*, Bk I, Ch VII.

[466] *Commentary on the Apostles' Creed*, 4.

[467] *Against Hermogenes*, Ch XXVI. Others, such as Rabanus Maurus, agreed with Basil that the water above the firmament could be in the form of ice and thus be a transparent crystalline substance (*Commentariorum in Genesin*, PL 107, 449). The great Jewish scholar, Moses Maimonides, held that the firmament referred to the sphere of the fixed stars, and that the sun rested within this sphere, adding that "there is no vacuum in the universe" (*The Guide for the Perplexed*, trans. M. Friedländer (NY: Dover, 1956), p. 214).

[468] *To Autolycus*, Bk II, Ch XI; XIII.

[469] *Orthodox Faith*, Bk 2, Ch VII.

[470] *Orthodox Faith*, Bk 2, Ch VII.

Interestingly enough, there is not a lot of information in the Pentateuch about the shape of the Earth. Except for Job, which may have been written earlier, most of the information we have about the shape and substance of the Earth comes from the Psalms and Proverbs, while some comes from the prophets (Isaiah, Jeremiah, Micah), and a couple references in 1 Samuel. There is also a mention in Hebrews.

The Bible speaks about the "corners of the Earth,"[471] or "ends of the Earth."[472] The latter two terms do not, of course, mean that the Earth has literal corners or ends. Rather, "corners" refers to the four compass points (north, east, south and west), while "ends" refers to the respective east and west horizons. Hence, Scripture is not implying that the Earth is flat. Not only does Scripture imply that the Earth is a sphere,[473] it never refers to the Earth as being flat.

Jb 38:4 shows that the foundation of the Earth is a complicated structure with precise measurements that are unfathomable to Job. Jr 31:37 echoes this perspective as it says "the foundations cannot be discovered." We understand from this language that the "foundation of the earth" is its core, upon which everything else rests. It is a substance of extreme strength, as Mi 6:2 and Ps 104:5 indicate. Modern science has not been able to tell us the composition of the core of the earth, since everything from molten iron to rock has been proposed without resolution.

The Bible also speaks of the "the foundation of the earth,"[474] and the "pillars of the earth."[475] The latter would be the structures that rest on the foundation, which is more or less indicated in 1Sm 2:8. Some have assumed that the Bible is merely reiterating something akin to the ancient Hindu idea that earth is flat and rests upon a giant turtle. But no such notions are displayed in Scripture. Scripture maintains that the earth rests in space and is not supported by any material thing for it "hangs upon nothing" (Jb 26:7). This would mean that the "pillars" apply only to the interior of the Earth. The pillars rest between the core and the surface. Science knows this as the "mantle" of the earth. They also know that the mantle is made up of rock, much of it granite rock, which is one of the hardest structures known. They also know that these structures appear intermittently around the globe, and are always positioned vertically, one end facing the core and the other facing the surface of the Earth.[476] To recap, there is an inner core. Around the core is the mantle, which contains vertical pillars radiating from the top of the mantle to the surface of the Earth. Around the mantle, is the land surface of the Earth, but it is uneven. Between the uneven portions, water collects. If one were looking at this from a two-dimensional perspective, one could draw a circle (concentric with the core and the mantle) that would cut through the uneven land mass and the water mass, serving as a boundary for the land and water (Pr 8:27; Jb 26:10; Is 40:22).

- The Fathers were very clear that the Earth is a sphere.

Gregory of Nyssa: "As, when the sun shines above the earth, the shadow is spread over its lower part, because its spherical shape makes it impossible for it to be clasped all round at one and the same time by the rays, and necessarily, on whatever side the sun's rays may fall on some particular point of the globe, if we follow a straight diameter, we shall find shadow upon the opposite point, and so, continuously, at the opposite end of the direct line of the rays shadow moves round that globe, keeping pace with the sun, so that equally in their turn both the upper half and the under half of the earth are in light and darkness.[477]

Basil: "Further, some hold that the Earth is in the form of a sphere, others that it is in that of a cone. At all events it is much smaller than the heaven, and suspended almost like a point in its midst. And it

[471] Jb 37:3; Is 11:12; 41:9; Ez 7:2; Ap 7:1; 20:8.

[472] Dt 28:64; 33:17; 1Sm 2:10; Jb 28:24; 38:13; Ps 19:4-6; 22:27; 46:9; 48:10; 59:13; 61:2; 65:5; 41:9; Jr 51:16; Dn 4:10-11; Mk 13:27.

[473] Jb 26:10; Pr 8:27-29; Is 40:22.

[474] 2Sm 22:16; Ps 18:15; 102:25; Pr 8:27-29; Is 48:13; Jn 17:24.

[475] 1Sm 2:8; Jb 9:6; 38:4-6.

[476] Dr. Robert Gentry has made studies on granite rocks that are near the surface and has found that they contain Polonium 218 halos. Since Polonium 218 has a half-life of 3 minutes, this means that the granite columns had to have been made instantaneously. Modern science has never produced granite in the laboratory. Its crystalline structure will not allow reproduction. (wwwhalos.com)

[477] *On the Soul and the Resurrection*.

will pass away and be changed. But blessed is the man who inherits the Earth promised to the meek."[478]

Basil: "These are lakes, and there is only one sea, as those affirm who have traveled round the Earth."[479]

Clement of Alexandria: "And how the Earth and sea their place should keep; And when the seasons, in their circling course, winter and summer, spring and autumn, each should come, according to well-ordered plan; out of a confused heap who didst create this ordered sphere, and from the shapeless mass."[480]

Augustine: "But they do no remark that, although it be supposed or scientifically demonstrated that the world is of a round and spherical form…"[481]

Augustine: "Ye have heard in the Psalm, 'I have seen the end of all perfection.' He hath said, I have seen the end of all perfection: what had he seen? Think we, had he ascended to the peak of some very high and pointed mountain, and looked out thence and seen the compass of the earth, and the circles of the round world, and therefore said, 'I have seen the end of all perfection.'"[482]

Augustine: "…this Christ's one Church, this the Unity which we are, is crying form the ends of the earth....But wherefore have I cried this thing? 'While my heart was being vexed.' He showeth himself to be throughout all nations in the whole round world, in great glory, but in great tribulation."[483]

Augustine: "…the earth more abundantly hath given her fruit, and that crop now hath filled the round world."[484]

Augustine: "…the whole round world repeopled by the three sons of Noe: for from East and West and North and South shall come they that shall sit down with the Patriarchs."[485]

Augustine: "Which thing signified, that, being as it were on a floor in the midst of the whole round world, the dry fleece was the former people Israel."[486]

Eusebius: "The sun and the moon have their settled course. The stars move in no uncertain orbits round this terrestrial globe. The revolution of the seasons recurs according to unerring laws. The solid fabric of the earth was established by the word: the winds receive their impulse at appointed times; and the course of the waters continues with ceaseless flow, the ocean is circumscribed by an immovable barrier, and whatever is comprehended within the compass of earth and sea, is all contrived for wondrous and important ends."[487]

Gregory of Nyssa: "For just as those skilled in astronomy tell us that the whole universe is full of light, and darkness is made to cast its shadow by the interposition of the body formed by the earth; and that this darkness is shut off from the rays of the sun, in the shape of a cone, according to the figure of the sphere-shaped body, and behind it; while the sun, exceeding the earth by a size many times as great as its own, enfolding it round about on all sides with its rays, unites at the limit of cone the concurrent streams of light; so that if (to suppose the case) any one had the power of passing beyond the measure to which the shadow extends, he would certainly find himself in light unbroken by darkness."[488]

Jerome: "…so all substance shall be refined into its most perfect form and rarified into aether which is a pure and uncompounded essence; or else the sphere which I have called motionless and all that it contains will be dissolved into nothing, and the sphere in which the antizone itself is contained shall be called 'good ground,' and that other sphere which in its revolution surrounds the earth and goes by the

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[478] *Orthodox Faith*, Book 2, chapter 10.

[479] *Hexameron*, Homily IV, 4.

[480] *Paedagogus* (also found in Clement of Rome).

[481] *City of God*, Bk XVI, Ch 9.

[482] *Homilies on First John*, Homily X, 5

[483] Homily on Psalm 61, 2.

[484] Homily on Psalm 67, 8.

[485] Homily on Psalm 69, 1

[486] Homily on Psalm 72, 9.

[487] *Life of Constantine*, Bk 2, Ch LVII.

[488] *On the Making of Man*, XXI, 3.

name of heaven shall be reserved for the abode of the saints."[489]

- The Fathers knew that the moon reflected light and traveled in a circle around the earth.

Gregory of Nyssa: "Do you not confidently maintain that it is so, because you have arrived by reasoning through phenomena at the conception of such and such a movement, of such distances of time and space, of such causes of eclipse? And when you look at the waning and waxing moon you are taught other truths by the visible figure of that heavenly body, *viz*. that it is in itself devoid of light, and that it revolves in the circle nearest to the earth, and that it is lit by light from the sun; just as is the case with mirrors, which, receiving the sun upon them, do not reflect rays of their own, but those of the sun, whose light is given back from their smooth flashing surface. Those who see this, but do not examine it, think that the light comes form the moon herself. But that this is not the case is proved by this; that when she is diametrically facing the sun she has the whole of the disc that looks our way illuminated; but, as she traverses her own circle of revolution quicker from moving in a narrower space, she herself has completed this more than twelve times before the sun has once traveled round his; whence it happens that her substance is not always covered with light."[490]

John Chrysostom: "Perhaps each of you might wish to be such as to able to command the sun and moon. At this point what would they say who assert that the heaven is a sphere? For why did he not [merely] say, "Let the sun stand still," but added "Let the sun stand still at the valley of Elom," that is he will make the day longer? This was done also in the time of Hezekiah. The sun went back. This again is more wonderful than the other, to go the contrary way, not having yet gone round his course."[491]

Cyril of Jerusalem: "…and the whole earth to the heaven in which it is embosomed; the earth, which bears the same proportion to the heaven as the center to the whole circumference of a wheel, for the earth is no more than this in comparison with the heaven."[492]

- The Fathers recognized both the earth as the center of the universe, and that it is round, as noted by his reference that water goes "round the Earth."

Athanasius: "And wells, again, and rivers will never exist without the earth; but the earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, being bound fast at the center of the universe. And the sea, and the great ocean that flows outside round the whole earth, is moved and borne by winds wherever the force of the winds dashes it."[493]

- The Fathers were aware of how the Greeks understood the solar system.

Anatolious of Alexandria: "And Thales discovered the eclipse of the sun and its period in the tropics in its constant inequality. And Anaximander discovered that the earth is poised in space, and moves round the axis of the universe. And Anaximenes discovered that the moon has her light from the sun, and found out also the way in which she suffers eclipse. And the rest of the mathematicians have also made additions to these discoveries. We may instance the facts – that the fixed stars move round the axis passing through the poles, while the planets remove from each other round the perpendicular axis of the zodiac; and that the axis of the fixed stars and the planets is the side of a pente-decagon with four-and-twenty parts."[494]

Hippolytus: "For among them there are from the monad three double (numbers), *viz*., 2, 4, 8, and three triple ones, *viz*., 3, 9, 27. But the diameter of Earth is 80, 108 stadii, and the perimeter of Earth 250,543 stadii; and the distance also from the surface of the Earth to the lunar circle, Aristarchus computes at 8,000,178 stadii, but Apollonius 5,000,000, whereas Archimedes computes it at 5,544,1300. And from the lunar to solar circle,

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[489] Letters, 124, To Avitus.

[490] *On the Soul and the Resurrection.*

[491] *Homily on Hebrews*, Homily 8, 7.

[492] *Catechetical Lectures*, Lec 6, 3.

[493] *Against the Heathen*, First Book, Pat 1, 27.

[494] *The Paschal Canon*, Chapter XVII.

(according to the last authority), are 50,262,065 stadii; and from this to the circle of Venus, 20,272,065 stadii, and from this to the circle of Mercury, 50,817,165 stadii; and from this to the circle of Mars, 40,541,108 stadii; and from this to the circle of Jupiter, 20,275,065 stadii; and from this to the circle of Saturn, 40,372,065 stadii; and from this to the Zodiac and the furthest periphery, 20,082,005 stadii."[495]

- The Fathers agreed with most of the geometry of the Greek geocentrists, but condemned their belief in astrology.

Methodius: "Resuming then, let us first lay bare, in speaking of those things according to our power, the imposture of those who boast as though they alone had comprehended from what forms the heaven is arranged, in accordance with the hypothesis of the Chaldeans and Egyptians. For they say that the circumference of the world is likened to the turnings of a well-rounded globe, the earth having a central point. For its outline being spherical, it is necessary, they say, since there are the same distances of the parts, that the earth should be the center of the universe, around which as being older, the heaven is whirling. For if a circumference is described from the central point, which seems to be a circle, - for it is impossible for a circle to be described without a point, and it is impossible for a circle to be without a point, - surely the earth consisted before all, they say, in a state of chaos and disorganization. Now certainly the wretched ones were overwhelmed in the chaos of error, "because that, when they knew God, they glorified Him not as God, neither were thankful; but became vain in their imaginations, and their foolish heart was darkened."[496]

Lactantius: "It followed, therefore, from this rotundity of the heaven, that the earth was enclosed in the midst of its curved surface. But if this were so, the earth also itself must be like a globe; for that could not possibly be anything but round, which was held enclosed by that which was round. But if the earth also were round, it must necessarily happen that it should present the same appearance to all parts of the heaven."[497]

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[495] *Refutation of All Heresies*, Bk 4, Ch 8

[496] *Discourse On the Virgins*, Dis. VIII, Thekla, Ch XIV.

[497] *False Wisdom of Philosophers*, Bk 3, Ch 24, On the Antipodes.

Pope Urban VIII (1623 – 1644)

"Che il sole sia centro del mondo et immobile di moto locale, è propositione assurda e falsa in filosofia, e formalmente heretica, per essere espressamente contraria alla Sacra Scrittura."

(Translation: "The proposition that the sun is the center of the world and does not move from its place is absurd and false philosophically and formally heretical, because it is expressly contrary to the Holy Scripture")

"Che la terra non sia centro del mondo nè imobile, ma che si muova etiandio di moto diurno, è parimente propositione assurda e falsa nella filosofia, e considerate in teologia ad minus erronea in Fide."

(Translation: "The proposition that the Earth is not the center of the world and immovable but that it moves, and also with a diurnal motion, is equally absurd and false philosophically and theologically considered at least erroneous in faith")

The decrees against heliocentrism included in the formal sentence against Galileo Galileo, approved and facilitated by Pope Urban VIII, June 22, 1633[498]

[498] Original Italian of the decrees, as cited in *Galileo E L'Inquisizione*, Antonio Favaro, 1907, p. 143.

Chapter 14

The Catholic Church's Teaching on Geocentrism

John Paul II

CHALLENGE — DECEMBER 1979 PAGE 13

Pope Calls For Reexamination Of Galileo Case In Important Speech On Science

John Paul II made an important speech on Nov. 10, 1979 to the Pontifical Academy of Sciences. It will be heard of often in times ahead. It will be used by modernists to justify their reinterpretations of Catholic truth as taught by the Church for centuries.

Pope John Paul II has done nothing less than call into question the decisions of his predecessors on the case of Galileo. Many will argue that if his predecessors could be wrong on such an important matter as the relationship between Catholic teaching and science, what guarantee is there that Pope John Paul II himself is not wrong in what he teaches about human rights and other matters.

The Pope was speaking on an occasion commemorating the centenary of the birth of Einstein for whom the Pope had fulsome praise.

TASK

The Pope said: "The search for truth is the task of basic science . . . Pure science is a good, which every people must be able to cultivate in full freedom from all forms of international slavery or intellectual colonialism."

"Basic research must be free with regard to the political and economic authorities which must co-operate in its development without hampering it in its creativity or harnessing it to serve their own purposes. Like any other truth, scientific truth is, in fact, answerable only to itself and to the supreme Truth, God, the creator of man and of all things."

The Pope went on to speak of applied science, with the development of various technologies which, he said, must be put in the service of mankind and be subject to ethical and moral norms.

RELIGION

Then he said, "the Church willingly recognizes that she has benefited from Science . . . The collaboration between religion and modern science is to the advantage of both, without violating their respective autonomy in any way. Just as religion demands religious freedom, so science rightly claims freedom of research."

He referred to Vatican II's recognition of "the legitimate autonomy of culture and especially of the sciences." He said he confirmed these declarations and then added: "The Church, filled with admiration for the genius of the great scientist in whom the imprint of the creative Spirit is revealed, without intervening in any way with a judgment which it does not fall upon her to pass on the doctrine concerning the great systems of the universe, proposes the latter, however, to the reflection of theologians to discover the harmony existing between scientific truth and revealed truth."

Turning to Galileo, he said the Vatican Council was referring to him, among others, when it said: "We cannot but deplore certain attitudes (not unknown among Christians) deriving from a shortsighted view of the rightful autonomy of science; they have occasioned conflict and controversy and have misled many into thinking that faith and science are opposed."

GALILEO

The Pope said, "To go beyond the stand taken by the council, I hope that theologians, scholars and historians, animated by a spirit of sincere collaboration, will study the Galileo case more deeply and, in loyal recognition of wrongs from whatever side they come, will dispel the mistrust that still opposes in many minds a fruitful concord between science and faith, between the Church and the world. I give all my support to this task, which will be able to honour the truth of faith and of science and open the door to future collaboration."

The Pope recalled that Galileo "declared explicitly that the two truths of faith and of science can never contradict each other." Galileo wrote in 1613: "Holy Scripture and nature proceeding equally from the divine Word, the former dictated as it were by the Holy Spirit, the latter as a very faithful executor of God's orders." Similarly, Vatican II said: "The things of the world and the things of faith derive from the same God."

The Pope cited with approval what Galileo wrote: "Holy Scripture can never lie provided however that its real meaning is understood. The latter — I do not think it can be denied — is often hidden and very different from what the mere sense of the words seem to indicate."

PLURALITY

The Pope said, "The Ecclesiastical magisterium admits the plurality of the rules for the interpretation of Holy Scripture. It teaches expressly in fact, with Pius XII's Divino affiante Spiritu, the presence of different literary styles in the sacred books and therefore the necessity of interpretations in conformity with the character of each of them."

The Modernist heresy, condemned by Pius X, is essentially that the truths of Catholic faith should be reinterpreted to make them conform with the conclusions of science and reason, both of which have the same source as Revelation. John Paul II is not saying that the truths of Catholic faith should be changed to conform with modern knowledge; on the contrary, he insists over and over that truth cannot change. He expresses confidence that scientific truth and religious truth must be in harmony and invites theologians to show this harmony, as Thomas Aquinas showed the harmony between faith and reason. But undoubtedly his words will be used by many theologians to justify the reinterpretations of Catholic truth they seek to spread within the Church.

Most Catholics today, including many in the Vatican hierarchy, have been unduly stigmatized by the Galileo affair. Since almost everyone has accepted as a *fait accompli* that the heliocentric system is the operating model of cosmology, almost every apologetic issued from either the Catholic hierarchy or its lay scholars in the last hundred years has, in one form or another, been for the sole purpose of finding some rationale why previous popes and their heads of doctrine had vehemently condemned the heliocentric system. But this type of apologetic has problems from the start. To be Catholic has always meant that what was decreed in the past remains decreed in the present. The Catholic accepts that those who issued our historic decrees did so under the guidance of the Holy Spirit. Unless, per chance, an equally authoritative decree overturned a previous one, it has been commonly understood that a Catholic was bound to give his full allegiance to the former. Hence the dilemma for the contemporary Catholic apologist is: (a) if the Holy Spirit was guiding the Church in the Galileo affair, and (b) if the Earth revolves around the sun, then how could the Church have been led to make such a tremendous and embarrassing blunder? Catholic apologists have agonized over this question for centuries. Unfortunately, almost all of them have tried to answer the dilemma by denying (a) and accepting (b). We have learned thus far in our treatise that the real truth is actually the other way around: the Holy Spirit was, indeed, guiding the Church, and heliocentrism is false.

Nevertheless, under the strain of appearing entrenched in an archaic medieval mentality and obtuse to the modern world, it was only a matter of time before the Catholic Church would readdress the Galileo affair in hopes of reconciling what were presumed to be the facts of science with the Church's official declarations about the truths of Scripture. The suggestion was already hinted in Vatican II's document *Gaudium et spes* in 1963:

> Consequently, we cannot but deplore certain habits of mind, which are sometimes found too among Christians, which do not sufficiently attend to the rightful independence of science and which, from the arguments and controversies they spark, lead many minds to conclude that faith and science are mutually opposed…. The recent studies and findings of science, history and philosophy raise new questions which effect life and which demand new theological investigations.[499]

[499] Vatican II, Gaudium et spes ¶36 and ¶62. As a matter of record, leading up to *Gaudium et spes*, Fr. George Coyne states: "several cultural and scientific associations (*Pax Romana*, *Union des Scientifiques Français*) and many individual scientists urged that there be a 'solemn rehabilitation of Galileo.' The efforts were in vain" ("The Church's Most Recent Attempt to Dispel the Galileo Myth," in *The Church and Galileo*, ed. Ernan McMullin, University of Notre Dame Press, p. 358). Later in this chapter we will address in detail the above statement from *Guadium et spes*.

It is no less a surprise that the one pope to take up the mantel and fill this lacuna of history would be none other than the late **John Paul II** (1920-2005), one of the most cosmopolitan popes in the history of the Catholic Church. If there was ever a man who had the desire of reconciling the world with the Church it was Karol Wojtyla, who from his early years as a bishop of Poland sought peace and compromise between rivaling factions. The Galileo affair became just that chance and it was planned early in his pontificate (1979). For what it's worth, the pope's personal plane that escorted him across the world into more countries than any previous pope was dubbed, "The Galileo." In Kraców, Poland where he was a bishop, Karol Wojtyla was called "the Copernican Canon," which was rather fitting since Copernicus came from Poland.

The challenge before him, of course, was no easy one. Since John Paul II, by most counts, was personally convinced that both heliocentrism and evolution were about as close to scientific truth as science could offer, he had the unenviable task of explaining why his predecessors, if they were guided by the Holy Spirit as he believed all popes in matters of doctrine were guided, could be so wrong on such a basic truth of Holy Scripture. Of course, since we must be realistic, few could expect that the purpose behind John Paul II's attempted reconciliation would include the possibility that the popes and cardinals of the 17th century were right and Galileo was wrong. It is almost a certainty that the pope and the members of the commission he authorized to investigate the issue went into it with the *a priori* conviction that the previous popes and cardinals had made a serious error. In that light, we might say that the commission was biased and compromised from the beginning. Consequently, the commission believed that it had the responsibility to tell the world why the popes of yesteryear were mistaken, yet, perhaps, without explicitly admitting so.

John Paul II revealed his commission's findings in a speech to the Pontifical Academy of Science (PAS) in October of 1992.[500] As we will see, there seems to have been a larger hand at work which limited what would be said in the pope's speech, since what at first was expected to be a clear disavowal of the declarations of previous popes on the Earth's immobility actually turned out to be an open-ended treatise that, perhaps unbeknownst to its commission authors, preserved the sanctity of the decisions against Galileo. As one author put it: "…when the commission was finally wound up in 1992, its achievements fell short of what had been expected from it."[501]

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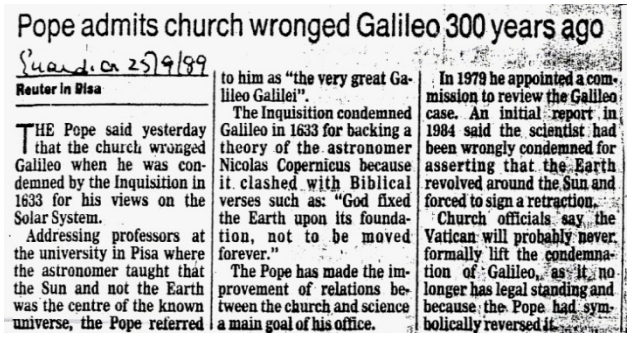
[500] The Pontifical Academy of Science has close to one hundred members. Candidates for membership are chosen by the Academy and are appointed for life by the pope. The Director of the Vatican Observatory, the Director of the Astrophysical Laboratory of the Vatican Observatory, the Prefect of the Vatican Library and the Prefect of the Secret Archives of the Vatican, are all members *pro tempore* and have the same rights and perform the same functions as the Pontifical Academicians. The scientific disciplines of the members are in nine fields: physics and related disciplines, astronomy, chemistry, the earth and environmental sciences, mathematics, the applied sciences, the philosophy and history of sciences, and the life sciences (*i.e.*, botany, agronomy, zoology, genetics, molecular biology, biochemistry, the neurosciences, and surgery). About a third of the members have won a Nobel Prize. Being a "pontifical" assemblage of scientists one would assume that the members would either be Christians or have some spiritual allegiance to the Catholic Church and/or the pope. The fact is, however, many of the PAS members profess no allegiance to Christianity, and many are avowed agnostics or atheists (*e.g.*, Stephen Hawking, Paul Davies). All of them have accepted the Darwinian and Copernican hypotheses and have made it clear they do not entertain any other views. Consequently, any scientific theory that depends on a significant degree of divine intrusion is more or less dismissed as either incredible or unscientific. Since the PAS has the most influence on the scientific information that is given to the pope or his papal commissions, it would be safe to assume that there is a pro-Copernican and pro-Darwinian bias to all the information it releases.

[501] Ernan McMullin, editor of *The Church and Galileo*, Univ. of Notre Dame Press, 2005, p. 2. McMullin adds: "the final report delivered to the Pontifical Academy of Sciences and the speech prepared for the pope for delivery on the same occasion were plainly inadequate from the historical standpoint," and in closing: "There has admittedly been disappointment, grave disappointment indeed…But it is in the spirit of that original invitation that this collection of essays was first conceived and is now presented" (p. 7). McMullin, of course, believes that



Pope admits church wronged Galileo 300 years ago

Guardian 25/9/89

Reuter in Pisa

THE Pope said yesterday that the church wronged Galileo when he was condemned by the Inquisition in 1633 for his views on the Solar System.

Addressing professors at the university in Pisa where the astronomer taught that the Sun and not the Earth was the centre of the known universe, the Pope referred to him as "the very great Galileo Galilei".

The Inquisition condemned Galileo in 1633 for backing a theory of the astronomer Nicolas Copernicus because it clashed with Biblical verses such as: "God fixed the Earth upon its foundation, not to be moved forever."

The Pope has made the improvement of relations between the church and science a main goal of his office.

In 1979 he appointed a commission to review the Galileo case. An initial report in 1984 said the scientist had been wrongly condemned for asserting that the Earth revolved around the Sun and forced to sign a retraction.

Church officials say the Vatican will probably never formally lift the condemnation of Galileo, as it no longer has legal standing and because the Pope had symbolically reversed it.

That this turn of events could occur as it did is quite intriguing considering the initial impetus that formed the papal commission. On November 10, 1979, John Paul II gave a speech on the centenary of Einstein's birth in which he stated: "Galileo had much to suffer…at the hand of individuals and institutions within the Church."[502] A fair question to ask is, what "individuals" could be in view other than Cardinal Robert Bellarmine and Pope Paul V who in 1616 took the lead in thwarting Galileo; as well as Pope Urban VIII in 1633 who sentenced Galileo for saying things that were "vehemently suspect of heresy" and "opposed to Scripture"? What "institutions" could be in view other than the Inquisition and the *Index of Forbidden Books*? This was the speech in which the pope expressed the desire to have an intense study of the Galileo case, after which Cardinal Casaroli, the Secretary of State, organized the commission known as the *Studi Galileiani* in 1981. But when the address to the Pontifical Academy of Science was finally aired eleven years later, there was no indictment of "individuals and institutions within the Church" but only what was politely categorized as a "mutual incomprehension" between Galileo and "the theologians of the day." There is also no mention in the speech that the Earth moves, the main point of contention between Galileo and the Church. In other words, if the listener to the 1992 speech was waiting to hear a formal disavowal of the decisions made by Bellarmine, Paul V and Urban VIII, it simply was not there. What remained in the speech was a far cry from what may have been originally intended. Overall, the speech itself has enough ambiguities and theological and scientific loopholes within its short 3000-word content that either party, the pro-Galilean or the anti-Galilean, could extract support for their view.[503] The same type of non-committal remarks seem evident in the pope's September 22,

heliocentrism has been scientifically proven and this is the reason for his "grave disappointment" in John Paul II's speech. He and his colleagues appear to want their pound of flesh from the Vatican and will accept nothing less than an admission of error in the Galileo affair. He hints at this goal by remarking on Monsignor Pietro Parente's comment (the co-president of the commission charged with writing *Gaudium et spes*) regarding the request to the Vatican to have *Gaudium et spes* "acknowledge the Church's error with regard to Galileo" but was answered with: "*It would ask the Church to say: I have been wrong*" (*ibid*., p. 7, the italicized words are Parente's, the non-italicized are McMullin's). On the issue of Scripture interpretation, McMullin gives the typical modern apologetic: "The disputed passages in Scripture were simply not relevant to the Copernican issue in the first place: the language of these passages was accommodated to the intended audience and hence not to be taken literally, and in any event astronomical truth lay outside the purposes for which Scripture was intended. But Bellarmine and the qualifiers evidently had set both those arguments aside" (*ibid*., p. 156). Again, basing his opinion on the idea that heliocentrism is a fact of science and that Pope Leo XIII's 1893 encyclical *Providentissimus Deus* accommodated the language of appearance to explain Scripture's cosmology (NB: in actuality, Leo referred neither to Scripture's cosmology nor the Galileo affair, as we will see later in this chapter), McMullin levies his strongest indictment against the 17th century Church: "…it follows that the rejection by Bellarmine and the qualifiers of the application of these principles constituted an objective error on their part, as well as on the part of Paul V and the members of the Holy Office who ratified the qualifiers' condemnation of the Copernican theses on the grounds that they were 'contrary to Scripture'" (*ibid*., pp. 158-159, emphasis added). It is clear that McMullin and his colleagues desired the same sort of admission from John Paul II's speech but did not receive it.

[502] John Paul II, "Discourse on the One Hundreth Anniversary of the Birth of Albert Einstein," *Acta Apostolicae Sedis* (Vatican: Tipografia Poliglotta Vaticana), 1979, vol. 71, p. 1464.

[503] As an example of the variance, Maurice Finocchiaro remarks from his pro-Galilean stance that, "John Paul did not, however, explicitly endorse Poupard's report. Although he accepted some particular conclusions, in the context of the papal speech those theses lost the anti-Galilean flavor and implications they possessed in Poupard's speech. If this interpretation of John Paul's speech is correct, and if it is correct to say that the Vatican commission studies had been acquiring an increasing anti-Galilean tone and apologetic flavor, then perhaps one may conjecture that the pope was closing the Galileo case because he wanted to close the retrial of Galileo at the hand of people such as Poupard and Brandmüller" (*Retrying Galileo, 1633-1992*, Berkeley, University of California Press, 2005, p. 357).

1989 speech at Pisa in which the Reuter's reporter described one "Church official" as interpreting the pope to have only "symbolically reversed" the decrees against Galileo.[504]

A Preliminary Analysis of John Paul II's 1992 Speech on Galileo

After receiving the commission's results in 1990, as noted above, the pope decided to give a short speech on the Galileo matter to the Pontifical Academy of Science in October 1992. Even though this was a private affair between the pope and the Academy, it goes without saying that the larger audience, even if uninvited, was the rest of the world, for surely all were waiting to hear the pope's personal verdict on one of the most famous and controversial cases in ecclesiastical history. With little surprise, the world's newspapers invariably interpreted whatever the pope said in his speech as a complete and utter concession to Galileo. The *Los Angeles Times* headline read: "Earth Moves for Vatican in Galileo Case – Vatican Admits Error in 17th Century Case." The *Washington Post* chimed: "Vatican Says Galileo Right After All – Three Centuries Later, Pope Admits Error." The opening paragraph of the *Arlington Catholic Herald* followed suit: "Pope John Paul II formally acknowledged that the church erred when it condemned 17th century astronomer Galileo Galilei for maintaining that the earth revolved around the sun."

As it stands, a papal speech does not carry any particular ecclesiastical authority, but the mere fact that it came from the pope who represents both the authority of the Church and his papal predecessors means that the speech carries its own practical and pastoral weight, for a pope must be very judicious about the things he says, even if they are unofficial opinions of his own, for the masses invariably interpret them as the voice of the Church. In addition, even though the pope himself was not the actual author of the speech, nevertheless, he necessarily takes responsibility for his own spoken words, for it is to him, not his underlings, that we look for the Church's position.[505]

Since, however, the speech was prepared for the pope, it can be scrutinized in light of who was most influential on the papal commission of authors. In this case, the pope indicates that **Cardinal Paul Poupard** bears much of the responsibility for the historical and scientific information contained in the speech, since the pope stated clearly: "I would like to express my sincere gratitude to Cardinal Poupard, who was entrusted with coordinating the Commission's research in its concluding phase."[506] This may have been one of the reasons that the

[504] Original story from *The Guardian* of September 25, 1989, followed in *L'Osservatore Romano*, October 10, 1989. Here the pope says only that Galileo was "an essential stage in the methodology," and that his work was merely part of "the journey towards the world's knowledge of nature," not that heliocentrism is a proven fact of science.

[505] McMullin reveals that the address to the Pontifical Academy of Science was a "speech prepared for the pope" (*The Church and Galileo*, p. 2).

[506] Poupard gave a speech prior to and on the same day as the pope on October 31, 1992 to the Pontifical Academy of Science, but records of this are not readily available. Poupard's speech is titled: "Address at the Conclusion of the Proceedings of the Pontifical Study Commission on the Ptolemaic-Copernican Controversy in the 16th and 17th Centuries," and an English translation was published in *Origins* 22, Nov. 12, 1992, pp. 370-375, with the original in *Après Galilée*, Paris: Desclée de Brouwer, 1994, pp. 93-97. As for the commission itself, the Vatican Secretary of State, Cardinal Agostino Casaroli, named Cardinal Gabriel-Marie Garrone as president of the commission, and Fr. Enrico di Rovasenda, who was then chancellor of the Pontifical Academy of Science from 1974 to 1986, as his assistant. Six others were invited to the commission: Archbishop Carlo Maria Martini for the exegetical section; Archbishop Paul Poupard for the culture section; Professor Carlos Chagas and Fr. George Coyne for the section on scientific and epistemological questions; Msgr. Michele Maccarrone and Fr. Edmond Lamalle for historical and juridical questions.

speech was originally written in French, since Cardinal Poupard is not only French, but when the commission was formed he was the Archbishop of Paris and the president of the *Institut Catholique* in Paris.[507]

By Poupard's own admission, he went into the investigation believing that Galileo was right and the Church was wrong. In 1992 he stated:

> The philosophical and theological qualifications, abusively attributed to the new theories regarding the centrality of the sun and the mobility of the earth, were the consequence of a period of transition in the realm of the knowledge of astronomy, and an exegetical confusion regarding cosmology….We need to recognize there errors as Your Holiness asked.[508]

As such, if there are some errors of fact in the papal speech, it is Cardinal Poupard who shares the brunt of the responsibility. As we will see, there are, indeed, quite a few such factual errors, as well as an equal number of erroneous conclusions from those errors. Still, some hold that "neither the final report nor the papal discourse appear to reflect the majority of the conclusions which are enunciated in the official publications of the Commission," which again suggests that the commission originally intended to be much more lenient on Galileo and much harder on the Church than what the papal speech turned out to be.[509]

A Logical and Inevitable Warning to the Church

Before we analyze the pope's speech, we need to reiterate one important point. If an individual is predisposed to believe that the heliocentric model is correct and that the popes and cardinals of the 1600s were in error in condemning Galileo, this stance not only creates an unbearable tension between the popes of today and the popes of the past, but it also, ironically, calls into question the ability of present popes and cardinals to judge the issue correctly, or to judge any issue correctly, barring a clear declaration of infallibility. The average man in the street sees this logic quite clearly. For example, the article in the *Challenge* periodical noted above ("Pope Calls For Reexamination Of Galileo Case In Important Speech On Science") mentions this conundrum for the pope in its opening statement:

> Pope John Paul II has done nothing less than call into question the decisions of his predecessors on the case of Galileo. Many

[507] It is also significant that Cardinal Poupard aligns himself more with the liberal school of both theology and biblical exegesis. He is also known to have a great admiration for Pierre Teilhard de Chardin. Teilhard's works were banned by the Church in the monitum of John XXIII of June 30, 1962 stating that his books contained "ambiguities and grave doctrinal errors." Regarding the Galileo affair, Teilhard made a direct connection between the fall of geocentrism and the rise of evolutionary theory and a rejection of the traditional teaching on Original Sin: Teilhard writes: "As a result of the collapse of geocentrism, which she has come to accept, the Church is now caught between her historico-dogmatic representation of the world's origin, on the one hand, and the requirements of one of her most fundamental dogmas on the other – so that she cannot retain the former without to some degree sacrificing the latter. With the end of geocentrism, what was emerging was the evolutionist point of view. All that Galileo's judges could distinctly see as menaced was the miracle of Joshua. The fact was that in consequence the seeds of decomposition had been introduced into the whole of the Genesis theory of the fall: and we are only today beginning to appreciate the depth of the changes which at that time were already potentially completed." (Teilhard de Chardin, "Fall, Redemption and Geocentrism," *Christianity and Evolution*, 1969, 1971, pp. 37-38). Fr. George Coyne, former director of the Vatican observatory, who is mentioned in the pope's speech as one who worked in close collaboration with Poupard, also aligns himself more with the liberal theological and exegetical school of thinking, as well as being a very vocal advocate of both heliocentrism and evolution (having also denounced Intelligent Design as "unscientific"), and has been highly critical of how the Church treated Galileo. Coyne believes that neither Bellarmine nor the popes following listened to Galileo's scientific claims, stating, "neither in 1616 nor in 1633 was any science discussed" ("The Church's Most Recent Attempt to Dispel the Galileo Myth," p. 342). But this assertion is certainly not true. Science may not have been the main focus, but it was certainly discussed, and both Bellarmine and Urban VIII told Galileo he had no scientific proof despite Galileo's claims to the contrary.

[508] *L'Osservatore Romano*, Nov. 1992, pp. 2-3, as cited in Atila S. Guimarães, "The Swan Song of Galileo's Myth," in *Tradition in Action*., nd, np.

[509] The words of Fr. George Coyne, commission member for science and epistemology ("The Church's Most Recent Attempt to Dispel the Galileo Myth," in *The Church and Galileo*, p. 354.

PAGE 14 CHALLENGE — DECEMBER 1979

Were Popes Paul V and Urban VIII Wrong In Their Treatment Of Galileo?

Pope John Paul II has called for a reexamination of the Galileo case by theologians, scholars and historians. He raises the question whether his predecessors, Pope Paul V and Urban VIII were wrong in their treatment of the Italian scientist. It is clear that the question of infallibility is not involved in the issue, since neither Pope professed to make any infallible statement about what Galileo taught. Traditionally, Catholics have been free to criticize or to defend the actions of these Popes just as in Catholic teaching the faithful are free to criticize or to defend the actions of Pope John Paul II in similar matters.

Galileo taught that the sun does not go around the earth, contrary to the common sense of people who for centuries before and after him have seen with their own eyes that the sun does rise in the east and does set in the west. Galileo was not condemned for saying that the earth goes around the sun; he was condemned for saying that the sun does not go around the earth and that Biblical interpretation was in error in saying that the sun stayed its course at the prayer of Josue and that the earth is immovable.

Galileo thought that his conclusions based on his scientific observations were as true as revealed truth. He was not prohibited from asserting that his system explained all celestial phenomena then known to him, which as Cardinal Bellarmine asserted was an unexceptional proposition and one sufficient for all practical purposes, but he was prohibited from asserting as true what contradicted infallible Scripture.

ATTITUDE

Cardinal Bellarmine also said, "I say that if a real proof be found that the sun is fixed and does not revolve round the earth, but the earth round the sun, then it will be necessary, very carefully, to proceed to the explanation of the passages of Scripture which appear to be contrary, and we should rather say that we have misunderstood these than pronounce that to be false which is demonstrated."

For many years after Galileo, scientists generally accepted the Copernican system which he espoused, but it has not yet become a doctrine of faith that Galileo's scientific conclusions must be believed by Catholics. Like evolution and indeed like quantum mechanics and Einstein's theories, there is no divine assurance that they are true in the same way as the truths of Revelation are true.

Nor do those who actually saw the miracle of Fatima have to believe that they did not see the sun stay its course in 1917 just as it had done for Josue.

PROCEEDINGS

Galileo was a professor who taught at Padua and at Florence. In 1611 he came of his own accord to Rome and set up his telescope in the Quirinal Garden of Cardinal Bandini. Galileo proceeded to publish his works in the vernacular, thus troubling the minds of Catholics and bringing confusion to them.

The Inquisition (predecessor of the Sacred Congregation for the Doctrine of the Faith) asked him to attend to answer questions, just as the Sacred Congregation has asked Father Schillebeeckx to come for the same purposes. Galileo freely attended. The Holy Office told him that his system was scientifically false, anti-Scripural or heretical and that he must renounce it. He promised to teach it no more. This was in December, 1615.

There were some protests, Foscarini for instance saying that Holy Writ is intended to teach men to go to heaven and not how the heavens go. Galileo was invited to correct his works to show that he was advancing scientific hypotheses and not established fact. Cardinal Barberini was among those who deplored the decision of the Inquisition.

SECOND TIME

Galileo, while professing to obey the decree of the Holy Office, and even while receiving a pension from the Pope, continued nonetheless to promulgate his system as if it were true in the sense prescribed. In 1632 in Florence he published another work supporting the Copernican system.

He was again cited before the Inquisition and went up to Rome to defend himself, saying that he had never held the Copernican system since his former trial in 1616. The Inquisition did not believe him and he was condemned to be imprisoned at the pleasure of the Inquisition and to recite the Seven Penitential Psalms once a week for three years.

He remained under sentence of imprisonment until his death in 1642 although he was actually in prison for only 22 days in a handsome and commodious apartment of one of the officers of the Inquisition. Before his death he received a Papal blessing and was buried in the Church of Santa Croce at Florence.

Popes Paul V and Urban VIII were the pontiffs at the time of the condemnations and undoubtedly approved of them although they did not themselves issue any personal decrees on the matter. Urban VIII was the former Cardinal Barberini who had deplored the first condemnation but he upheld the second.

There is an excellent article on Galileo in the first Catholic Encyclopedia, 1909, Volume VI, page 342.

> will argue that if his predecessors could be wrong on such an important matter as the relationship between Catholic teaching and science, what guarantee is there that Pope John Paul II himself is not wrong in what he teaches about human rights and other matters?[510]

The concern of the *Challenge* reporter is logical. Once it is posited that the former theologians of the Catholic Church made a pastoral error by refusing to listen to science and insisting on a literal interpretation of Scripture, this assessment, by force of logic, leaves today's theologians of the Catholic Church open to the same error. That is, they themselves may be refusing to listen to the scientific evidence against their view, and, consequently, they may be giving the wrong pastoral advice to their flock by erroneously promoting a non-literal interpretation of Scripture. This is the inevitable trap into which Church officials fall when they question or reject previous high-level decisions in the ecclesiastical Tradition. In short, no one can deny this simple logic: if those of the past can err, then those of the present can err. To be more specific, if the popes of the seventeenth century who approved the condemnations against heliocentrism could err, then current popes who approve the reigning opinions of modern science can also err. Ironically, the modern Church is 'hoist by its own petard,'[511] for if the Holy Spirit, who does not lie, was not guiding the aforementioned popes and their Sacred Congregations during the inquisition of Galileo on an issue of such great pastoral importance, how can we be sure the Holy Spirit is guiding the present pastors of the Church? In fact, we are left with an even more haunting question: if the Holy Spirit was not guiding the pastors of the past, then who was guiding them? The intractable nature of this problem is reinforced by the fact that, according to the modern Church, neither the seventeenth century papal sanction against Copernicanism, namely, that it was "formally heretical" "erroneous in faith" and "opposed to Scripture," nor the twentieth century papal speech that "theologians did not recognize the formal distinction between Sacred Scripture and its interpretation," are, to use Cardinal Poupard's own word, "irreformable."

As much as John Paul II, who, by common accounts personally believed in heliocentrism, desired to correct what he understood were the errors of the past, he inadvertently admits that he himself is subject to error in judging the past. In a public but unofficial speech to scientists in May 1983, John Paul II stated:

> Thus is it understood more clearly that divine Revelation, of which the Church is guarantor and witness, does not involve as such any scientific theory of the universe and the assistance of the Holy Spirit does not in any way come to guarantee explanations which we might wish to maintain on the physical constitution of reality. That the Church was able to go ahead with difficulty in a field so complex, should neither surprise nor scandalize. The Church, founded by Christ who has declared himself to be the Way, the Truth, and the Life, remains nonetheless composed of limited human beings who

[510] *Challenge* newspaper, London, Dec. 1979, page 13.

[511] The expression "hoist by one's own petard" first appeared in Shakespeare's play, Hamlet, meaning "to blow oneself up with one's own bomb, be undone by one's own devices."

> are an integral part of their cultural epoch.[512]

Although, on the one hand, this statement could be understood as John Paul II's realization that divine revelation does not address issues such as whether the cosmos works on the basis of Quantum Mechanics, String Theory or Einsteinian Relativity, on the other hand, the implication is strong that John Paul is speaking about the Galileo affair and saying that the seventeenth century ecclesiastical authorities made their alleged mistakes because they were "limited human beings who [were] an integral part of their cultural epoch." Odd as it may seem coming from a pope of the Catholic Church, this statement appears to divest these clerical authorities of any guidance or overriding protection from the Holy Spirit. It is as if in order to explain the unexplainable, John Paul II resorts to saying that God ignored the Church for an indefinite period of time, and which, unfortunately, resulted in the Church succumbing to the dark side of the "culture" of that day. Needless to say, it is a frightening and disheartening scenario that John Paul visualizes here. Those who think deeply about the implications of what he is saying cannot honestly draw any long-term comfort from it. It inevitably and inescapably makes every "reformable" teaching of the Church come under the black cloud of suspicion, including the "reformable" teachings of John Paul II himself.

In brief, the problems with John Paul II's assessment of the situation in his May 1983 speech are threefold. First, the "cultural epoch" of John Paul II is no more certain of the "physical constitution of reality" than the cultural epoch from four centuries prior. For example, as we noted in Volume I, the three major scientific theories cited above (Quantum Mechanics, String Theory and Einsteinian Relativity) diametrically contradict one another. We have also seen that Einsteinian Relativity has declared its native inability to tell us which of the two major celestial bodies, the sun and the Earth, revolves around the other, since both space and movement, by definition, are relative. At least the seventeenth century prelature had a conviction of which body was revolving and which was not, and they based it on Scripture and Tradition.

Second, the "limited human beings" in the Church whom John Paul II says were responsible for these alleged miscues are, unfortunately, still with us in the Church today, regardless how much they seek to elevate themselves above their 17th century counterparts. Modern society, including the moral scandals and loss of faith that even John Paul II admitted were concurrent with his own pontificate, is certainly no closer to God than those who lived four centuries prior.[513] As such, as much as Paul V and Urban VIII are considered "limited human beings," so John Paul II cannot escape the same "limitation," especially on the coattails of the confusing array of theories in modern science.

Third, in faulting the prelature of the past, John Paul II puts himself in the dubious position of having to choose the lesser of two evils to exonerate the Church at large. On the one hand, if it is accepted that his papal predecessors were wrong in condemning heliocentrism, then, although John Paul saves the modern Church on one count, he inevitably makes it a miserable failure on another count, for he now has the insurmountable problem of explaining how the Church of the past, which claimed to be guided by the Holy Spirit just as much as the Church of the present, could have been duped into thinking that true cosmology was even addressed by Scripture, much less erroneously concluding that the sun revolved around the Earth. No appeal to the "cultural epoch" is going to explain why all the Fathers, all the medievals, all the popes, all the saints, all the doctors, all the theologians and all the parishioners of the Catholic Church for almost the last two millennia could be led into such a stark and raving error regarding the revolutions of the heavenly bodies until modern science (most of which is atheistic and totally confused itself as to how the universe operates, along with a Catholic Church since Vatican II that has certainly not exhibited the highest moral and doctrinal standards we have seen in previous ecclesiastical eras) came along to enlighten us to the indisputable and irreformable truth, respectively. That is the first of the two evils.

[512] As cited in Fantoli's *Galileo: For Copernicanism and for the Church*, p. 509.

[513] John Paul II himself said just one month into his pontificate: "We are now standing in the face of the greatest historical confrontation humanity has gone through. I do not think that wide circles of the American society or wide circles of the Christian community realize this fully. We are now facing the final confrontation between the church and the anti-Church, of the Gospel versus the anti-Gospel" (*Wall Street Journal*, Nov. 9, 1978)."

The second of the two evils is this: if John Paul's papal predecessors were right, it is obviously even more devastating for the Church at large, for: (a) John Paul II would be in error in stating that the previous Church was in error; (b) he would be in error in believing heliocentrism is true; (c) he would be in error in not discovering his two-fold error; (d) he would demonstrate that he, not the Church of the past, was not being guided by the Holy Spirit, at least in regard to personal opinions such as those he expressed in May 1983 and October 1992 to the world's scientists.

How Then Should the Church Proceed?

Are we doomed to pick the lesser of two evils? There answer is no. Fortunately, there is a way out of this dilemma, and it will come, ironically, from none other than John Paul II himself as he gives the admonition in his 1992 speech to the Pontifical Academy of Science. He states:

> It is a duty for theologians to keep themselves regularly informed of scientific advances in order to examine…whether or not there are reasons for taking them into account in their reflection or for introducing changes in their teaching.[514]

Keeping "regularly informed of scientific advances" so that theologians can "introduce changes in their teaching" is precisely what this book, *Galileo Was Wrong: The Church Was Right*, is encouraging modern theologians to do. The same direction was given by Cardinal Casaroli, the then Vatican Secretary of State, to the pope's Galileo commission on July 3, 1981. It stated at the outset that there should be neither an intention to overturn the results of Galileo's 1633 trial nor to craft a rehabilitation of Galileo. The marching orders were simply to "rethink" the Galileo affair. As Casaroli put it:

> The aim of the various groups should be to rethink the whole Galileo question, with complete fidelity to historically documented facts and in conformity to the doctrine and culture of the time, and to recognize honestly, in the spirit of the Second Vatican Council and of the quoted speech of John Paul II, rights and wrongs from whatever side they come. This is not to be the review of a trial or a rehabilitation, but a serene and objectively founded reflection, in the context of today's historical-cultural epoch.[515]

As we "rethink" the Galileo affair and theologians begin to see that there is no scientific proof for heliocentrism and that geocentrism has much more scientific credibility than previously reported, they will, as John Paul II admonished them, have enough information to "introduce changes in their teaching" as they consider the facts of science in a whole new way, leading, hopefully, to a moratorium on apologizing for the popes and cardinals of the seventeenth century and, in turn, giving them the respect they are due as stewards of the Gospel who promoted the inerrancy of Holy Writ. Once an honest, studious and open-minded analysis is made of the scientific evidence, one will be able to see that the Holy Spirit was, indeed, behind the scenes guiding the Church of yesteryear to censor Copernicanism and, in turn, insist that we take Scripture's propositions at face value. Without scientific proof for heliocentrism, today's Church is under no obligation to entertain it as more than a curious hypothesis, and, consequently, she is neither under divine compulsion nor can she claim any justifiable reason to abandon the literal interpretation of Scripture. As St. Augustine once said:

[514] John Paul II, address to the Pontifical Academy of Science, November 4, 1992, ¶8. John Paul II said a similar thing to the PAS in an address on the subject of evolution on October 22, 1996: "For my part, when I received those taking part in your academy's plenary assembly on October 31, 1992, I had the opportunity with regard to Galileo to draw attention to the need of a rigorous hermeneutic for the correct interpretation of the inspired word. It is necessary to determine the proper sense of Scripture, while avoiding any unwarranted interpretations that make it say what it does not intend to say. In order to delineate the field of their own study, the exegete and the theologian must keep informed about the results achieved by the natural sciences (*cf.* AAS 85 1/81993 3/8, pp. 764-772; address to the Pontifical Biblical Commission, April 23, 1993, announcing the document on the The Interpretation of the Bible in the Church: AAS 86 1/81994 3/8, pp. 232-243).

[515] Quoted from Casaroli, 1981, as translated by M. Segre in "Light on the Galileo Case?" in *Isis* 88, pp. 500-501, as cited in *Retrying Galileo*, p. 344.

> But if they are able to establish their doctrine with proofs that cannot be denied, we must show that this statement of Scripture…is not opposed to the truth of their conclusions.[516]

Suffice it to say, modern science has never provided the world with "proofs that cannot be denied" to back up its steadfast devotion to heliocentrism. In that light, Pope Leo XIII made Augustine's teaching concerning the interpretation of Scripture into Catholic doctrine, following the Tradition of the Church:

> But he must not on that account consider that it is forbidden, when just cause exists, to push inquiry and exposition beyond what the Fathers have done; provided he carefully observes the rule so wisely laid down by St. Augustine – not to depart from the literal and obvious sense, except only where reason makes it untenable or necessity require.[517]

Simply put, without scientific proof for heliocentrism, there is no "reason" or "necessity" to "depart from the literal and obvious sense" of Scripture. As physicist Henri Poincaré understood it from the side of science: "We do not have and cannot have any means of discovering whether or not we are carried along in a uniform motion of translation."[518] Einstein was thus forced to conclude:

> Either coordinate system could be used with equal justification. The two sentences: "the sun is at rest and the Earth moves," or "the sun moves and the Earth is at rest," would simply mean two different conventions concerning two different coordinate systems.[519]

In an ironic sort of way, Einstein's statement about the essential equality of differing "coordinate systems" is remarkably similar to what Robert Cardinal Bellarmine told Fr. Paolo Antonio Foscarini when the latter insisted upon forcing the heliocentric system on the world. Being the astute intellectual he was, Bellarmine, like Einstein, easily saw how mathematics could save the appearances of either system. Bellarmine had taught astronomy in a number of Jesuit colleges.[520] He knew the arguments of celestial motion on both sides of the aisle. But, going beyond relativity, he also knew that, despite the mathematical equivalence, only one system could be the correct one. Thus, to Foscarini he writes:

> First. I say that it seems to me that Your Reverence and Galileo did prudently to content yourself with speaking hypothetically, and not absolutely, as I have always believed that Copernicus spoke. For to say that, assuming the earth moves and the sun stands still, all the appearances are saved better than with eccentrics and epicycles, is to speak well; there is no danger in this, and it is sufficient for mathematicians. But to want to affirm that the sun really is fixed in the center of the heavens and only revolves around itself without traveling from east to west, and that the earth is situated in the third sphere and revolves with great speed around the sun, is a very dangerous thing, not only by irritating all the philosophers and scholastic theologians, but also by

[516] *The Literal Interpretation of Genesis* Book 2, Chapter 9, paragraph 21.

[517] Encyclical letter of 1893, *Providentissimus Deus*. The "Fathers," as we have seen in Chapter 13 were all avowed geocentrists in the face of many of the Greek philosophers and astronomers who were espousing heliocentrism.

[518] Poincaré's lecture titled: "L'état actuel et l'avenir de la physique mathematique," St. Louis, Sept. 24, 1904, *Scientific Monthly*, April, 1956. Commenting on Poincaré's work, Arthur Webster stated in 1913: "This [special relativity] principle is no less than a fundamental relation between time and space, intended to explain the impossibility of determining experimentally whether a system, say the Earth, is in motion or not" ("Henri Poincaré as Mathematical Physicist," *Science*, Vol. 38, Issue 991, Dec. 26, 1913, p. 907).

[519] *The Evolution of Physics: From Early Concepts to Relativity and Quanta*, Albert Einstein and Leopold Infeld, New York, Simon and Schuster, 1938, 1966, p. 212. As Fred Hoyle notes: "…according to the physical theory developed by Albert Einstein [the heliocentric and geocentric systems] are indeed physically equivalent to each other" (*Astronomy and Cosmology*, p. 8).

[520] A manuscript of his course in astronomy from 1570-72 is housed at the University of Louvain.

> injuring our holy faith and rendering the Holy Scriptures false.

As we have shown in the preceding pages of Volume 1 of *Galileo Was Wrong: The Church Was Right*, the evidence for why the Holy Spirit led our previous popes to condemn any model that required the Earth to move is so abundant that, in consideration of the fact that modern science has admitted both that it cannot prove heliocentrism and that geocentrism is not only a perfectly viable model of the universe but in many respects it is the more logical answer to the scientific data, it is the world that now owes an apology to the Catholic Church. In this light, Catholic scientist, author, and former professor of the Massachusetts Institute of Technology, Wolfgang Smith writes:

> If there has been little debate in recent times on the subject of geocentrism, the reason is clear: almost everyone takes it for granted that the geocentrist claim is a dead issue, on a par, let us say, with the flat-Earth hypothesis. To be sure, the ancient doctrine has yet a few devoted advocates in Europe and America, whose arguments are neither trivial nor uninformed; the problem is that hardly anyone else seems to care, hardly anyone is listening. Even the biblically oriented creation-science movement, which of late has gained a certain prestige and influence, has for the most part disavowed geocentrism. The fact remains, however, that geocentrist cosmology constitutes not only an ancient, but indeed a traditional doctrine; should we not presume that as such it enshrines a perennial truth? To maintain, moreover, that this truth has nothing to say on a cosmographic plane – that the doctrine, in other words, is "merely symbolic or allegorical" – to think thus is to join the tribe of theologians who are ever willing to "demythologize" at the latest behest of the scientific establishment. It will not be without interest, therefore, to investigate whether the geocentrist claim – yes, understood cosmographically! – had indeed been ruled out of court. I shall urge that it has not. As regards the Galileo controversy, I propose to show that Galilean heliocentrism has proved to be scientifically untenable, and that in fact the palm of victory belongs to the wise saintly Cardinal Bellarmine.[521]

Smith's words are confirmed when we see the common rationale behind the thousands of histories written on the Galileo affair. All of the historians take for granted that heliocentrism has been scientifically proven. Thus they write their analyses of the historical events with that self-assured presumption as their foundation. Few, if any, have ever made a critical investigation of the purported proofs for a moving Earth. Instead, they resign themselves to parrot the *status quo* of modern science. Their treatises are repetitious attempts to turn over every rock and look into every crevice of the historical situation hoping to find the silver bullet that reveals the "real" reason why the Church was so hard on Galileo,[522] yet during the entire course of their research they are totally incapable of finding that reason, for they have already dismissed the notion of a fixed Earth as a remote, if not a laughable assertion. Maurice Finocchiaro, one of the more respected Galileo historians, admits in the opening pages of his latest work that he is driven to uncover every detail of the Galileo affair because, as he says, "a key recurring question has been whether, how, and why the condemnation was right or wrong, and that is what the title *Retrying Galileo* is meant to convey."[523] But Finocchiaro, although he makes no

[521] Wolfgang Smith, *The Wisdom of Ancient Cosmology: Contemporary Science in Light of Tradition*, p. 149. Feyerabend adds: "the tradition defended by the Church had interesting ancestors in antiquity and has progressive defenders today….And almost all philosophers of science writing today would have agreed with Bellarmino that Copernicus's case was very weak indeed" (*Farewell to Reason*, pp. 248, 257).

[522] For example, Pietro Redondi, in his book *Galileo Heretic* (1982, 1987), says that the real reason the Church was so hard on Galileo was not because of Copernicanism but because Galileo's theory of "atomism" in *The Assayer* (1623) was in direct conflict with the doctrine of the Eucharist, despite the fact that there is no indication in the official documents that such was the case. As Feyerabend notes: "what Galileo says about atomism in the *Assayer* is much too brief and indefinite to conflict with transubstantiation (it is an aside almost, not an elaborate statement) and with the exception of a rather problematic document no such conflict was perceived" (*Against Method*, p. 115).

[523] Maurice Finocchiaro, *Retrying Galileo*, 2005, p. ix.

claims to knowing the science, pursues his unrelenting quest believing firmly that although

> Galileo did not provide a valid scientific proof of the earth's motion…this demonstration was available in 1820 after a number of other discoveries: Newton's universal gravitation (1687), Bradley's stellar aberration (1729), Guglielmini's eastward deflection of falling bodies (1789-1792), and Calandrelli's annual stellar parallax (1806).[524]

As M.I.T. professor Wolfgang Smith has noted above, however, anyone today who has made an honest investigation into the scientific merits of geocentrism and discovered the unproven assumptions of heliocentrism, will easily recognize that Finocchiaro's proposed "demonstrations" of a moving earth are totally baseless, yet (and we speak with no exaggeration in pointing out that) these alleged "demonstrations" are the foundation for everything Finocchiaro has written on the Galileo affair. Obviously, if the foundation of his critique is fallacious, then so are the conclusions he draws from them, and which applies to every other author who is puzzled why the Church condemned heliocentrism.

Detailed Analysis of John Paul II's 1992 Speech on Galileo

With these preliminary facts in the background, we will now proceed to analyze John Paul's speech to the Pontifical Academy of Science. The following English translation of the pope's address, which was originally given in French, appeared in *L'Osservatore Romano* N. 44 (1264) on November 4, 1992. We will discuss pertinent parts of the speech intermittently. Key comments of the pope's speech have been underlined for emphasis.

> **Papal Speech:** Your Eminences, Your Excellencies, Ladies and Gentlemen,
>
> 1. The conclusion of the plenary session of the Pontifical Academy of Sciences gives me the pleasant opportunity to meet its illustrious members, in the presence of my principal collaborators and the Heads of the Diplomatic Missions accredited to the Holy See. To all of you I offer a warm welcome.
>
> My thoughts go at this moment to Professor Marini-Bettolo, who is prevented by illness from being among us, and, assuring him of my prayers, I express fervent good wishes for his restoration to health.
>
> I would also like to greet the members taking their seats for the first time in this Academy; I thank them for having brought to your work the contribution of their lofty qualifications.
>
> In addition, it is a pleasure for me to note the presence of Professor Adi Shamir, of the Weizmann Institute of Science at Rehovot, Israel, holder of the Gold Medal of Pius XI, awarded by the Academy, and to offer him my cordial congratulations.

[524] *Ibid*., p. 348. As we discovered in Volume I, neither the laws of gravity, stellar aberration, stellar parallax, nor the deflection of falling bodies, prove that the earth is in motion. Every presumed proof for heliocentrism can be equally explained from a geocentric perspective, since the same forces and motions will occur if the Earth is rotating in a fixed universe or the universe is rotating around a fixed Earth. As far as modern science is concerned, there is no difference between these two models. But Finocchiaro is apparently oblivious to the alternative explanation, concluding that Newton's laws can only show that "the sun has such a greater mass and is so much closer to the said center [of mass] that it moves much less then all the other planets" and thus concludes "the principle foundation of the prohibition [against Galileo and the heliocentric system] no longer subsists…" (*ibid*., p. 145). Finocchiaro's claim of the discovery of parallax by Calendrelli in 1806 is dubious. As Macpherson notes: "The one pre-Herschelian problem in sidereal astronomy was the distance of the stars. Owing to its bearing on the Copernican theory, the problem was attacked by the astronomers of the seventeenth and eighteenth centuries. Herschel made numerous attempts to detect the parallax of the brighter stars, but failed. Meanwhile there had been many illusions. Piazzi believed that his instruments – which in reality were worn out and unfit for use – had revealed parallaxes in Sirius, Aldebaran, Procyon and Vega; Calendrelli, another Italian, and John Brinkley (1763-1835), Astronomer Royal of Ireland, were similarly deluded; and in 1821 it was shown by Friedrich Georg Wilhelm Struve (1793-1864), the great German astronomer, that no instrument then in use could possibly be successful in measuring the stellar parallax" (Hector Macpherson, *A Century's Progress in Astronomy*, William Blackwood and Sons, Edinburgh and London, 1906, pp. 150-151).

> Two subjects in particular occupy our attention today. They have just been ably presented to us, and I would like to express my gratitude to Cardinal Paul Poupard and Fr. George Coyne for having done so.
>
> I. 2. In the first place, I wish to congratulate the Pontifical Academy of Sciences for having chosen to deal, in its plenary session, with a problem of great importance and great relevance today: the problem of the emergence of complexity in mathematics, physics, chemistry and biology.
>
> The emergence of the subject of complexity probably marks in the history of the natural sciences a stage as important as the stage which bears relation to the name of Galileo, when a univocal model of order seemed to be obvious. Complexity indicates precisely that, in order to account for the rich variety of reality, we must have recourse to a number of different models.

Analysis: This is the first indication in the speech that the approach of the Vatican is not going to side to any certain degree with Galileo; rather, it appeals to "complexity" precisely because modern science has discovered that, despite the configurations afforded by Newtonian science, trying to figure out what is revolving around what is not as easy as it was once thought to be. As we noted in Volume I of *Galileo Was Wrong: The Church Was Right*, one could make a model choosing any point in the universe as the center and subsequently calculate by Fourier analysis what the precise revolutions of the surrounding bodies must be on a purely mathematical basis. Since modern science believes all bodies are in motion, there is no means of preferring one mathematical system over the other. Hence, the appeal to "having recourse to a number of different models," whether they be the Ptolemaic, the Copernican, the Keplerian, the Brahian, the Einsteinian, or any combination of the above, seems to be the establishment of a neutral ground from which the speech seeks to prime its readers who may come to the issue believing that it is a simple case of exonerating heliocentrism and rejecting geocentrism. The speech recognizes that the issue is much more complex. Later in the speech, the pope again refers to the "emergence of complexity" and the "theme of complexity," showing that it is a consistent line of argumentation for the Vatican's analysis of the situation.

> **Papal Speech**: This realization poses a question which concerns scientists, philosophers and theologians: how are we to reconcile the explanation of the world – beginning with the level of elementary entities and phenomena – with the recognition of the fact that "the whole is more than the sum of its parts"?
>
> In his effort to establish a rigorous description and formalization of the data of experience, the scientist is led to have recourse to metascientific concepts, the use of which is, as it were, demanded by the logic of his procedure. It is useful to state exactly the nature of these concepts in order to avoid proceeding to undue extrapolations which link strictly scientific discoveries to a vision of the world, or to ideological or philosophical affirmations, which are in no way corollaries of it. Here one sees the importance of philosophy which considers phenomena just as much as their interpretation.
>
> 3. Let us think, for example, of the working out of new theories at the scientific level in order to take account of the emergence of living beings. In a correct method, one could not interpret them immediately and in the exclusive framework of science. In particular, when it is a question of the living being which is man, and of his brain, it cannot be said that these theories of themselves constitute an affirmation or a denial of the spiritual soul, or that they provide a proof of the doctrine of creation, or that, on the contrary, they render it useless.
>
> A further work of interpretation is needed. This is precisely the object of philosophy, which is the study of the global meaning of the data of experience, and therefore also of the phenomena gathered and analyzed by the sciences.
>
> Contemporary culture demands a constant effort to synthesize knowledge and to integrate learning. Of course, the successes which we see are due to the specialization of research. But unless this is balanced by a reflection concerned with articulating the various branches of

knowledge, there is a great risk that we shall have a "shattered culture," which would in fact be the negation of true culture. A true culture cannot be conceived of without humanism and wisdom.

II. 4. I was moved by similar concerns on 10 November 1979, at the time of the first centenary of the birth of Albert Einstein, when I expressed the hope before this same Academy that "theologians, scholars and historians, animated by a spirit of sincere collaboration, will study the Galileo case more deeply and, in frank recognition of wrongs from whatever side they come, dispel the mistrust that still opposes, in many minds, a fruitful concord between science and faith."(l) A Study Commission was constituted for this purpose on 3 July 1981. The very year when we are celebrating the 350th anniversary of Galileo's death, the Commission is presenting today, at the conclusion of its work, a number of publications which I value highly. I would like to express my sincere gratitude to Cardinal Poupard, who was entrusted with coordinating the Commission's research in its concluding phase. To all the experts who in any way took part in the proceedings of the four groups that guided this multidisciplinary study, I express my profound satisfaction and my deep gratitude. The work that has been carried out for more than 10 years responds to a guideline suggested by the Second Vatican Council and enables us to shed more light on several important aspects of the question. In the future, it will be impossible to ignore the Commission's conclusions.

One might perhaps be surprised that at the end of the Academy's study week on the theme of the emergence of complexity in the various sciences, I am returning to the Galileo case. Has not this case long been shelved and have not the errors committed been recognized?

That is certainly true. However, the underlying problems of this case concern both the nature of science and the message of faith. It is therefore not to be excluded that one day we shall find ourselves in a similar situation, one which will require both sides to have an informed awareness of the field and of the limits of their own competencies. The approach provided by the theme of complexity could provide an illustration of this.

5. A twofold question is at the heart of the debate of which Galileo was the centre. The first is of the epistemological order and concerns biblical hermeneutics. In this regard, two points must again be raised. In the first place, like most of his adversaries, Galileo made no distinction between the scientific approach to natural phenomena and a reflection on nature, of the philosophical order, which that approach generally calls for. That is why he rejected the suggestion made to him to present the Copernican system as a hypothesis, inasmuch as it had not been confirmed by irrefutable proof. Such therefore, was an exigency of the experimental method of which he was the inspired founder.

Analysis: The foregoing concurs with the history of the situation. Galileo was permitted to expound on his heliocentric system for practical purposes just as long as he did not consider it the actual model of the cosmos. The key point, however, is that John Paul II recognizes that without "irrefutable proof" the Church is under no obligation to consider heliocentrism as a fact of science. Consequently, if the lack of irrefutable proof persists to the present day, then the Church is likewise required to take the same stance it did in the days of Galileo – it must continue to favor geocentrism for it is clearly the model advocated by Scripture and 1600 years of Christian teaching prior to Galileo. As we have noted in Volume 1, there is no "irrefutable proof" that the Earth moves around the sun. In this light, Augustine warns us:

> I have learnt that a man is not in any difficulty in making a reply according to his faith which he ought to make to those who try to defame our Holy Scripture. When they are able, from reliable evidence, to prove some fact of physical science, we shall show that it is not contrary to our Scripture. But when they produce from any of their books a theory contrary to Scripture, and therefore contrary to the Catholic faith, either we shall have some ability to demonstrate that

> it is absolutely false, or at least we ourselves will hold it so without any shadow of a doubt. And we will so cling to our Mediator, in whom are hidden all the treasures of wisdom and knowledge, that we will not be led astray by the glib talk of false philosophy or frightened by the superstition of false religion.[525]

In fact, much of the scientific evidence reveals that the Earth is motionless. As we noted earlier, one scientist concluded regarding the 1887 Michelson-Morley experiment:

> It is both amusing and instructive to speculate on what might have happened if such an experiment could have been performed in the sixteenth or seventeenth centuries when men were debating the rival merits of the Copernican and Ptolemaic systems. The result would surely have been interpreted as conclusive evidence for the immobility of the Earth, and therefore as a triumphant vindication of the Ptolemaic system and irrefutable falsification of the Copernican hypothesis.[526]

The pope continues:

> **Papal Speech**: Secondly, the geocentric representation of the world was commonly admitted in the culture of the time as fully agreeing with the teaching of the Bible of which certain expressions, taken literally seemed to affirm geocentrism. The problem posed by theologians of that age was, therefore, that of the compatibility between heliocentrism and Scripture.

Analysis: Here we have an admission that, if the Bible is taken literally, it affirms, or seems to affirm, geocentrism. It also acknowledges the basis upon which the popes and cardinals of the 1600s formed their argument against Galileo, that is, it was first and foremost "opposed to Scripture." It also means that, if one were to reject the teaching of geocentrism, he must necessarily reject the literal interpretation of Scripture. Although lessening the traditional strictures on literal interpretation may appear to be possible by simply shifting the principles of hermeneutics, it is not so easy when one considers that the hallmark of Catholic biblical interpretation for the prior 1600 years was a persistent and uncompromising literal interpretation of Scripture. This methodology gave the Church such crucial doctrines as Baptismal Regeneration, which, when reading the words of Jesus in John 3:5, "Unless a man is born of water and the Spirit he cannot enter the kingdom of heaven," the Church interpreted them as only and distinctly applicable to the literal application and effect of water as the means by which salvation was procured. The Church did the same with the words of Jesus in Matthew 26:26, "This is my body," which have been literally interpreted as being the actual body of Jesus Christ. Moreover, this staunchly literal interpretation of Scripture was produced even in the face of not being able to explain regeneration or transubstantiation, respectively, in a scientific way, and in the face of opposition from heretical sects, both then and now, insisting that we interpret Jesus' words symbolically rather than literally. Surely, if the Lord can make his body present in the Eucharist yet, as it were, "save the appearances" of the bread and wine, then he would have no trouble putting the Earth in the center of the universe and having the latter revolve around the former. Literal exegesis of Scripture is the undeniable legacy of Catholic biblical interpretation, and thus the burden of proof is certainly on the exegete who seeks to depart from it.

> **Papal Speech**: Thus the new science, with its methods and the freedom of research which they implied, obliged theologians to examine their own criteria of scriptural interpretation. Most of them did not know how to do so.

Analysis: It was not so much that they "did not know how to do so," but that they simply did not feel compelled to do it. As even John Paul II noted in the above paragraph, there would be no good reason for them to change their interpretive methodology unless "irrefutable proof" for heliocentrism could be produced. Bellarmine, who took the lead in the exegetical issues of this case, plainly acknowledged in his remarks to Galileo that if such proof existed, he would not be censoring

[525] *The Literal Meaning of Genesis*, Book 1, Chapter 21, Para. 42, in *Ancient Christian Writers*, *op. cit*., p. 45

[526] G. J. Whitrow, *The Structure and Evolution of the Universe*, London, Hutchinson and Co., 1959, p. 79.

Galileo and he would not have adhered to a traditional and literal biblical hermeneutic. If there had been such proof, the Church would only need to say that when Scripture spoke about the sun moving around a stationary Earth this would be considered phenomenological language as opposed to literal language. But it is precisely this dramatic paradigm shift of biblical hermeneutics that the 17th century Church was not willing to initiate (since all of the Church's previous doctrines were created by a literal interpretation of Scripture) unless forced to do so by irrefutable scientific proofs; proofs, we might add, that were not existent then and are not existent now.

> **Papal Speech**: Paradoxically, Galileo, a sincere believer, showed himself to be more perceptive in this regard than the theologians who opposed him. "If Scripture cannot err," he wrote to Benedetto Castelli, "certain of its interpreters and commentators can and do so in many ways."(2) We also know of his letter to Christine de Lorraine (1615) which is like a short treatise on biblical hermeneutics.(3)

Analysis: First of all, whether Galileo was a "sincere believer" is not something that we, 350 years removed from his day, may be able to judge, at least in the early and middle stages of his life. As we have outlined in Chapter 11 of this volume, Galileo's personal life was certainly not the model of saintly living. The ill treatment of his mistress and children, along with his well-known pride and arrogance, are not the typical acts of a sincere Christian believer. Galileo may have been passionate about his science and his wish to make Scripture conform to it, but there is a legitimate question whether Galileo was a personally devout man of God. It is only in the latter stages of his life and, ironically, when he renounced Copernicanism a year before his death, do we find evidence that Galileo was humble and repentant of his former days. Interestingly enough, the pope's commission, which had been working on the Galileo issue for at least nine years (1981-1990), makes absolutely no mention of Galileo's eventual rejection of heliocentrism, even though it is common knowledge among reputable scholars who are familiar with Galileo's life.

The remark that Galileo "showed himself more perceptive…than the theologians who opposed him" or that his letter to Christine is a "short treatise on biblical hermeneutics," gives much more credit to Galileo than he is deserving, at the same time that it disregards the well-known Scriptural erudition of someone like Robert Cardinal Bellarmine. What evidence exists (other than the question-begging assertion that the "theologians" were wrong about geocentrism) that the prelature did not know how to "examine their own criteria for scriptural interpretation"? The theologians of the 17th century were well-trained exegetes, and this is the very reason they were able to stem the tide of the Protestant rebellion that was occurring about the same time. How could they be so astute against Protestant theology yet so obtuse against Galileo's theology? Moreover, these particular theologians had the Council of Trent in their exegetical arsenal, and the Council was clear that no deviation from a patristic consensus was allowed in Catholic biblical interpretation. As the record shows, if there was ever a consensus of Fathers that believed firmly in one doctrine, it was their consensus on geocentrism. Conversely, Galileo had no formal training in biblical interpretation and hardly ventured into any noteworthy studies of Scripture, except when he was required to do so in an effort to save his own heliocentric theory. We have already seen examples in Chapter 12 of Galileo's poor exegetical skills. One of the few examples we have of Galileo exegeting a text of Scripture, Joshua 10:10-14, is quite elementary and fanciful.[527] The details of exegesis neither interested Galileo nor did he have any skill to accomplish such a task. Galileo always spoke in generalities about Scripture for it was the philosophical approach to interpretation that he wanted desperately to change in order to make room for heliocentrism. In fact, as we will see later, Galileo's appeal to Scripture was contradictory. On the one hand, he argued against the astronomical authority of Scripture and on the other hand he assumed it in order to develop Copernican interpretations of problematic passages.[528]

[527] Fantoli tries to escape the scholarly consensus on this point by suggesting that Galileo meant his interpretation of Joshua 10 to be an "ad hominem" attack against those who insisted that Joshua really intended to stop the sun, but there is no suggestion in Galileo's words for such a conclusion. It appears to be another case, frequently employed in his book, of Fantoli seeking to insulate Galileo from criticism and promote the heliocentric system (Annibale Fantoli, *Galileo: For Copernicanism and for the Church*, pp. 207-208)

[528] This particular contradiction was noticed by Maurice Finocchiaro in the analysis of Carlos Chagas' Preface to

Moreover, Galileo made no recourse to the Fathers or the medievals or the history of the popes and councils that went before him. Galileo was, in fact, demanding a total paradigm shift of biblical interpretation for the sake of one issue, an issue that neither he nor anyone else had proven to anyone's satisfaction. On the other hand, of course, if one thinks that modern science has proven indisputably that heliocentrism is true, he would certainly be predisposed to accept why the papal commission would conclude that Galileo was "more perceptive" than Bellarmine.

> **Papal Speech**: 6. From this we can now draw our first conclusion. The birth of a new way of approaching the study of natural phenomena demands a clarification on the part of all disciplines of knowledge. It obliges them to define more clearly their own field, their approach, their methods, as well as the precise import of their conclusions. In other words, this new way requires each discipline to become more rigorously aware of its own nature.
>
> The upset caused by the Copernican system thus demanded epistemological reflection on the biblical sciences, an effort which later would produce abundant fruit in modern exegetical works and which has found sanction and a new stimulus in the Dogmatic Constitution Dei Verbum of the Second Vatican Council.

Analysis: Here we see one of the most significant yet most disturbing admissions from the modern prelature about what the Galileo affair did to Catholic hermeneutics. Once geocentrism had been rejected because it was assumed that science had proven heliocentrism, the Bible would never be looked at the same again. If the Fathers of the Church, the medieval theologians, and the prelature were wrong about interpreting the Bible as a source that gave literal and accurate truth concerning history and the cosmos, then this would forever set the stage for limiting the Bible's domain. This "new way" is dictated by the fact that it is assumed the 17th century Church was wrong to insist that the Bible could be taken at face value. It is a cataclysmic shift in thinking that is comparable to no other in the history of the Church. As we will see later, this is precisely why Bellarmine was so adamant against it.

The "new way" is followed by a "new stimulus" in biblical interpretation supposedly given by Vatican II's *Dei Verbum*. As most biblical scholars know, *Dei Verbum* contains one very controversial phrase which many in the Catholic prelature and Catholic academia have taken as a license to assert that Scripture is inerrant only when it speaks about matters of salvation. Fr. Poupard, Fr. Coyne and the rest of the papal commission follow this new school of thought on biblical hermeneutics. Many seminaries, universities, secondary schools and many new bible translations have adopted it since Vatican II closed its doors in 1965. The sentence in question is from paragraph 11 of *Dei Verbum* and reads as follows:

> Since, therefore, all that the inspired authors, or sacred writers, affirm should be regarded as affirmed by the Holy Sprit, we must acknowledge that the books of Scripture, firmly, faithfully and without error, teach that truth which God, for the sake of our salvation, wished to see confided to the sacred Scriptures.[529]

The phrase that modern biblical scholarship has seized upon in order to advance the idea that Scripture is inerrant only when it speaks on salvation is "for the sake of our salvation." In effect, what

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Rinaldo Fabris' 1986 monograph on Galileo published by the Pontifical Academy of Sciences. It is also pointed out that "contemporary theologians were split about whether Scripture was a philosophical authority" (*Retrying Galileo*, p. 347).

[529] Austin Flannery, *Vatican Council II, The Conciliar and Post Conciliar Documents*, New York, Costello Publishing Co. second printing, 1977, p. 757. The edition of Walter M. Abbot has a slightly different syntax: "Therefore, since everything asserted by the inspired authors or sacred writers must be held to be asserted by the Holy Spirit, it follows that the books of Scripture must be acknowledged as teaching solidly, faithfully and without error that truth which God wanted put into sacred writings for the sake of salvation." Flannery puts the clause "for the sake of our salvation" immediately after "God," thus indicating God's motivation for giving us Scripture, *i.e.*, so that we can be saved. In the Abbott edition, "for the sake of our salvation" is put at the end of the sentence and which might suggest that it modifies "truth" rather than "God." For a thorough analysis and refutation of this thesis please see Fr. Brian Harrison's penetrating critique: "The Truth and Meaning of Scripture According to *Dei Verbum 11*," in *Living Tradition*, No. 59, July 1995 located at the archives of the rcforum.org.

would normally be interpreted as nothing more than an affirmation that God made all of Scripture inerrant so that we can have a sure foundation upon which we can attain salvation, has now been turned into an excuse for why Scripture is not inerrant when it speaks on history and science – a view of Scripture never before taught in the Catholic Church.

A good example of this neo-orthodox view of the Bible are in the works of the late Fr. Raymond Brown, editor of the *New Jerome Biblical Commentary*, and one of the most influential Catholic theologians in the world. He writes: "Scriptural teaching is truth without error to the extent that it conforms to the salvific purpose of God."[530] In another work he writes:

> In the last hundred years we have moved from an understanding wherein inspiration guaranteed that the Bible was totally inerrant to an understanding wherein inerrancy is limited to the Bible's teaching of 'that truth which God wanted put into the sacred writing for the sake of our salvation.' In this long journey of thought the concept of inerrancy was not rejected but was seriously modified to fit the evidence of biblical criticism which showed that the Bible was not inerrant in questions of science, of history, and even of time-conditioned religious beliefs.[531]

Suffice it to say, not only was the veracity of the Bible changed in order to make room for heliocentrism, but the modern exegete was also required to recognize the possibility of error in Scripture in order to separate the salvific message from the historical message. This mentality has also slipped over into the world of science. Raymond Brown himself was a staunch evolutionist, attributing a voluminous amount of his *New Jerome Biblical Commentary* to that very subject and basing his view on the supposition that, since the Bible was not inerrant in cosmogony, he had every right to espouse evolution. Secular scientists were following Brown and his colleagues. Carl Sagan, the world's premier cosmologist until his recent death, in one sentence speaks of the Church "censoring alternative views and threatening to torture," and then couples that in the next paragraphs with:

> But if the Bible is not everywhere literally true, which parts are divinely inspired and which are merely infallible and human? As soon as we admit there are scriptural mistakes (or concessions to the ignorance of the times), then how can the Bible be an inerrant guide to ethics and morals?[532]

As we noted in the Chapter 13, however, the Church has been very clear that ALL of Scripture is inerrant, whether it speaks of salvation, history, the cosmos or any other propositional truth. There simply is no precedent for interpreting the phrase "for the sake of our salvation" as anything more than the very reason why the Bible, *in toto*, was made inerrant by the Holy Spirit, that is, so there would be no doubt about the veracity of the entire message of God who cannot lie and who leads us to salvation. The footnotes of *Dei Verbum* 11 make this truth perfectly clear as it quotes from the same Fathers, theologians, popes and councils that Bellarmine and Urban VIII depended upon to condemn the cosmology of Galileo and uphold the total inerrancy of Holy Writ.[533]

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[530] *New Jerome Biblical Commentary*, p. 1169.

[531] *The Virginal Conception and Bodily Resurrection of Jesus*, Paulist Press, 1973, pp. 8-9. He adds: "Historical and critical studies of doctrine may lead to a similar modification of an over-simplified understanding of the infallibility of Church teaching….While the public admission of historical relativity in doctrinal formulations is a recent phenomenon in official Catholicism….A clear example is the variation in the last 125 years in the presentation of the Church's teaching about evolution. The Church has infallibly taught the doctrine that God was specially involved in creating man in His image and likeness. For almost 1900 years that theological doctrine was interpreted to include the how of man's creation, namely, by direct divine action forming man's body from the earth, and woman's body from man's. Today no serious theologian accepts this understanding of the how, because of the scientific evidence favoring evolution; yet the changed understanding of the how has not negated the infallibility of the Church's teaching for we have learned to distinguish between the theological insight and the physical imagery in which it was clothed" (*ibid*, p. 9).

[532] *Pale Blue Dot*, pp. 40, 42.

[533] Immediately after the sentence "…the books of Scripture, firmly, faithfully and without error, teach that truth which God, for the sake of our salvation, wished to see confided to the sacred Scriptures," *Dei Verbum 11* gives footnotes from five sources stating that Scripture is inerrant in its totality. They are: (1) St. Augustine's *The Literal Interpretation of Genesis* 2, 9, 20 and *Epistle* 82,

> **Papal Speech**: 7. The crisis that I have just recalled is not the only factor to have had repercussions on biblical interpretation. Here we are concerned with the second aspect of the problem, its pastoral dimension.
>
> By virtue of her own mission, the Church has the duty to be attentive to the pastoral consequences of her teaching. Before all else, let it be clear that this teaching must correspond to the truth. But it is a question of knowing how to judge a new scientific datum when it seems to contradict the truths of faith. The pastoral judgment which the Copernican theory required was difficult to make, in so far as geocentrism seemed to be a part of scriptural teaching itself. It would have been necessary all at once to overcome habits of thought and to devise a way of teaching capable of enlightening the people of God. Let us say, in a general way, that the pastor ought to show a genuine boldness, avoiding the double trap of a hesitant attitude and of hasty judgment, both of which can cause considerable harm.

Analysis: Here we see somewhat of an anachronistic treatment of the mentality of the 17th century prelature and its theologians. We can safely say that it was not "necessary to overcome habits of thought" simply because there was no proof of Galileo's universe. As such, the best way for the Church of that day to "be attentive to the pastoral consequences of her teaching," was to maintain her complete trust in the Bible so that the parishioners under them would do the same. If the prelature were to succumb to the theories of Galileo and subsequently teach the uneducated masses that Scripture was no longer to be trusted when it spoke on history or the cosmos, we can imagine what kind of confusion this would have caused in their minds, especially in the wake of such upheavals as the Protestant rebellion, the Renaissance and the beginnings of the Enlightenment that were occurring concurrently with the Galileo affair and its aftermath. This was one of the most tumultuous times in the history of the Church. The right pastoral choice was certainly to adhere to the tradition of the Church which always held Scripture as the highest authority on all that it addressed, and which was subservient to no intellectual pursuit of man, especially one that had no proof for its conjectures.

> **Papal Speech**: 8. Another crisis, similar to the one we are speaking of, can be mentioned here. In the last century and at the beginning of our own, advances in the historical sciences made it possible to acquire a new understanding of the Bible and of the biblical world. The rationalist context in which these data were most often presented seemed to make them dangerous to the Christian faith. Certain people, in their concern to defend the faith, thought it necessary to reject firmly based historical conclusions. That was a hasty and unhappy decision. The work of a pioneer like Fr Lagrange was able to make the necessary discernment on the basis of dependable criteria.

Analysis: Although the speech does not specifically name what it has in view, its reference to the "advances of the historical sciences" and "firmly-based historical conclusions" is most likely alluding to the theory of Julius Wellhausen and his followers who theorized that the Old Testament, in particular the Pentateuch, was written by different authors at widely separated times. As we discuss in Chapters 13 and 15 concerning the interpretation of Genesis 1-2, the Wellhausen theory holds that Genesis 2 is a much earlier account than Genesis 1, the latter written by an author in the "Priestly" ranks during the return of Israel from Babylonian captivity around 515 B.C. Of the two accounts, then, Genesis 2 is the more "historical," while Genesis 1 is merely an effort by the Jews to make the God of Israel more powerful than the Babylonian god, Marduk, so that the Jews could be invigorated to believe that their God would restore their previous fortunes. In other words, today's biblical scholars claim that Genesis 1 is a fabricated story to get the Israelites excited. This so-called "historical science," however, is completely at odds with the traditional view the Church held for the 1900 years prior, that is, that Moses wrote the Pentateuch and did so by giving us historical events and their details that were

3. (2) St. Thomas, *De Veritatis*, q. 12, a. 2; (3) The Council of Trent, Ses. IV, *de canonicis Scripturas* (Denz. 783; (4) Leo XIII's *Providentissimus Deus*: EB 121, 124, 126, 127; (5) Pius XII's *Divino Afflante*: EB 539. None of these sources state or suggest that Scripture is only inerrant when it speaks on salvation.

completely reliable and chronologically accurate, from the Creation, to the Fall, to the Tower of Babel, to the Flood and beyond. Although it is true that in 1918 Fr. M. J. Lagrange separated the good from the bad in the Wellhausen and other "historical critical" theories of biblical exegesis, by the late 1940s and beyond many Catholic biblical scholars paid little attention to his warnings, accepting the Wellhausen theory and other like-minded theories with little reservation. Cardinal Poupard, for example, was well known for accommodating many of these liberal theories of biblical hermeneutics at his *Institut Catholique* in Paris.

> **Papal Speech**: It is necessary to repeat here what I said above. It is a duty for theologians to keep themselves regularly informed of scientific advances in order to examine if such be necessary, whether or not there are reasons for taking them into account in their reflection or for introducing changes in their teaching.

Analysis: We have already remarked on the impact this statement has on the discussion. Suffice it to say, if the theologians of today are required to "keep themselves regularly informed of scientific advances" in order to adjust their theological teachings, it would be well for them to delve into the merits of geocentric science, for as we have seen in the first volume of *Galileo Was Wrong: The Church Was Right*, the evidence for a central and immobile Earth is quite overwhelming.

> **Papal Speech**: 9. If contemporary culture is marked by a tendency to scientism, the cultural horizon of Galileo's age was uniform and carried the imprint of a particular philosophical formation. This unitary character of culture, which in itself is positive and desirable even in our own day, was one of the reasons for Galileo's condemnation. The majority of theologians did not recognize the formal distinction between Sacred Scripture and its interpretation, and this led them unduly to transpose into the realm of the doctrine of the faith a question which in fact pertained to scientific investigation.

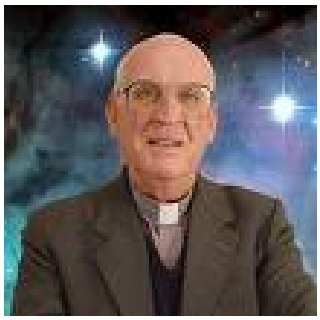
Analysis: That the Church of Galileo's day "carried the imprint of a particular philosophical formation" is actually not a detriment to its usefulness but its best asset. The Church was both Augustinian and Thomistic, the former leaning more toward Platonic philosophy and the latter more toward the Aristotelian, although there was much mixing and matching depending on the subject matter being discussed. These thought paradigms helped the Church both universalize and particularize its doctrines and its outlook on the world. The fact is, those paradigms withstood the test of time. The only significant challenges to them came from the burgeoning physical sciences, since there was a certain independence that scientific endeavor assumed by its very nature. But the Church's "philosophical formation" had already accommodated such challenges. As we noted previously, a thousand years earlier Augustine stated quite clearly that if science could provide irrefutable proofs for its claims, the Church would be more than willing to modify its interpretations of Scripture. Bellarmine posed the same thing to Galileo, and thus the "philosophical formation" was consistent. Moreover, literal interpretation of the Bible was the mainstay for 1600 years prior and it served the Church very well as the foundation for almost all of the Church's doctrinal and philosophical beliefs. Each doctrine came from the literal interpretation of a specific passage of Scripture.[534] It was only when science tried to call the Church's bluff, as it were, and falsely claimed to have proof of its assertions, or perhaps thought that it had proof when it was only misinterpreting its own scientific evidence, that the climate began to change quite drastically.

In addition, the idea that a "majority of theologians did not recognize the formal distinction between Sacred Scripture and its interpretation" is a statement with little basis in fact. For such a serious indictment against the exegetes of the 1600s we would expect at least some examples beside the question-begging assertion that their consensual belief in geocentrism serves as evidence. As even one of the members of the commission, **Fr. George Coyne**, admitted:

> It is, furthermore, claimed in the Papal address that the error of the theologians was due to their failure to "recognize the

[534] *e.g.*, Baptism – John 3:5; Confession – John 20:23; Eucharist and Mass – Matthew 26:26; John 6:54; Marriage and Divorce – Matthew 19:3-9; Extreme Unction – James 5:14, *etc*.

distinction between Sacred Scripture and its interpretation." This cannot be correct.



Since the time of Augustine, this distinction was well established and it was taught in all the schools of exegesis at the time of Galileo. In fact, in 1616 the qualifiers/consultors of the Holy Office knew this distinction and made use of it in formulating their philosophical-theological opinion on Copernicanism.[535]

It must also be pointed out that it was not merely "theologians" of the day who were teaching that the Earth's position and immobility was part of the Scriptural revelation. It was mainly the popes and cardinals of the 1600s and 1700s. Bellarmine himself said: "Nor can one answer that this [geocentrism] is not a matter of faith." Paul V assembled eleven cardinals who condemned the Copernicanism of Fr. Foscarini in 1615 as being "formally heretical." Pope Urban VIII argued profusely with Galileo on the basis that heliocentrism was "opposed to Scripture" and finally decreed through his Holy Office that belief in the non-movement of the sun around the Earth was "formally heretical," and by doing so made heliocentrism a belief that was against the faith.[536] How could Urban VIII allow such a statement unless he believed that Copernicanism was an impossibility? Indeed, it was these very prelates that made the determination that Scripture had the final say in this particular aspect of cosmology, not merely a first or pre-eminent say. As one can plainly see, this issue was not, by any stretch of the imagination, merely left to "theologians" to debate. Unfortunately, the 1992 papal speech treats these popes and cardinals almost as if they were uninvolved bystanders and more or less duped by "theologians" (who are also unnamed), most of whom are categorized as those who knew very little about proper biblical exegesis. In fact, in the statement following (see below), the papal speech even attempts to exonerate "Robert Bellarmine" from the error of these "theologians," but history shows that Bellarmine was Galileo's most ardent antagonist, basing his argument on the fact that Scripture had, if not the final say, at least the reigning say prior to any irrefutable proof from science to the contrary. Quoting Fr. Coyne again:

> The "theologians" in both discourses are unidentified and unidentifiable. There is no mention of the Congregation of the Holy Office, of the Roman Inquisition or of the Congregation of the Index, nor of an injunction given to Galileo in 1616 nor of the abjuration required of him in 1633 by official organs of the Church. Nor is mention made of Paul V or Urban VIII, the ones ultimately responsible for the activities of those official institutions.[537]

One can only assume that the absence in the 1992 speech of these authoritative arms of the Church was deliberate. There was no bull, no encyclical, no decree, no discipline, no abrogation and no derogation. Whatever the reasons, the fact remains that without a formal mention or a formal disavowal of past authoritative decisions, nothing has changed, at least in the official sense. The most

[535] "The Church's Most Recent Attempt to Dispell the Galileo Myth," p. 344.

[536] From final 1633 sentence against Galileo: "Che il sole sia centro del mondo et immobile di moto locale, è propositione assurda e falsa in filosofia, e formalmente heretica, per essere espressamente contraria alla Sacra Scrittura" ("The proposition that the sun is the center of the world and does not move from its place is absurd and false philosophically and formally heretical, because it is expressly contrary to the Holy Scripture"), as cited in *Galileo E L'Inquisizione*, Antonio Favaro, 1907, p. 143; and *Le Opere di Galileo Galilei*, Antonio Favaro, p. 403.

[537] "The Church's Most Recent Attempt to Dispell the Galileo Myth," in *The Church and Galileo*, p. 354. Coyne's reference to "both discourses" refers to Poupard's "Address at the Conclusion of the Proceedings of the Pontifical Study Commission on the Ptolemaic-Copernican Controversy in the 16th and 17th Centuries," Origins 22 (Nov. 12, 1992), pp. 370-375 in English, with the original in Après Galilée (Paris: Desclée de Brouwer, 1994), pp. 93-97, and the actual address given by Pope John Paul II. Both speeches were given on October 31, 1992, with Poupard's preceeding the Pope's.

that can be said, perhaps, is that the Church has implied an unofficial toleration of heliocentrism without giving any official endorsement. In retrospect, we can see why Fr. Coyne and his colleagues, who are avowed heliocentrists, are quite miffed by the papal speech and view it as a failure for the cause of Galileo and modern science. Here, after more than ten years of study by a papal commission, the only concrete result is a short, non-authoritative speech addressed to a small body of scholars; a speech that contains no formal retractions or condemnations of any of the actions taken by the prelature against Galileo. All that the speech really does is attempt to give a rationale for why the two sides disagreed, and even in that case the speech has its own distortions and obfuscations, as we have seen thus far.

> **Papal Speech**: In fact, as Cardinal Poupard has recalled, Robert Bellarmine, who had seen what was truly at stake in the debate personally felt that, in the face of possible scientific proofs that the earth orbited round the sun, one should "interpret with great circumspection" every biblical passage which seems to affirm that the earth is immobile and "say that we do not understand, rather than affirm that what has been demonstrated is false."(4) Before Bellarmine, this same wisdom and same respect for the divine Word guided St Augustine when he wrote: "If it happens that the authority of Sacred Scripture is set in opposition to clear and certain reasoning, this must mean that the person who interprets Scripture does not understand it correctly. It is not the meaning of Scripture which is opposed to the truth but the meaning which he has wanted to give to it. That which is opposed to Scripture is not what is in Scripture but what he has placed there himself, believing that this is what Scripture meant."(5) A century ago, Pope Leo XIII echoed this advice in his Encyclical Providentissimus Deus: "Truth cannot contradict truth and we may be sure that some mistake has been made either in the interpretation of the sacred words, or in the polemical discussion itself."(6)

Analysis: Fr. Coyne, a member of the commission, shows the flaws and inaccuracies of the above paragraph:

> Note that the epistemic priority is given here to Scripture. Since Galileo had no irrefutable proofs of Copernicanism, the current interpretation of Scripture by theologians, including Bellarmine, should remain, but always subject to reinterpretation. Is this a correct presentation of Bellarmine's position?
>
> The final report interprets Bellarmine as saying: "As long as there are no proofs for the movement of the Earth about the Sun, it is necessary to be cautious in interpreting Scripture." What Bellarmine actually says is: "Should proofs be had, then we must go back and reinterpret Scripture." The difference is: Bellarmine did not say: "Theologians should be cautious now in interpreting Scripture in expectation that proofs for Copernicanism might appear" but rather: "If a proof were to appear, then on that day in the future theologians would have to be cautious in interpreting Scripture."
>
> This interpretation of Bellarmine's position, in both the final report and in the Papal address, is based on a partial and selective reading of the *Letter to Foscarini*. In the passage immediately preceding the one just cited, Bellarmine had taken a very restrictive position by stating that:
>
> > Nor can one answer that this [geocentrism] is not a matter of faith, since if it is not a matter of faith 'as regards the topic,' it is a matter of faith 'as regards the speaker'; and so it would be heretical to say that Abraham did not have two children and Jacob twelve, as well as to say that Christ was not born of a virgin, because both are said by the Holy Spirit through the mouth of the prophets and the apostles.
>
> Clearly if geocentrism is a matter of faith "as regards the speaker," then openness to scientific results and circumspection in interpreting Scripture are simply ploys.

They lead nowhere. Furthermore, Bellarmine cites Scripture itself in the person of Solomon to show that proofs for Copernicanism are very unlikely. And still more, at the end of the *Letter to Foscarini* Bellarmine appears to exclude any possibility of a proof by stating that our senses clearly show us that the sun moves and that the earth stands still, just as someone on a ship "sees clearly" that it is the ship that is moving and not the shoreline. Both discourses [Poupard's and the Pope's] cite Bellarmine's statement:

> I say that if there were a true demonstration [of Copernicanism] then one would have to proceed with great care in explaining the Scriptures that appear contrary and say rather that we do not understand them, rather than that what is demonstrated is false.

What they do not cite is the next sentence of Bellarmine: "But I will not believe that there is such a demonstration until it is shown to me." From the concluding sentences of the letter it is clear that Bellarmine was convinced that there could be no such demonstration. A further indication of this conviction on Bellarmine's part is that he supported the Decree of the Congregation of the Index which was aimed at excluding any reconciliation of Copernicanism with Scripture…. And why did he agree to deliver the injunction to Galileo in 1616? This injunction prohibited Galileo from pursuing his research as regards Copernicanism. Galileo was forbidden to seek precisely those scientific demonstrations which, according to Bellarmine, would have driven theologians back to reinterpret Scripture.[538]

Papal Speech: Cardinal Poupard has also reminded us that <u>the sentence of 1633 was not irreformable</u>, and that <u>the debate</u> which had not ceased to evolve thereafter, <u>was closed in 1820 with the imprimatur given to the work of Canon Settele</u>.(7)

Analysis: An imprimatur, which is on an even lesser level of authority than the sentence issued by Pope Urban VIII in 1633, cannot "close the debate." This is especially true in light of the fact that Galileo, Copernicus and Kepler's books were left on the *Index of Forbidden Books* after Settele was given his imprimatur in 1822. Technically, the matter can only be closed if a pope or council issues an infallible decree and declares that no more debate will be heard. For example, up until the Council of Trent, there were continuing debates concerning the content of the canon of Scripture. From Jerome, to Pope Gregory the Great, to Cardinal Cajetan, various doubts about the canon were voiced even though previous popes and councils had issued authoritative decrees (*e.g.*, Pope Damascene, Council of Florence). It was only at Trent that a formal infallible decree, accompanied with an admonition that all debate on the canon must cease, did the debate finally come to an end.

As to whether the decrees and sentences of 1616 and 1633 were "not irreformable," Fr. Coyne makes an insightful remark:

> So far as we can conclude from the circumstances of the condemnation, Pope Urban VIII and the cardinals of the Holy Office certainly did not themselves think it to be "reformable." Furthermore, if it was reformable, why has the condemnation of 1633 or, for that matter, the Decree of the Congregation of the Index in 1616 never explicitly been "reformed."[539]

Coyne's logic is sound. It is one thing for Poupard to claim that the 1616 and 1633 decisions were "not irreformable," but the revealing of this pertinent fact of canon law actually turns out to be an admission from Poupard that the Catholic Church has never reformed the 17th century decisions. This is just another testimony to the divine protection that has apparently been given to the Church's teaching. Ernan McMullin, although personally endorsing Galileo and his cosmology, likewise admits:

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[538] "The Church's Most Recent Attempt to Dispell the Galileo Myth," in *The Church and Galileo*, pp. 345-346.

[539] *The Church and Galileo*, p. 354. Coyne adds: "In the Galileo case the historical facts are that further research into the Copernican system was forbidden by the decree of 1616 and then condemned in 1633 by official organs of the Church with the approbation of the reigning pontiffs" (*ibid*).

> And let there be no mistake, the judgment of the qualifiers in 1616 and the language of the decree supported by it *were* couched in definitive terms; it was not proposed as something "reformable," to use a term favored by some recent theologians. The decree did not say that in the absence of a demonstration, maintaining the Copernican theses would be risky ("temerarious"). It described the theses as "contrary to Scripture," period, just as the qualifiers had "qualified" the heliocentric claim as "formally heretical."[540]

This is precisely why, as we will see later, that Bellarmine expected no proof for heliocentrism to arise in the future, and why the ecclesiastical argument against Galileo was never really based on whether proof existed. The Church depended on an *a priori* argument that could not be toppled. She drew her line in the sand long before scientific proof became part of the discussion. Galileo knew this to be the case:

> …for in disputes about natural phenomenon they seem to claim the right to force others by means of authority of Scripture to follow the opinion they think is most in accordance with its statements, and at the same time they believe they are not obliged to answer observations and reasons to the contrary.[541]

> …to have such knowledge and demonstration. When one is in possession of this, since it too is a gift from God, one must apply it to the investigation of the true meanings of the Holy Writ as those places which seem to read differently.[542]

But, of course, Galileo was not in "possession" of such "knowledge and demonstration." At best his evidence was circumstantial; at worst it was a pure bluff from things he knew provided no proof, despite his claims that such items were a "gift of God." There was really nothing else to say. Galileo's claims were contrary to Scripture, case closed. Scripture was not going to change. The only thing that could change was Galileo, which he eventually did, forcefully in 1633 and voluntarily in 1641.[543] As McMullin notes:

> The issue was primarily an exegetical one. Should the disputed passages be understood as being accommodated to the capacity of the hearers, as the defenders of Copernicus suggested? That this was the key question was clearly grasped in Rome well before the Copernican issue came before the Holy Office for formal decision.[544]

Canon Giuseppe Settele's Imprimatur

As for the 1822 imprimatur to Settele, it certainly made no formal and official reform of the 1616, 1633, 1664 decrees, and it is obvious that the 1992 papal speech did not do so either. Indeed, instances in Church history in which a later pope formally and officially changed an authoritative decree and sentence given by a previous pope and his Holy Office would be extremely rare, and, may have never occurred in the history of the Church.

Even more significant is that little known facts concerning the 1822 procedure do not raise Settele's imprimatur to any kind of definitive reform of the 1616-1633 decrees. Fr. Coyne explains why, and his analysis is most intriguing since it suggests that the Holy Office of 1820-22 was not being as forthright about this issue as it should have been:

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[540] "The Church's Ban on Copernicanism," in *The Church and Galileo*, p. 159.

[541] "…mentre sento che essi pretendono di poter costringer altri, con l' autorità della Scrittura, a seguire in dispute naturali quella opinione che pare a loro che più consuoni con I luoghi di qualla, stimandosi insieme di non essere in obbligo di solvere le ragioni o esperienze in contrario" (*Le Opere di Galileo Galilei*, vol. 5, pp. 323-324, translated by Finocchiaro).

[542] *Le Opere di Galileo Galilei*, vol. 5, p. 322.

[543] Galileo was well aware of this dimension of the contention between himself and the Church. In a June 8, 1624 letter to Federico Cesi (one of the censors later assigned by Riccardi to edit Galileo's *Dialogo*) he remarks: "…ma che non era da temere che alcuno fosse mai per dimostrarla necessariamente vera" ("that it was not to be feared that anyone would ever be able to demonstrate it as necessarily true") in *Le Opere di Galileo Galilei*, vol. 13, p. 182.

[544] "The Church's Ban on Copernicanism," in *The Church and Galileo*, pp. 172-173.

> The judgment rendered in the final report that "the sentence of 1633 was not irreformable" is accepted in the Papal address. In both discourses [Poupard's and the Pope's] there is an attempt to establish that a reformation actually started as soon as the scientific evidence for Copernicanism began to appear. It is claimed that the reform was completed with the *imprimatur* granted under Pope Pius VII to the book of Canon Settele, *Elements of Optics and Astronomy* in 1822, in which Copernicanism was presented as a thesis and no longer as a mere hypothesis.[545] There are a number of inaccuracies of historical fact and interpretation in these judgments.
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> The *imprimatur* of 1822 did not refer to Galileo or to the sentence of 1633. It referred to the teachings of Copernicanism. And if it is claimed that the *imprimatur* implicitly reformed the sentence of 1633, why was it not made explicit? As a matter of fact, the works of Copernicus and Galileo remained on the Index until 1835, more than a decade after the Settele affair. And since the sentence of 1633 refers explicitly to Galileo's failure to observe the decree of 1616, why was that decree not also reformed? Of course, if the tactical maneuver of the Commissary of the Holy Office, Olivieri, for granting the imprimatur to Settele's book were to be accepted, then the decree of 1616 and the sentence of 1633 would have been fully justified. At the recommendation of the cardinals of the Holy Office, in order to resolve the issue and to "safeguard the good name of the Holy See," Olivieri devised the following formula. Copernicus was not correct, since he observed circular orbits and epicycles. The Church was, therefore, justified on scientific grounds to condemn Copernicanism in 1616 and 1633. Obviously, there was no need to revoke a decree which rejected what was incorrect at the time of the decree! It appears, from the diaries of Settele, that Olivieri himself had some doubts about his argumentation. Considering all of these circumstances, the resolution of the Settele affair can hardly be considered a definitive reform of the sentence of 1633.[546]

Fantoli agrees with Coyne's assessment:

> Father Grandi….Working in agreement with Olivieri…had tried to realize the objective of saving the good name of the Holy See, substantially by emphasizing the fact that the Copernican system, by then recognized even by Catholic authors, had been purified from errors and inconsistencies which made it unacceptable in its original form. This was equivalent to maintaining that the Church had not erred in 1616 by putting on the *Index* a work at that time so defective at the level of physics and that now the Church was legitimately authorized to approve it after its errors were corrected…. That is, the Church had been right in condemning the latter from a scientific point of view, because Galileo had also upheld heliocentrism in its unsatisfactory Copernican form and, moreover, he had not been able to give convincing proofs of heliocentrism.[547]

Finocchiaro sees the same exaggerations and inconsistencies in Poupard's analysis of the situation. Commenting on Poupard's 1992 article in *L'Osservatore Romano* titled "Galileo Case Is Resolved,"[548] Finocchiaro observes the following:

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[545] Here Coyne adds a footnote: "Paolo Maffei, *Giuseppe Settele, il suo diario e la questione galileiana* ["Giuseppe Settele: His Diary on the Galileo Question"] (Foligno: Edizione dell'Arquata, 1987), shows that, although the imprimatur to Settele's book was a *de facto* recognition of Copernicanism, it did not refer at all to the Galileo affair. He furthermore shows that Settele had hoped that his case would have brought the Church to reconsider that affair."

[546] "The Church's Most Recent Attempt to Dispell the Galileo Myth," in *The Church and Galileo*, p. 346.

[547] Annibale Fantoli, *Galileo: For Copernicanism and the Church*, p. 520.

[548] Paul Poupard, "Galileo Case Is Resolved," *L'Osservatore Romano*, November 4, 1992, weekly edition in English.

Poupard says that "in 1741, in the face of the optical proof of the fact that the earth revolves round the sun, Benedict XIV had the Holy Office grant an imprimatur to the first edition of the *Complete Works of Galileo*," however, the rationale underlying the imprimatur for Galileo's *Dialogue* was the plan to change its geokinetic language from categorical to hypothetical; hence this imprimatur was not, as Poupard goes on to say in the next paragraph, an "implicit reform of the 1633 sentence," but rather a kind of reaffirmation of it, "correcting" the *Dialogue* in the way that the Index's decree of 1620 "corrected" Copernicus's book. Poupard also says that "this implicit reform of the 1633 sentence became explicit in the decree of the Sacred Congregation of the Index that removed from the 1757 edition of the Catalogue of Forbidden Books works favoring the heliocentric theory," but we have seen that the 1757 decision was still implicit and indirect, so much so that Galileo's *Dialogue* was still left on the *Index* and Settele's *Astronomy* in 1820 could run into difficulties; moreover, the 1757 decision amounted to dropping the clause "all books teaching the earth's motion and sun's immobility" from the Index, and to describe this action as a "decree…that removed…works favoring the heliocentric theory" amounts to a sophistical use of equivocation; for what was being removed was not the listed heliocentric works (which would imply removing Galileo's *Dialogue*, Copernicus's *Revolutions*, *etc*.), but rather the clause "all heliocentric works" (which in fact left those specific works in the Index). Referring to the Settele affair, Poupard asserts that "the unjustly censored author lodged an appeal with Pope Pius VII, from whom in 1822 he received a favorable opinion," and here Poupard's chronology is careless at best, for we have seen that the favorable decision on Settele's personal case came in 1820, although it was indeed in 1822 that the general Inquisition ruling came; however, the 1822 decision was not implemented until the 1835 Index (and not in 1846, as Poupard misstates in the next paragraph.[549]

Whatever degree of historical revisionism Poupard is guilty of fostering, the facts reveal Maurizio Benedetto Olivieri certainly had a dilemma on his hands. The Dominican censor, Filippo Anfossi, refused Giuseppe Settele permission "to publish an explicitly Copernican textbook on the grounds that the decree of 1616 and the sentence of 1633 had never been revoked."[550] Anfossi's reasoning hearkens back to what the head of the Congregation of the Index relayed to the French astronomer Joseph Lalande in 1765 when the latter sought to have Galileo's *Dialogo* taken off the Index. Lalande was told that because Galileo's condemnation came under the aegis of a canonical trial, the legal sentence against Galileo had to be revoked first before any consideration to reevaluating the *Dialogo* could be initiated.[551] Consequently, Olivieri's mental machinations went to work. He had to come up with some rationale why the Holy Offices of 1616 and 1633 could appear to condemn something that ultimately turned out to be true, yet still avoid the accusation that they had erred in condemning it. Perhaps Olivieri had a eureka moment when he found his devious solution, for it surely seemed ingenious. As he envisioned it, the 1616 Holy Office could easily accomplish the task if it were to posit that it declared *only the Copernican version* of heliocentrism erroneous, and make it so on a mere technicality. Since by this time Kepler had introduced elliptical orbits and dispensed with Copernicus' epicycles, Olivieri reasoned that the Holy Office could condemn Copernicanism as technically erroneous even though, Olivieri added, the Holy Office believed in the more correct form of heliocentrism (*i.e*., the form with elliptical orbits instead of epicycles). As Olivieri's rationalization played itself out, he reasoned that the 1822 Holy Office would have no need to revoke the decrees or sentence of the 1616 and 1633 Holy Offices because, technically speaking, they were right about condemning Copernicus' epicyclic model. Of course, this does not explain how Settele could obtain an imprimatur from Olivieri for teaching what

[549] *Retrying Galileo*, p. 426, n. 68.

[550] As worded by Ernan McMullin, editor of *The Church and Galileo*, p. 6.

[551] As noted by Finocchiaro in *Retrying Galileo*, p. 154.

Olivieri's tortured logic had already admitted was an erroneous view advocated by Copernicus (unless, of course, Settele had already dispensed with epicycles and adopted Kepler's ellipses, an issue, incidentally, that is not mentioned by any historians). Or perhaps Settele's mere effort to move Copernicanism from a "hypothesis" to a "thesis" was viewed as less dangerous than moving it from a hypothesis to a "fact," the very shift that got Galileo into trouble.[552] Along these lines, the response from the Holy Office on September 11, 1822 has one very significant fact worthy of note. The decree states:

> Their Eminences have decreed that, for the time being, now and in future, a license is not to be refused to the Masters of the Sacred Apostolic Palace for the printing and publication of works dealing with the mobility of the earth and the immobility of the sun according to the common opinion of modern astronomers, as long as there are no other contrary indications, on the basis of the decrees of the Sacred Congregation of the Index of 1757 and of this Supreme Holy Office of 1820.[553]

Here the Holy Office refers to the mobility of the Earth as the *communem modernorum astronomorum opinionem* ("the common opinion among modern astronomers"), which shows that the Church still regarded Copernicanism as a mere "opinion" regardless of whether said opinion was held by a majority of astronomers. Hence, it is of no real consequence that Settele's imprimatur would be issued based on whether it was a hypothesis or a thesis or somewhere between the two. "Opinions" are as commonplace as the people who hold them. Moreover, imprimaturs that are issued under false pretenses, as was obviously the case in Olivieri's efforts for Settele, certainly cannot catapult an opinion to a place of honor. The effort to bypass the 1633 papal-approved decision that a fixed sun and a moving Earth were "formally heretical" and "erroneous in faith" by claiming that it was only the *particular version* of Copernicanism that was being condemned is one of the most ludicrous and egregious forms of rationalization ever propounded by an ecclesiastical ward. In the final analysis, it does not matter whether the version of heliocentrism is Copernican, Neo-Copernican, Keplerian, Newtonian, etc. The 1633 Holy Office's decision stated that any cosmology that claims the sun is

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[552] "Thesis" is the word used by Fr. Coyne in the above quoted sentence: "…the book of Canon Settele, *Elements of Optics and Astronomy* in 1822, in which Copernicanism was presented as a thesis and no longer as a mere hypothesis." Fantoli concurs, stating: "This volume [Settele's] would teach the Copernican system as a thesis and not just a hypothesis" (*Galileo: For Copernicanism and the Church*, p. 497). In general parlance, a "hypothesis" is a proposition that is merely assumed, with little or no evidence, to serve as the basis for initiating the reasoning process. A "theory" is an explanation that is based on at least some evidence that then leads one to reason out a plausible solution. A "thesis" is a conviction of a certain viewpoint that is put forth in anticipation of objections being weighed against it in order to determine its validity. A thesis is not, however, a physical fact, and thus George Sim Johnston's comment: "the work of Canon Settele, in which Copernicanism was presented as a physical fact and no longer a hypothesis" is stretching the truth just a bit (George Sim Johnston, "The Galileo Affair," Princeton, NJ, Septer Press, nd, p. 8, emphasis added). In any case, the editor, Ernan McMullin makes a comment that should be addressed. He writes: "It took the intervention of the pope, Pius VII, to override Anfossi's logic and to prod the Holy Office to decide (though not to publish their decision) that Copernicanism was no longer theologically objectionable. The decision could be changed, it was argued, because now the heliocentric alternative had been, in effect, demonstrated, so the situation was no longer what it had been for the theologians of 1616 and 1633" (*The Church and Galileo*, p. 6). The problem with McMullin's analysis is that the Church of 1616 was not asking for a "demonstration" of Copernicanism, for there were plenty of ways one could do so, both then and now. But a "demonstation" is nothing more than a workable model. No one has argued that a sun-centered and earth-moving model is unworkable or undemonstrable. Rather, the 1616 Holy Office protested that this very model had not been "irrefutably proven." The crucial difference between demonstration and proof is the hinge upon which this debate rests. Since at most only one of the two models could be correct, the Church was required to adhere to the model of Scripture and Tradition unless it could be proven absolutely that she was wrong in doing so.

[553] "E.mi DD. Decreverunt, non esse a praesenti et futuris pro tempore Magistris Sacri Palatii Apostolici recusandam licentiam pro impressione et publicatione operum tractantium de mobilitate terrae et immobilitate solis iuxta communem modernorum astronomorum opinionem, dummodo nihil aliud obstet, ad formam Decretorum Sacrae Congregationis Indicis anni 1757, et huius Supremae anni 1820" (Antonio Favaro*, Galileo e l'Inquisizione,* pp. 30-31).

fixed or the Earth moves is formally heretical and erroneous in faith.

In regards to issuing imprimaturs under false pretenses, as we will see in more detail later, Galileo was issued an imprimatur in 1631, under very questionable circumstances, for his book *Dialogue on the Two Great World Systems*, since before he received the imprimatur he failed to inform the censor that he was given an injunction in 1616 not to write or speak on the subject of heliocentrism. Effectively, this made Galileo's imprimatur null and void. Additionally, the subsequent condemnation of Galileo's book in 1633 by Pope Urban VIII shows that a censor may mistakenly issue an imprimatur assuming that a book contains no heretical teachings, but which, under closer scrutiny, is found not only to contain heresies but those of the "formal" variety, since Urban, through his Holy Office, declared that heliocentrism was "formally heretical."[554]

In the end, it is quite unsettling to see Olivieri and the cardinals who advised him project upon the Holy Office of 1616 such calculating and deceptive motives in its condemnation of Copernicanism. Perhaps Olivieri's desperate act is an indication of the intense pressure modern science had been putting on the Church during the 1800s. By this time, Kepler's planetary ellipses and Newton's theories of motion, at least in the way they were being interpreted by mainstream science, were making it very difficult for one to adhere to a geocentric universe. Moreover, the Renaissance, the Enlightenment and the Industrial Revolution were certainly no help in maintaining traditional beliefs. Additionally, in the aftermath of the 1789 French Revolution, Napoleon had deported Pius VI to Florence, abolished the papal government, and set up a Roman Republic, with his army keeping vigilance. He did the same to Pius VII, deporting him to France in 1810 and not freeing him until 1814. These events may be significant in the Galileo affair, since Napoleon expressed a keen interest in Galileo's trial, which resulted in him confiscating all of Rome's records and transporting them to France. The file on Galileo's trail was not returned to the Vatican until 1843, eight years after his book was removed from the Index.[555] Not coincidentally, it was under Pius VII's reign that Settele found weak spots in the Church's protocol to obtain an imprimatur for his book.

Fr. Coyne continues his intriguing commentary on this episode of the Galileo affair:

> But antecedent to this purported definitive reform there are several intermediate reform movements which the final [Poupard] report addresses. Referring to the discoveries of aberration and parallax, it states that:
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> > The facts were unavoidably clear, and they soon showed the relative character of the sentence passed in 1633. This sentence was not irreformable. In 1741…Benedict XIV had the Holy Office grant an imprimatur to the first edition of the complete works of Galileo…. This implicit reform of the 1633 sentence became explicit in the decree of the Sacred Congregation of the Index which removed from the 1757 edition of the Catalogue of Forbidden Books works favoring the heliocentric theory.[556]
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> To what extent were the activities of 1741 and 1757 reform decisions? The imprimatur of Benedict XIV was granted under the condition that the stipulations of

[554] From the final 1633 sentence against Galileo: "Che il sole sia centro del mondo et immobile di moto locale, è propositione assurda e falsa in filosofia, e formalmente heretica, per essere espressamente contraria alla Sacra Scrittura" ("The proposition that the sun is the center of the world and does not move from its place is absurd and false philosophically and formally heretical, because it is expressly contrary to the Holy Scripture"), as cited in *Galileo E L'Inquisizione*, Antonio Favaro, 1907, p. 143. In his Sept. 18, 1632 dialogue with Francesco Niccolini, Pope Urban said: "it was not the first time that books already approved by Inquisitors were then rejected and prohibited here, because this had happened many times" (Finocchiaro, *The Galileo Affair*, p. 235).

[555] As Finocchiaro reports: "The Vatican, however, did not forget the matter. There is evidence that in 1835 it made a further attempt to retrieve the file, but to no avail. Unexpectedly, however, in 1843 it was returned to the Holy See by the nuncio to Vienna, to whom it had been given by Blacas's widow" (*Retrying Galileo*, p. 181). Without the file on Galileo's trial, we see a lacuna in the evidence available to Pope Gregory XVI's court in deciding to take Galileo's *Dialogo* off the Index.

[556] From Cardinal Poupard's "Address" to the Pontifical Academy of Science on October 31, 1992, no. 3, ¶ 2 and no. 4, ¶ 1.

> the Padua Inquisitor, who had requested the imprimatur, be observed. The result was that the publication in 1744 of the "complete works" had to exclude the *Letter to Christina* and the *Letter to Castelli*. Furthermore, the *Dialogue* had to be printed in Volume IV, accompanied by the 1633 sentence and the text of Galileo's abjuration, and it had to contain a preface emphasizing its "hypothetical" character.
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> In 1757 after the Cardinal Prefect of the Congregation of the Index had spoken about the matter with Pope Benedict XIV, a decision was taken at a meeting of the consultors (not the Cardinal members) to omit the general prohibition of Copernican books in the new *Index of Forbidden Books*, to be published in 1758. What was to be admitted and prohibited? In the 1619 edition of the *Index of Forbidden Books*, the first after the 1616 decree, and in subsequent editions there were two categories of prohibitions of Copernican works: *nominatim* (specific works) and general. The edition of 1758 excluded only the general. Included still were among others: Copernicus' *De Revolutionibus*, Galileo's *Dialogue* and Kepler's *Epitome*.[557]

Now we have reached the watershed and it appears as if Cardinal Poupard was either ignorant of these details; performed only a cursory review of the evidence; or he deliberately obfuscated the facts to make it appear as if the Church had fully condoned Copernicanism and rejected the decisions of the Holy Offices of 1616 and 1633. The gravity of this situation is noted in the fact that Poupard not only gave a speech with false or incomplete information to the Pontifical Academy of Science, but he also foisted the same distorted evidence upon the pope who then disseminated it to the world. It is Poupard who is responsible for the content since he handed the pope the following statement on October 31, 1992: "…the results of the interdisciplinary enquiry which you asked the Commission to undertake."[558] In reality, no pope of the 18th century had "reformed" the 17th century decisions. The 1741 and 1757 decisions carried almost identical prohibitions as that found in the last *Index of Prohibited Books* updated by Alexander VII in 1664. Moreover, the 1820 decision (giving an imprimatur to Canon Settele) was based on the duplicity of Olivieri, and even in that case, Galileo and Copernicus were kept on the *Index*.

The 1835 Index of Gregory XVI

This leaves the 1835 Index of Gregory XVI as the last official dealing with Copernicanism. As we noted previously, suspect activity also occurred during this time. Since the Church made it clear it would not even consider removing Copernican cosmology off the *Index* until science could substantiate its case with "irrefutable" proof, lo and behold, a false proof, namely, stellar parallax, suddenly appeared (and hence the equally false claim that heliocentrism was a proven fact), which resulted in the authorities under Pope Gregory XVI removing Copernicus' and Galileo's works from the *Index of Forbidden Books* in 1835. Astrophysicist and historian, Owen Gingerich, explains:

> But, Hooke [says]… "May not the Sun move as Ticho supposes, and that the Planets make their Revolutions about it whilst the Earth stands still, and by its magnetism attracts the Sun and so keeps him moving about it?"[559] There is needed,

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[557] "The Church's Most Recent Attempt to Dispel the Galileo Myth," in *The Church and Galileo*, pp. 346-347. The editor, Ernan McMullin, concurs: "In 1741, Galileo's *Dialogo* received an imprimatur as part of a collected edition of Galileo's works. But there was a catch. It had to be prefaced with a disclaimer…the work was to be regarded as no more than a "mathematical hypothesis." It also had to contain the texts of the sentence and abjuration and had to substitute the "earth's apparent motion" for "the earth's motion" in the marginal postils. It was thus far from a revocation of the 1616 ban on the *Dialogue*; indeed, it effectively changed nothing with regard to the theological status of Copernicanism" (*The Church and Galileo*, pp. 5-6).

[558] From Poupard's "Address," No. 5, ¶ 3, as cited in Coyne, p. 352.

[559] Robert Hooke, "An Attempt to Prove the Motion of the Earth from Observations," (London, 1674), p. 3. Hooke writes: "Whether the Earth move or stand still hath been a problem, that since Copernicus revived it, hath much exercised the Wits of our best modern Astronomers and Philosophers, amongst which notwithstanding there hath

> Hooke declares, an *experimentum crucis* to decide between the Copernican and Tychonic systems, and this he proposed to do with a careful measurement of the annual stellar parallax. I will not describe Hooke's attempt, which used what might well be described as the first major instrumentation set up for a single purpose, but let me merely state that Hooke thought he had confirmed the effect and therefore the Copernican arrangement.
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> While it soon became apparent that Hooke's handful of observations had not established a convincing annual parallax, further attempts led James Bradley to the discovery of stellar aberration, published in 1728.[560] This phenomenon, easily explained in terms of a moving earth, did not have the historical cachet that the quest for parallax had. Hence, ironically, what persuaded the Catholic Church to take Copernicus' book off the Index was an ultimately false claim for the discovery of an annual stellar parallax. The new edition of the Index appearing in 1835 finally omitted *De Revolutionibus*, three years before a convincing stellar parallax observation was at last published.[561]

From Gingerich's source, *La Condamnation des Livres Copernicians et sa Révocation*, we now know that the decision to remove Copernicus and Galileo from the 1835 *Index* was made under false pretenses. In fact, we might say that the pope allowed the removal under the duress of a scientific forgery – the false claim that Bradley discovered stellar parallax almost a hundred years earlier, in 1728. Since there was no other reason for the Church to address the Copernican issue in 1835, it is more than coincidence that a bogus claim for stellar parallax was being propped up a century later as the missing cog in the cosmic wheel for the Church to cower to the demands of "science."

But the story is not over. Not only was the 1835 reprieve for Copernicus and Galileo presumptuous in light of the false claims of stellar parallax, even three years later (1838) when Bessel published the first authenticated parallax, the case for heliocentrism was still not proven, since, obfuscated in the clamor of the new discovery was the unadmitted but undeniable fact that stellar parallax does not prove heliocentrism, since parallax can also be explained equally well from a geocentric model.[562] It is safe to conclude that if Gregory XVI had not been influenced by the false claims of 1835 and the unproven assertions of 1838, the Church would have never seen fit to give either Copernicus or Galileo even a tiny pardon. Therefore, the removal from the *Index*, if it was based on the above presumptuous scientific claims, is invalid. (See more detailed analysis of both the 1822 and 1835 decisions later in this book).

As it stands, the debate is far from "closed." Perhaps the only thing closed is the minds of those who believe Galileo was right and the Church was wrong. Not only is Poupard guilty of one-sided thinking, but so are those who worked with him. A typical example is noted in the position of Bernard Vinaty who wrote an article in the volume edited by Poupard on behalf of the 1983 Galileo commission. Even in the face of the primitive scientific evidence Galileo presented, and the rejection of that evidence by Bellarmine and the Holy Office as highly dubious, Vinaty proposes that Galileo, indeed, proved the Earth was in motion and thus insisted that "it is erroneous to maintain that the decisive proof of Copernicanism came only with the first observation

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not been any one who hath found out a certain manifestation either of the one or the other Doctrine" (cited in *Parallax*, Alan Hirshfeld, p. 144.)

[560] James Bradley, "An account of a new-discovered motion of the fixed stars," *Philosophical Transactions*, 35 (1727–28), 637–61.

[561] Owen Gingerich, at St. Edmunds Public Lecture series, titled: "Empirical Proof and/or Persuasion," March 13, 2003, taken from Pierre-Noël Mayaud, S.J., *La Condamnation des Livres Copernicians et sa Révocation: á la lumière de documents inédits des Congregation de l'Index et de l'Inquisition*, ["The Condemnation of the Copernicus' Book and its Revocation: In the Light of Documents Edited by the Index of the Inquisition"] Rome: Editrice Pontificia Universita Gregoriana, 1997, no page number.

[562] See Chs. 3, 8 & 12 in Vol. I of *Galileo Was Wrong: The Church Was Right* for a detailed explanation of parallax in both the heliocentric and geocentric models. See also the *Galileo Was Wrong: The Church Was Right* CDrom of parallax animations.

of the annual parallax of a star by the astronomer Friedrich Bessel."[563]

> **Papal Speech**: 10. From the beginning of the Age of Enlightenment down to our own day, the Galileo case has been a sort of "myth," in which the image fabricated out of the events was quite far removed from reality. In this perspective, the Galileo case was the symbol of the Church's supposed rejection of scientific progress, or of "dogmatic" obscurantism opposed to the free search for truth. This myth has played a considerable cultural role. It has helped to anchor a number of scientists of good faith in the idea that there was an incompatibility between the spirit of science and its rules of research on the one hand and the Christian faith on the other. A tragic mutual incomprehension has been interpreted as the reflection of a fundamental opposition between science and faith. The clarifications furnished by recent historical studies enable us to state that this sad misunderstanding now belongs to the past.

Analysis: The above plea that the Galileo case was all a big "misunderstanding" between science and faith implies the following unstated premise, *i.e.*, that the members of the papal commission went into their investigations having already accepted the belief that the Earth moves around the sun. Thus, the commission was biased and compromised from the start. Moreover, even though the commission concedes that clerics of the 1600s condemned those who proposed a moving Earth, the papal speechwriters believe they can politely wiggle out of the dilemma by pleading ignorance for the Church's part in the fiasco. They do so by making a subtle yet profound reference to "recent historical studies" that have supposedly put this "sad misunderstanding in the past." By the phrase "historical studies," the speech writers are referring to the tenets of historical biblical criticism which began in earnest in Catholic Scripture studies in the late 1880s and which were cautiously permitted for at least some usage after the 1943 encyclical of Pius XII, *Divinio Afflante Spiritu*. Identical to the Scripture that they invariably misinterpreted, Catholic liberals also misinterpreted Pius XII's encyclical, believing that it gave them a *carte blanche* approval to deliteralize any portion of Scripture that suited their desires. In fact, it would be no exaggeration to say that the liberals had been waiting for a little over 300 years (1616-1943) for the Church to relax the requirements for literal interpretation of Scripture in the wake of the Galileo affair. They were convinced that science had proven the Earth moved and thus there was only one sure-fire and face-saving way to coincide that scientific fact with both Scripture and the 17th century Catholic magisterium, and it was an atomic bomb – the Church must declare that literal interpretation of Scripture is not required, and that it speaks with inspiration and inerrancy only in matters of salvation. Even the somewhat conservative *Catholic Encyclopedia* of 1910 took as an *a priori* fact that heliocentrism was correct and thus concluded that

> …it is undeniable that the ecclesiastical authorities committed a grave and deplorable error, and sanctioned an altogether false principle as to the proper use of Scripture. Galileo and Foscarini rightly urged that Holy Writ is intended to teach men to go to heaven, not how the heavens go.[564]

Whatever damage would be sustained to the Church's credibility by her relinquishing of the literal interpretation of Holy Writ that she had depended upon for the 1900 years prior was of little consequence in the minds of the liberals who so desperately craved worldly appeasement, especially the esteem of the scientific community. As they rationalized the dilemma, relinquishing literal interpretation was a small price to pay to save face for the Church. The modern Church could label the 17th century Church as an entity that employed enthusiastic but ignorant clerics who did not have

[563] Bernard Vinaty, "Galileo and Copernicus," in *Galileo Galilei, 350 anni di storia, 1633-1983*, ed. Paul Poupard, Casale Monferrato: Piemme, 1984, p. 42, as cited in *The Church and Galileo*, p. 187.

[564] Article by John Gerard, *Catholic Encyclopedia*, New York, Robert Appleton Publishing, Vol. VI, p. 344. We note here Gerard's attempt to insulate the popes (Paul V and Urban VIII) from direct involvement in the "deplorable error" as he resorts to the euphemistic and vague wording "ecclesiastical authorities" as the culprits in the affair. This is akin to Cardinal Poupard's use of "the errors of the theologians" that was placed in the address of John Paul II to the Pontifical Academy of Science in 1992.

the privilege of being blessed with our "recent historical studies" of the finer art of biblical interpretation. The truth is, of course, that the modern Church caved into the pressure from the *status quo* of modern science and accepted heliocentrism as a fact, which then led her to believe that she had to redo twenty centuries of traditional biblical interpretation. As even Feyerabend observes:

> It is a pity that the Church of today, frightened by the universal noise made by the scientific wolves, prefers to howl with them instead of trying to teach them some manners.[565]

The Church was warned about the "howling" of "historical criticism" by Pope Leo XIII:

> …. There has arisen, to the great detriment of religion, an inept method, dignified by the name of the "higher criticism," which pretends to judge of the origin, integrity and authority of each Book from internal indications alone. It is clear, on the other hand, that in historical questions, such as the origin and the handing down of writings, the witness of history is of primary importance, and that historical investigation should be made with the utmost care; and that in this matter internal evidence is seldom of great value, except as confirmation. To look upon it in any other light will be to open the door to many evil consequences. It will make the enemies of religion much more bold and confident in attacking and mangling the Sacred Books; and this vaunted "higher criticism" will resolve itself into the reflection of the bias and the prejudice of the critics. It will not throw on the Scripture the light which is sought, or prove of any advantage to doctrine; it will only give rise to disagreement and dissension, those sure notes of error, which the critics in question so plentifully exhibit in their own persons; and seeing that most of them are tainted with false philosophy and rationalism, it must lead to the elimination from the sacred writings of all prophecy and miracle, and of everything else that is outside the natural order.[566]

Although the so-called "compatibility" between science and faith had been reached by accepting a moving Earth and non-literally interpreted Scriptures, true compatibility can only be reached by accepting a non-moving Earth and literally interpreted Scriptures. As Bellarmine wrote:

> In Scripture there are many things which of themselves do not pertain to the faith, that is, which were not written because it is necessary to believe them. But it is necessary to believe them because they were written, as is evident in all the histories of the Old Testament, in the many histories in the Gospel and in the Acts of the Apostles, in the greetings of Paul in his Epistles, and in other such things.[567]

But as we have outlined in stark detail in Volume 1, the movers and shakers of the scientific community have shown their outspoken aversion to the possibility of a non-moving Earth, even in the face of scientific evidence that adequately demonstrates the case. Although the evidence for a central and immobile Earth is just dripping from the data, the science community has ignored, silenced,

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[565] *Farewell to Reason*, p. 260. He adds that in the scientific community, "…the idea of free and independent research is a chimera." With regard to "scientific knowledge-claims," Feyerabend notes: "…we have seen that even the liberal climate of the modern age has not prevented scientists from demanding the same kind of authority which Bellarmino possessed as a matter of course but exercised with much greater wisdom and grace." Regarding the Church's "howling with the wolves," he adds: "In 1982 Christian Thomas and I organized a seminar at the Federal Institute of Technology in Zürich with the purpose of discussing how the rise of the sciences had influenced the major religions and other traditional forms of thought. What surprised us was the fearful restraint with which Catholic and Protestant theologians treated the matter – there was no criticism either of particular scientific achievements or of the scientific ideology as a whole" (*ibid*).

[566] *Providentissimus Deus*, 1893, ¶17.

[567] *De controversiis*, I, I, 4, 12, as found in Roberto Cardinal Bellarmino, S. J., *Opera omnia*, cited in Blackwell's *Galileo, Bellarmine and the Bible*, p. 32.

stifled, and ridiculed such evidence as best as it can. Even the Pontifical Academy of Science has shown that its ears are closed to any suggestion that either evolution or heliocentrism are unproven theories, or that creationism and geocentrism (the "sciences" of Scripture) have any scientific evidence to support them. As noted earlier, it is not the scientific evidence that is in dispute; rather, it is the *interpretation* of that evidence from which Faith and Science often divide. As it stands, among scientists, interpretations of the evidence are always colored by biased philosophical and ideological presuppositions and ill-formed prejudices. For example, we noted in Volume 1, when faced with the telescopic evidence that Earth might possibly be in the center of the universe, the renowned astronomer Edwin Hubble was forced by his presuppositions and prejudices to say that such an interpretation of the evidence must be "disregarded," was "unwelcome" and "must be avoided"; it was "intolerable" and a "horror."[568] He quickly devised another theory of the universe just so he would not have to entertain a world with a central and non-moving Earth. Consequently, the scientific ideologues of today have now limited the debate to how the Church can reinterpret the Bible to preserve evolution and heliocentrism rather than encouraging scientists and theologians to interpret correctly the scientific data in order to preserve the literal reading of Scripture.

> **Papal Speech**: 11. From the Galileo affair we can learn a lesson which remains valid in relation to similar situations which occur today and which may occur in the future. In Galileo's time, to depict the world as lacking an absolute physical reference point was, so to speak, inconceivable.

Analysis: As Volume I of our work has shown, we have learned that a universe with an absolute reference point is "inconceivable" to the modern scientific community. Hubble told us it was "intolerable" to have the Earth in the center of the universe. Einstein's biographers said that it was "unthinkable" to conceive of the Earth not being in motion, and many other examples from Sagan to Hawking to Ellis were cited to show that the scientific community not only advocates no absolute reference point, it has an absolute aversion to doing so. Every experiment from Arago, Fresnel, Fizeau, Airy, Michelson-Morley, Miller, *etc*., could have been interpreted very easily as a *bona fide* demonstration of a motionless Earth, but science refused to do so and it ended up having to change the very fundamentals of physics to accommodate their own stubbornness. The reason is very simple. Modern science knows that if it admits to an absolute reference point or that Earth is motionless in the center of the universe, this could not have happened by chance. *Someone* would have had to place it there. They have all admitted it. This is no secret. But it is, indeed, a horrible thought to an atheist or an agnostic. It takes away any excuse he has for denying the existence of God, and most men simply will not accept being trapped in such a proverbial corner.

> **Papal Speech**: And since the cosmos, as it was then known, was contained within the solar system alone, this reference point could only be situated in the earth or in the sun. Today, after Einstein and within the perspective of contemporary cosmology neither of these two reference points has the importance they once had. This observation, it goes without saying, is not directed against the validity of Galileo's position in the debate; it is only meant to show that often, beyond two partial and contrasting perceptions, there exists a wider perception which includes them and goes beyond both of them.

Analysis: As we noted in Volume 1, what most people do not know and what modern science is not willing to admit to them is that Einstein's theory was invented precisely to counter dozens of experiments performed in the 1800s and 1900s that clearly demonstrated, as one viable interpretation, that the Earth was motionless in space. In other words, the experimental evidence could just as easily be interpreted to be against Einstein's theory as for it. The science community did everything it could to cover up this fact. The choice became clear: Einstein or the Church; Relativity or Scripture. One said everything was moving, the other said one object was motionless. One said matter shrinks, mass

[568] "Therefore we disregard this possibility.…the unwelcome position of a favored location must be avoided at all costs....such a favored position is intolerable...Therefore, in order to restore homogeneity, and to escape the horror of a unique position…must be compensated by spatial curvature. There seems to be no other escape" (*The Observational Approach to Cosmology*, Clarendon Press, 1937, pp. 50, 51, 58).

increases and time slows down; the other said nothing has changed and never will. The only significant thing that Einstein added to the debate was, ironically, to take the foundation out of heliocentrism, since in Einstein's world it is just as correct to say the sun revolves around the Earth as it is to say the Earth revolves around the sun, and therefore geocentrism cannot be discounted. Hence, the very answer that modern science invented in order to save itself from geocentrism is the very theory that allows geocentrism in the back door as the best alternative.

> **Papal Speech**: 12. Another lesson which we can draw is that the different branches of knowledge call for different methods. Thanks to his intuition as a brilliant physicist and by relying on different arguments, Galileo, who practically invented the experimental method, understood why only the sun could function as the center of the world, as it was then known, that is to say, as a planetary system.

Analysis: We have seen in Chapter 11 that Galileo, though he had some high points in his life, was hardly a "brilliant physicist." The so-called "arguments" (*e.g.*, the tides) he presented to the pope and the Holy Office were those that even he knew were specious. Other claims, such as the four moons circling Jupiter that he is purported to have discovered, do not prove heliocentrism. The circling moons only prove that the center of mass of that system is situated closer to Jupiter than it is to the four moons. But there is no proof from Galileo or anyone else that the Earth cannot serve as the center of mass for the universe. Modern science has shown us by its own mathematics that such a model is highly possible, and it would be the only such instance, since there can be only one center of mass for the whole universe. This location would make Earth the unique place that Scripture indicates it is, an "unthinkable" alternative for modern science.

> **Papal Speech**: The error of the theologians of the time, when they maintained the centrality of the earth, was to think that our understanding of the physical world's structure was, in some way, imposed by the literal sense of Sacred Scripture.

Analysis: This is the most problematic sentence in the entire speech. As we noted previously from remarks made by Fr. Coyne (a member of the 1981 Galileo commission for science and epistemology), the speech makes a deliberate attempt to blame the entire matter on nameless "theologians" of the past. Three times the speech refers to these unidentified "theologians" as the cause of the problem as if there was some tremendous difference between what the theologians were teaching and what the magisterium was upholding. In reality, there was no disagreement. It was the Catholic magisterium that put its full weight behind the condemnation of Copernicus, Foscarini, Galileo, Kepler and any other would-be entrepreneur that invented a cosmological model to overturn geocentrism. Galileo was told directly by Pope Urban VIII in 1633 that his opinion that the Earth moved around the sun was "an absurd proposition and false in philosophy and formally heretical," to the point that he sought the help of the Grand Duke of Tuscany to help him silence Galileo.[569] Pope Paul V was heavily involved in 1616 creating the canonical injunction forbidding Galileo to speak or write about Copernicanism. His papal commission of eleven cardinals found that heliocentrism was "a proposition that was absurd in philosophy and formally heretical, which contradicts the express meaning of Sacred Scripture in many places."[570] Every pope thereafter, barring incidents of clerical chicanery, made the same or similar requirements, and no pope ever made a formal and

[569] The 1633 sentence against Galileo stated that heliocentrism was: è propositione assurda e falsa in filosofia, e formalmente heretica ("an absurd proposition and false in philosophy and formally heretical") cited in *Galileo E L'Inquisizione*, Favaro, p. 143. As we will see later, Maurice Finocchiaro's *The Galileo Affair* has one of the better confirmations of Urban's appeal. In the chapter titled "Diplomatic Correspondence 1632-1633" he shows that the bulk of the correspondence was between Pope Urban VIII and the ambassador to the Duke of Tuscany, Francesco Niccolini, detailing Urban's outright rejection of Galileo's assault on "Holy Scripture, religion, and Faith," wherein Urban implored the Duke to help in "shielding Catholicism from any danger" because "this work of his is indeed pernicious, and the matter more serious than his Highness thinks" (*ibid.*, pp. 232, 235, 236, quotes taken directly from Urban VIII as recorded in *Le Opere di Galileo Galilei*, vol. 14, pp. 388-393).

[570] "…dictum propositionem esse stultam et absurdam in philosophia, et formaliter haereticam, quatenus contradicit expresse sententiis Sacrae Scripturae in multis locis…" (*Le Opere di Galileo Galilei*, Favaro, vol. 19, p. 321).

official reversal of the condemnation of either Copernicanism or Galileo. If anything, the "theologians" were a secondary part of the whole process, since they had no authority, save by the pope and his Holy Office, to force their will on Galileo.

As for the comment that it was an "error" for these theologians to believe that "Scripture imposed itself on the structure of the physical world," far from exonerating Cardinal Bellarmine as the papal speech attempted to do earlier, it has inadvertently derogated him as a blundering cleric for having ever confronted Galileo with the argument that his Earth-moving universe was "opposed to Scripture." The popes who endorsed Bellarmine's hermeneutic were also in error for not stopping Bellarmine from using such a fallacious argument. In fact, the Church for a dozen decades and counting was likewise totally deceived into thinking that literal interpretation was the right approach to Scripture and it should have realized that, perhaps, Galileo was sent from heaven, as it were, to tell them they had it all wrong. In fact, the whole Church, from the time of the Fathers onward for 1500 years had it all wrong because they mistakenly believed that cosmology could not be "opposed to Scripture." How is it that such a pernicious and damnable "error" could have ever entered the Church so many centuries earlier and yet not be realized until some genius presented a specious argument that the tides could only be caused by a rotating Earth? How is it that not until two hundred years after Galileo's "evidence," the Church, which is supposed to be led by the Holy Spirit, did not even catch its own "error" until it granted an imprimatur in 1822 to a Canon who whose censor cooked the books in favor of Copernicus but forgot to take him off the *Index*? How is it possible that the hermeneutic of accepting what was "imposed by the literal sense of Sacred Scripture," which worked so well in recognizing doctrines such as the Holy Eucharist ("This is my body") and Baptismal Regeneration ("Unless a man be born of water") and many other precious distillations from Sacred Scripture, could suddenly become so erroneous a methodology when applied to celestial motion that the modern Church finds itself constantly wringing its hands over the past and feels compelled to introduce new fangled interpretive schemas that have virtually destroyed the Church from within? For the 1981 papal commission to use such weak and illogical arguments to save face for themselves is indeed a travesty.

For those who believe that the Church of the 1600s erred in the Galileo case, they need to ask themselves one very important and logical question: Is it the case that the Congregation of the Holy Office, which was put in place by Paul III one hundred years earlier to protect the Church from error, is the very institution that itself falls into error; which falls headlong into one of the most serious and pernicious breaches ever committed in human history concerning one of the most fundamental of tasks given to the Church – the interpretation of Scripture?

Additionally, if the 17th century Church was wrong about the interpretation of Scripture, then, although the 1992 papal speech attempts to deflect the blame for the error from off the magisterium by such calculated phrases as "the error of the theologians," is this not itself an error for failing to put the blame squarely where it should be – on the very popes and cardinals who authorized it with the full weight of their magisterial offices? In effect, one falsehood (the error of the Inquisition against Galileo) has led to a second falsehood (the papal speech's failure to expose the true perpetrators). Consequently, the very institution the modern Church sought to protect is the very institution that it destroys.

The only solution is for the modern Church to admit that the 17th century Church was correct, and the same Church is required to make it an officially recognized fact for the rest of the Church's faithful. Otherwise, both the 17th century Church and the 21st century Church will be in error, and, unfortunately, barely able to be trusted again with anything short of a clear and unequivocal infallible declaration of doctrine on any subject it touches.

> **Papal Speech**: Let us recall the celebrated saying attributed to Baronius "Spiritu Sancto mentem fuisse nos docere quomodo ad coelum eatur, non quomodo coelum gradiatur."

Analysis: This is the famous statement often translated as: "The Holy Spirit tells us how to go to heaven, not how the heavens go." In some colloquial versions "Holy Scripture" replaces "Holy Spirit". The speech says that it has been "attributed" (original: "attribuita") to Cardinal Baronius because no exact quote exists from Baronius' writings.[571] In

any case, it is not indicative of any magisterial decree or even an authoritative statement, but a mere cliché that may have been circulating in the pro-Galilean *Accademia die Lincei* circles during the controversy. It has no more weight than any other opinion that was being propagated at that time, and thus it is quite out of place in a 1992 papal address. Cardinal Poupard's resorting to such innocuous statements perhaps shows the pressure he was under to provide some historical evidence for the assault on the literal interpretation of Scripture. More to the point, however, is that Baronius' statement is not true. No one in the whole history of Catholic Scripture study up to that point had ever uttered such a presumptuous disclaimer on the domain of either the Holy Spirit's teaching or the content of Holy Writ. Baronius' quip can easily be countered with one that Robert Bellarmine was sure to have thought: "The Holy Spirit tells us how the heavens go, as well as how to get to heaven." Unfortunately, however, the papal speech has made delinquents of all the exegetes of the Church who lived prior to and in the time of the cliché of Cardinal Baronius. If the Bible does not concern itself with "how the heavens go" then why did the Fathers of the Church, in unanimous consent, believe it to be so, and why did Cardinal Bellarmine and his fellow cardinals, with the popes afterwards who for decades sanctioned their verdicts against Galileo, ever dare say that, because it was spoken by the Holy Spirit, a motionless Earth and a moving sun were "a matter of faith"? As we noted in Chapters 12 and 13, celestial motion centered on an immobile Earth permeates the divine record, from the Pentateuch to the Deuterocanonicals and everything between them.

> **Papal Speech**: In fact, the Bible does not concern itself with the details of the physical world, the understanding of which is the competence of human experience and reasoning. There exist two realms of knowledge, one which has its source in Revelation and one which reason can discover by its own power. To the latter belong especially the experimental sciences and philosophy. The distinction between the two realms of knowledge ought not to be understood as opposition. The two realms are not altogether foreign to each other, they have points of contact. The methodologies proper to each make it possible to bring out different aspects of reality.

Analysis: The veracity of this statement depends on what is meant by "details." It is certainly true that the Bible does not get into the minutia of the scientific machine, but it does address the macro world quite handily. The six days that God has given him to labor, it is man's quest to determine how the components of the universal machine works, that is, once he knows the basic macro-structure given to him by God. If he is wrong on the macro structure, he will either be wrong on the details, or he will amass a numerous amount of details without ever being able to put them together in a unified whole. This has been the failure of man ever since the Enlightenment's rationalistic philosophy made him think he could amass enough particulars to make his own universals. Modern man found out to his utter dismay that this was an impossible task. The universals must be given to him, and even some details must be added as well, otherwise man will be very confused in his intellectual pursuits. The "human reasoning and experience" to which the speech refers has severe limitations. In fact, the most important thing our reason should tell us is that we can be very wrong in our conclusions about the world if we do not start out with the right foundation. Our reasoning should lead us to realize that we can never figure out everything by our own reason, and thus our reason should lead us to revelation as our guiding help. Reason that seeks help from revelation is the only reasonable option for finite man. Our reason should lead us to ask why Scripture pays such an inordinate amount of time describing the cosmos if, as we are convinced by modern academia today, it did not consider it an important foundation for our understanding of the

[571] Galileo wrote it quite poetically in his native Italian to Madama Cristina di Lorena: "…ciò è l'intenzione dello Spirito Santo essere d'insegnarci come si vadia al cielo, e non come vadia il cielo" ("that is the intention of the Holy Spirit which is to teach us how to go to heaven, and not how the heavens go") and attributes it as coming from "Io qui direi quello che intesi da persona ecclesiastic constituita in eminentissimo grado" ("Here I refer to the understandings of an ecclesiastical person in a very eminent position"), who most suppose is Cardinal Cesare Baronio (*Le Opere di Galileo Galilei*, 1968, vol 5, p. 319, lines 25-28). Stillman Drake claims that "a marginal note by Galileo assigns this epigram to Cardinal Baronius" who "vistited Padua with Cardinal Bellarmine in 1598, and Galileo probably met him at that time" (*Discoveries and Opinions of Galileo*, p. 186).

world. As we noted earlier in Chapter 12, Scripture is so certain about the existence of an immobile Earth that it even uses that fact to vouch for God's veracity and faithfulness. Both are immovable rocks that cannot be disturbed, and thus one testifies to the strength of the other, all for our benefit.

As for the papal speech's comment that "the latter belong to the experimental sciences and philosophy," it is a fact that scientific experiments can be misinterpreted just as easily as Cardinal Poupard believes the Bible can be misinterpreted. Experimental science is not an end in itself. There is no monolithic consensus of belief among scientists about even the most general of issues. As we noted in Chapter 11, scientists continually fight and disagree with one another over some of the most basic issues. The only thing upon which they all seem to agree is that they want science to be their answer and religion to take a back seat. Modern academia has already made up its mind how it wants to interpret the scientific data and understand the world, and in that particular understanding it has little toleration for the propositions of religion.

> **Papal Speech**: III. 13. Your Academy conducts its work with this outlook. Its principal task is to promote the advancement of knowledge with respect for the legitimate freedom of science(8) which the Apostolic See expressly acknowledges in the statutes of your institution.
>
> What is important in a scientific or philosophic theory is above all that it should be true or, at least, seriously and solidly grounded. And the purpose of your Academy is precisely to discern and to make known, in the present state of science and within its proper limits, what can be regarded as an acquired truth or at least as enjoying such a degree of probability that it would be imprudent and unreasonable to reject it. In this way unnecessary conflicts can be avoided.

Analysis: Freedom always assumes responsibility, and it requires one to know the boundaries of one's freedom. Science has freedom within the constraints of science, but science does not have the freedom to impose its unproven theories on religion. In fact, science has provided very little proof for its many and varied theories. It has barely scratched the surface in understanding this very complicated world in which we live. It is high time for science to cease thinking that it has all the answers to life and the cosmos, or that it will ever attain anything close to complete knowledge on its own. This is why Pius X said the following:

> Human science gains greatly from revelation, for the latter opens out new horizons and makes known sooner other truths of the natural order, and because it opens the true road to investigation and keeps it safe from errors of application and of method. Thus does the lighthouse show many things they otherwise would not see, while it points out the rocks on which the vessel would suffer shipwreck.[572]

The fact is, science continually overturns science, and the overturning always occurs when the previous science was not built on the proper foundation. Like a hurricane coming through a Midwest town, a scientific edifice can be destroyed overnight if it is built on a faulty foundation. Geocentric science, which has only mounted its opposition with sophistication in the last fifty years or so, is on the horizon to overturn anti-geocentric science. The difference between the two camps is that geocentric science has the proper foundation, for it is built on divine revelation, patristic consensus and magisterial authority, all of which coincide with the scientific evidence that is now being discovered on a daily basis. Here, as always, proper interpretation of the scientific data is needed. When a scientist is confronted with evidence that the Earth is in the center of the universe, he is not permitted to hide his head in the sand like the proverbial ostrich complaining that such a conclusion is "intolerable" and "must be avoided at all costs," as Edwin Hubble did in the 1930s. If he sees evidence from numerous experiments that the Earth may not be moving in space, he cannot dismiss it and claim that such conclusions are "unthinkable," as Albert Einstein did in 1905, developing a whole new and convoluted science of physics just to avoid the possibility of a fixed Earth. The scientific evidence shows that there is, indeed, a high "degree of probability" that the Earth is central and immobile, but modern academia refuses to listen. It needs the guiding hand of religion to keep it honest, forcing it to interpret the

[572] Pope Pius X, encyclical of March 12, 1904, *Iucunda Sane*, 35.

scientific data with integrity, without bias and prejudice against the tenets of religion. At the least, it should offer both possibilities to its students. But that is not what we see today. Modern science has taken the cosmos as its prisoner and will not let anyone register a dissenting opinion in the halls of academia.

> **Papal Speech**: The seriousness of scientific knowledge will thus be the best contribution that the Academy can make to the exact formulation and solution of the serious problems to which the Church, by virtue of her specific mission, is obliged to pay close attention to problems no longer related merely to astronomy, physics and mathematics, but also to relatively new disciplines such as biology and biogenetics. Many recent scientific discoveries and their possible applications affect man more directly than ever before, his thought and action, to the point of seeming to threaten the very basis of what is human.
>
> 14. Humanity has before it two modes of development. The first involves culture, scientific research and technology that is to say whatever falls within the horizontal aspect of man and creation which is growing at an impressive rate. In order that this progress should not remain completely external to man, it presupposes a simultaneous raising of conscience, as well as its actuation. The second mode of development involves what is deepest in the human being, when transcending the world and transcending himself, man turns to the One who is the Creator of all. It is only this vertical direction which can give full meaning to man's being and action, because it situates him in relation to his origin and his end. In this twofold direction, horizontal and vertical, man realizes himself fully as a spiritual being and as homo sapiens. But we see that development is not uniform and linear, and that progress is not always well ordered. This reveals the disorder which affects the human condition. The scientist who is conscious of this twofold development and takes it into account contributes to the restoration of harmony.

Analysis: As we detailed the statistics in Chapter 11 of Volume II, the sad fact is that most of mainstream science does not endorse the "twofold development."

> **Papal Speech**: Those who engage in scientific and technological research admit as the premise of its progress, that the world is not a chaos but a "cosmos" – that is to say, that there exist order and natural laws which can be grasped and examined, and which, for this reason, have a certain affinity with the spirit. Einstein used to say: "What is eternally incomprehensible in the world is that it is comprehensible."(9) This intelligibility, attested to by the marvelous discoveries of science and technology, leads us, in the last analysis, to that transcendent and primordial Thought imprinted on all things.

Analysis: As we also detailed in Chapter 11, Einstein did not believe in a personal God, and because of his disbelief his moral life was almost totally bankrupt. Divorce, adultery, child abandonment, plagiarism and other moral deficiencies plagued him his whole life. In addition, we have seen from the scientific evidence that Albert Einstein, when faced with two possible solutions to both Maxwell's equations and the Michelson-Morley experiment, refused to accept the biblical one, which had the Earth motionless in space and kept physical laws the same. Instead, Einstein chose the solution that put the Earth in motion and necessitated a total revamping of physics. Moreover, the papal speech should be more forthright. Einstein's world is hardly "comprehensible." A haunted and uncertain world in which one twin ages faster than the other, where one clock slows down and the other speeds up, where objects shrink and their mass increases when moved, where everybody is in motion and no absolute place exists from which to measure their distances, where up is down and left is right, where mass is energy and force is imaginary. This bizarre menagerie is what is presented as the "comprehensible" world of Albert Einstein, the very world he was required to create in the minds of gullible men in order to keep the Earth moving in space in spite of the scientific evidence that said it was motionless.

> **Papal Speech**: Ladies and gentlemen, in concluding these remarks, I express my best wishes that your research and reflection will help to give our contemporaries useful directions for building a harmonious society in a world more respectful of what is human. I thank you for the service you render to the Holy See, and I ask God to fill you with his gifts.[573]

The Church Confronts Copernican Cosmology: 1500-1600

Why is it that the 1992 papal speech could not make an official break with its 17th century counterparts, or make a definitive case for Galileo and against geocentrism? Why was the papal speech high on ambiguities and dismissives but weak on answers and authoritative declarations? The reason, as we shall see, was that the predecessors of John Paul II were very direct and authoritative in the opposite vein. It is an inevitable fact of ecclesiastical protocol that the stronger the papal decisions of the past, the more accommodating to them must be those in centuries following. Rest assured, the Catholic Church has never officially declared that its previous popes and cardinals were in error over the Galileo case, and rest assured it never will.

One of the more interesting facts about the Galileo affair is that it was not the first time the Catholic Church confronted someone who wanted to change the traditional cosmology. In fact, considering the numerous episodes of this cosmological contention that occurred prior to Galileo, we might say that by the time Galileo came on the scene the Church was more or less fed up with theologians and mathematicians taking pot shots at geocentrism, and thus the axe finally came down on the unfortunate mathematician from Linceo. As we noted in Volume I, although it is true that Copernicus did not publish his *De revolutionibus* until the year he died (1543), and reportedly allowed Osiander to put a disclaimer on his work indicating that it was hypothetical, like Galileo after him, Copernicus himself did not wish to leave heliocentrism a mere mathematical possibility. His statements to Pope Paul III refer to opponents of heliocentrism as "idle talkers who take it upon themselves to pronounce judgment, although wholly ignorant of mathematics" and he accuses them of "shamelessly distorting the sense of some passage in Holy Writ to suit their purpose, they dare to reprehend and to attack my work."[574] These are not the words of a timid scholar who proposes a mere hypothetical model of the universe to fix the calendar and resign himself to carrying the burden of proof for a new theory; rather, it is someone whose convictions are very strong and who does not appreciate being underminded by those he considers ignorant of the truth and less than his equal.

One of Copernicus' close friends, Georg Joachim Rheticus (a homosexual who eventually severed ties with Copernicus after having been double-crossed by him) was pushing heliocentrism with even more vigor than Copernicus. Where Copernicus showed at least some reluctance to publish his final work, Rheticus greased the wheels by alerting Osiander who quickly fashioned the famous "hypothetical" disclaimer for Copernicus. Rheticus' verve came from his own heliocentric convictions, which he had published two years earlier, in 1541. In it Rheticus attacks what he senses is the prime battle ground of the controversy, assuring his readers that we should see "very clearly…that the motion of the earth does not contradict the Holy Scriptures."[575] He adds:

[573] Footnotes of the 1992 papal speech: (1) AAS 71 (1979), pp. 1464-1465. (2) Letter of 21 November 1613, in Edizione nazionale delle Opere di Galileo Galilei, dir. A. Favaro, edition of 1968, vol. V, p. 282. (3) Letter to Christine de Lorraine, 1615, in Edizione nazionale delle Opere di Galileo Galilei, dir. A. Favaro, edition of 1968, vol. V, pp. 307-348. (4) Letter to Fr. A. Foscarini 12 April 1615, *cf.* Edizione nazionale delle Opere di Galileo Galilei, dir. A. Favaro, vol. XII, p. 172. (5) Saint Augustine, *Epistula* 143, n. 7 PL 33, col. 588. (6) Leonis XIII Pont. Max. Acta, vol. XIII (-1894), p. 361. *Cf.* Pontificia Academia Scientiarum Copernico, Galilei e la Chiesa. (7) Fine della controversia (1820). Gli atti del Sant'Ufficio, a cura di W. Brandmuller e E. J. Griepl, Firenze, Olschki, 1992. (8) *Cf.* Second Vatican Ecumenical Council, Pastoral Constitution Gaudium et spes, n. 36, par. 2. (9) In The Journal of the Franklin Institute, vol. 221, n. 3, March 1936.

[574] Charles Wallis, *On the Revolution of the Heavenly Spheres*, Preface and Dedication to Pope Paul III, p. 7.

[575] The words of Tiedeman Giese in his letter to Rheticus of July 26, 1543 that are included in Copernicus' *Briefe Texte*, letter no. 194, 359, the original Latin being: "opusculum tuum, quo a sacrarum scripturarum dissidentia aptissime vindicasti telluris motum." Cited in *The Church and Galileo*, p. 27.

> From all this it is plain that it cannot be proved from the sacred writings that the earth is immobile. Therefore, he who assumes its mobility in order to provide a reliable calculation of times and motions is not acting against Holy Scripture."[576]

Rheticus is so sure of himself that he concludes:

> since…the motion of the earth may be considered as demonstrated truth, we need not fear that more balanced and learned judges will ascribe the marks of impiety to us.

Ironically, he uses the same argument about God's omnipotence that Urban VIII would use against Galileo, but in support of heliocentrism:

> Furthermore, there will not be lacking those who will bellow that it is monstrous to attribute movements to the earth, and who will take occasion to draw on and display their wisdom taken from the philosophers of nature. They are ridiculous, as if God's power could be measured by our capacities or our intellect. Are we to think that anything is impossible for God, who, by his Word, made the whole natural order out of nothing? Are we to tie God to the disputations of the Peripatetics.[577]

Rheticus' works, including the earlier pro-Copernican work, *Narratio prima*, were all placed on the *Index of Forbidden Books* published between 1559-1593, with a subsequent suppression of *Narratio* ordered by the Inquisition in 1598.[578] Tiedeman Giese (d. 1550), Bishop of Culm, whom Copernicus cites in his *Dedication to Paul III* as "my devoted friend…urged me…into publishing this book," had published his own book in 1536, titled *Hyperaspisticon*, taking the same course as Rheticus, that is, that Scripture was compatible with heliocentrism. Similarly, Nicholas Schöenberg, Cardinal of Capua, whom Copernicus refers to as "a man distinguished in all branches of learning," was also a supporter of the novel cosmology. Prior to these figures were Nicolas Oresme, Bishop of Lisieux (d. 1382)[579] who suggested that the Earth might be rotating, and Nicholas of Cusa, Bishop of Brixen (d. 1464)[580] who posited that the Earth was

[576] Rheticus' book was later published in 1651 by Johannes van Waersberge with the title *Cujusdam anonymi epistola de terrae motu*. A Latin text with an English translation has been published with the title: *G. J. Rheticus' Treatise on Holy Scripture and the Motion of the Earth*, Reyer Hooykaas, Amsterdam, North-Holland, 1984, as cited in *The Church and Galileo*, pp. 13, 27. But as Lerner notes: "This does not prevent him…from seeking to impose a heliocentric interpretation on certain passages of Scripture; here he sometimes goes well beyond the limits of the plausible" which "ran contrary…to the principle of accommodation that he had himself first called upon in his defense against the critics of Copernicanism. Rheticus does recognize, however, that the passages of Scripture quoted by him as implicitly heliocentric contain only 'obscure allusions' to the motion of the earth" (*ibid*., "The Heliocentric 'Heresy,'" p. 13). Moreover, apparently, Rheticus also didn't think Holy Scripture was against his homosexual lifestyle, a common result from those who insist that various face-value propositions in Scripture can be demoted to something less than a literal meaning.

[577] *Cujusdam anonymi epistola de terrae motu*, p. 44, as cited in *The Church and Galileo*, pp. 12-13, 27.

[578] Lerner notes that the suppression of *Narratio prima* was "recently discovered" in a "document from the Arch episcopal Curia of Naples."

[579] Oresme's specific assertion was that the Earth might rotate on an axis. His works were, *Traité de la sphère*, later printed in Paris with the second edition published in 1508, and *Traité du ciel et du monde*, published in 1377, his heliocentric views are expressed in chapters 24 and 25.

[580] From his book *De docta ignorantia* ("Learned Ignorance"). Based on his concept of an infinite universe, Cusa argues: "…it is impossible for the machine of the world to have any fixed and motionless center; be it this sensible earth, or the air, or fire or anything else. For there can be found no absolute minimum in motion, that is, no fixed center, because the minimum must necessarily coincide with the maximum….The world has no circumference, because it is had a center and a circumference, and thus had a beginning and end in itself, the world would be limited in respect to something else….The earth, therefore, which cannot be the center, cannot be lacking in motion; but it is necessary that it move in such a way that it could be moved infinitely less. Just as the earth is not the center of the world, so the sphere of the fixed stars is not its circumference….Thus it is the blessed God who is the center of the world" (Alexander Koyré, *From the Closed World to the Infinite Universe*, 1957, pp. 11-12). We might say that Cusa was

moving in some fashion, although not specifically by rotation or revolution. Naturally, both Oresme and Cusa claimed that they were not required to interpret Scripture literally.

For **Pope Paul III**, having the historical distinction of forming the Congregation of the Roman Inquisition in 1542 for the precise purpose of defending the Catholic Church from heresy,[581] the time was growing ripe for a confrontation with those who were teaching that Scripture need not be interpreted literally when it addressed issues of cosmology. The fact that Copernicus' book, *De revolutionibus*, was printed by a Lutheran who also had printed other non-Catholic works that the Inquisition had censured, added a flavor of animosity to the issue that only religious disputes can generate. Bartolomeo Spina, the Master of the Sacred Palace from 1542 until his death in 1547, sought to have Copernicus' book banned, which was eventually carried out by his Dominican colleague Giovanimaria Tolosani, who died two years later in 1549. Apparently, Osiander's "hypothetical" disclaimer did not persuade these particular censors. Similar to Copernicus' effort to persuade Paul III, Tolosani wrote a detailed geocentric treatise in 1546, which he dedicated to Paul III and which included an endorsement from Spina. In it Tolosani vehemently rejected Copernicus' universe and declared it an extreme danger to the faith precisely because of its attempt to deliteralize Sacred Scripture.[582]

As the 16th century reached the midway point, the staunchest anti-Copernican of the day was the Jesuit Christoph Clavius (d. 1612). He writes in his highly esteemed work:

> We conclude, then, in accordance with the common doctrine of the astronomers and the philosophers, that the earth lacks any local motion, either rectilinear or circular, and that the heavens themselves revolve continually round it…. Holy Scripture is also in favor of this doctrine, stating in a great number of places that the earth is stationary. It also bears witness to the fact that the sun and the other heavenly bodies are in motion.[583]

Pius V and the 1566 Catechism of the Council of Trent

One of the clearest official and authoritative statements from the Catholic Church defending the doctrine of geocentrism comes from the catechism issued under a decree of **Pope Pius V**, known as *The Catechism of the Council of Trent* or more simply, *The Roman Catechism*. It states:

> …He also gave to the sun its brilliancy, and to the moon and stars their beauty; and that they might be for signs, and for seasons, and for days and years. He so

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the first Relativist to express his thought in relativistic terms.

[581] Also known as the Congregation of the Holy Office or the Sacred Congregation. In 1965, Pope Paul VI changed the name to the Congregation for the Doctrine of the Faith.

[582] The work's title is: *On the Highest Immobile Heaven and the Lowest Stable Earth, and All Other Movable Heavens and Intermediate Elements*. Tolsani insisted Copernicus' teaching "could easily provoke discord between Catholic commentators on Holy Scripture and those who have resolutely decided to follow this false opinion. It is in order to avoid such scandal that we have written this short work" (English translation of the French translation *Aux origins*, p. 708, cited in *The Church and Galileo*, pp. 15-16).

[583] *In Sphaeram Ioannis de Sacro Bosco Commentarius*, Rome 1570, pp. 247-248, cited in *The Church and Galileo*, p. 18, 31. Clavius uses Psalms 19:5-6; 104:5 and Ecclesiastes 1:4-6 for his main support. See also: James Lattis' *Between Copernicus and Galileo*: *Christoph Clavius and the Collapse of Ptolemaic Cosmology*, University of Chicago Press, 1994.

> ordered the celestial bodies in a certain and uniform course, that nothing varies more than their continual revolution, while nothing is more fixed than their variety.[584]

Although this wording is somewhat brief, it correctly describes the Church's historical position. It states very clearly that the "sun…the moon and stars" are "celestial bodies" which move with a "certain and uniform course" and does not say that the Earth moves among them. Rather, to expel any doubt about what objects are revolving the catechism adds that the sun, moon and stars have a "continual revolution." Although the unspecified reference to "revolution" might cause a heliocentrist to infer that the sun's revolution does not necessarily mean it is revolving around the Earth, a few pages later the catechism disallows that inference by stating the following:

> The earth also God commanded to stand in the midst of the world, rooted in its own foundation and made the mountains ascend, and the plains descend into the place which he had founded for them.…[585]

The Roman Catechism then says the following toward the end of the book:

> But though God is present in all places and in all things, without being bound by any limits, as has been already said, yet in Sacred Scripture it is frequently said that He has His dwelling in heaven. And the reason is because the heavens which we see above our heads are the noblest part of the world, remain ever Incorruptible, surpass all other bodies in power, grandeur and beauty, and are endowed with fixed and regular motion.[586]

A few pages later the Catechism confirms its cosmology and the God who designed it:

> …all goods both natural and supernatural, must be recognised as gifts given by Him from whom, as the Church proclaims, proceed all blessings. If the sun by its light, if the stars by their motion and revolutions, are of any advantage to man; if the air with which we are surrounded serves to sustain us...nay, those very causes which philosophers call secondary, we should regard as so many hands of God, wonderfully fashioned and fitted for our use, by means of which He distributes His blessings and diffuses them everywhere in profusion.[587]

One of the more significant facts regarding the Roman Catechism's dogmatic assertion of

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[584] *The Roman Catechism, The Catechism of the Council of Trent*, translated by John A. McHugh, O.P. and Charles J. Callan, O.P., Tan Publishing, 1982, p. 27. This particular translation has a Nihil Obstat and Imprimatur, issued January 1923. The 1829 version says the same: "[God] so ordered the celestial orbs in a certain and constant course, that nothing can be seen more variable than their continual revolution, nothing more certain than that variety" (*Catechism of the Council of Trent*, Article 16, Chapter 2, translated by Fr. O'Donovan, Dublin, James Duffy and Sons, n. d., p. 38).

[585] *Ibid*., p. 28. The 1829 version reads: "God also, by his word, commanded the earth to stand in the midst of the world, 'founded upon its own basis'" (Article 18, Chapter 1). NB: the word "world" is from the Latin *mundus*, which means "universe." The clause "founded upon its own basis" may refer to the fact that, if the Earth were the universe's center of mass, it would be independent of all inertial forces, remaining in the center while neither resting upon or suspended by any force or object. As Job 26:7 says: "He…hangs the earth upon nothing."

[586] *Ibid*., pp. 511-512.

[587] *Ibid*., p. 516.

geocentrism is that it remained unchanged in all subsequent editions, including the last Roman Latin version in 1907 and the 1914 edition published in Turin, which, incidentally, was just three years before the Fatima visions of 1917 showing the sun moving in the sky. Obviously, no editor saw fit to remove the geocentric teaching from the catechetical regimen of Catholic doctrine. The introduction states:

> The original manuscript of the Catechism is not extant. But of the innumerable Latin editions that have appeared, the earliest are: The Manutian (Rome, 1566), so called because it was printed by Paulus Manutius by command of Pope Pius V….Among later Latin editions may be mentioned the following issued at Rome: The edition of 1761, which contains the Encyclical of Clement XIII on the excellence and use of the Roman Catechism; the Propaganda editions of 1858, 1871 and 1907.[588]

Also highly significant is the fact that the Roman Catechism makes a point of not only reiterating the dogmatic decrees from the Council of Trent, but its purpose was also to "examine every statement in the Catechism from the viewpoint of doctrine,"[589] which requires us to conclude that among the statements subjected to the prescribed analysis were the four geocentric catechetical teachings noted above. This is a clear indication that Pius V understood geocentrism as Catholic doctrine.

Despite the clear wording of Trent's catechism, the pressure from the Copernicans was great and scholars vacillated between geocentrism and heliocentrism. In 1584, Didacus à Stunica (d. 1600), a professor of Scripture at Osuna and Toledo, wrote in his *In Iob commentaria*[590] an exegesis of the cosmological passages in the book of Job. At this particular time, Stunica had accepted the heliocentric model because he was convinced that it helped astronomers to calculate the length of the year and the rate of the precession of equinoxes. Hence Stunica argued, for example, that Job 9:6 ("who shakes the earth out of its place, and its pillars tremble") could be interpreted as portraying the mighty power of God that would be needed to move the massive Earth around the sun. As we noted in Chapter 12, however, Job 9:6 actually strengthens the geocentric argument, since in specifying "pillars" the verse is only speaking about the internal tremblings of the Earth, in addition to the fact that the verse presupposes the Earth is already locked in place if it has to go through a temporary shaking. As determined as he was to interpret Job in a literal manner, Stunica spiritualized other passages. For Ecclesiastes 1:4 ("A generation goes, and a generation comes, but the earth remains for ever. The sun rises and the sun goes down, and hastens to the place where it rises") he argued that it did not refer to Earth's immobility but to its unchanging nature in contrast to the vacillations of human life; and that the movement of the sun was to be understood as speaking in the common language of the people. But in 1597 Stunica published his *Philosophiae prima pars* that rejected his previous view that the Earth moved. Stunica realized that, for all the arguments that Copernicus put forth as having the sun at the center, they could be explained equally well with the Earth at the center. Moreover, regarding the rotation of the Earth he stated:

> The motion that is most difficult to accept and that makes the opinion of the motion of the earth seem absurd to me is that whereby the whole earth is turned in rotation in the space of twenty-four hours.[591]

Even though Stunica had changed his mind, his previous work advocating heliocentrism was included in the condemnation of Galileo in the March 5, 1616.

Following Stunica was Juan de Pineda (d. 1637) with his 1600 work *Commentaria in Job libri tredecim*, and Jean Lorin (d. 1634) in his 1605 work *In Acta Apostolorum commentarii*. The most

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[588] *Ibid*., p. xxvi. Even later, namely 1969, is the French version of Roman Catechism, *Catechisme du Concile de Trente* (Paris: Itinéraires, 1969, p. 30), stating: *Dieu affermit aussi la terre sur sa base, et par sa parole Il lui fixa sa place au milieu du monde* ("The earth also God commanded to stand in the midst of the world, rooted in its own foundation").

[589] *Ibid*., p. xxv.

[590] 1584 in Toledo and reprinted in 1591 in Rome. He is also known as Diego de Zuñiga.

[591] Book 4, Chapter 5 of *Philosophiae prima pars*, published in Toledo in 1597, as cited in *The Church and Galileo*, p. 40.

celebrated was Nicolas Serarius (d. 1609) in his 1609 work on Joshua 10, *Josue ab utero ad ipsum usque tumulum*, in which he writes:

> Although in order to escape reprobation Copernicus dedicated his revolutions to the pope, nevertheless, in so far as his hypotheses are supposed to be held to be true, I do not see how they can avoid being tainted with heresy. For Scripture always keeps the earth at rest and gives motion to the sun and to the moon, so that when these heavenly bodies stand still one can see that it is on account of a great miracle.[592]

A year after Serarius' work, Galileo published his now famous *Siderius nuncius* ("Starry Messenger"), which was the first time he had made public his allegiance to Copernicanism. As we noted in Chapter 11, prior to 1610 Galileo kept totally silent about his heliocentric views and even taught the geocentric system in public. Perhaps what prompted him to take a chance exposing his private views in this dangerous climate was what Kepler had concluded about the Catholic Church and its official treatment of Copernicus (barring the critiques that heliocentrism had received from Tolasani, Clavius, *et al*.). Kepler notes:

> All the popes since 1542…have interpreted Scripture in such a way that none of them have so far accused Copernicus – even apart from the fact that Copernicus dedicated his work *De revolutionibus* to Paul III – of error or of heresy.[593]

True, the popes of the 16th century had more or less refrained from participating in the cosmological debate. After all, Paul III's original request to Copernicus was for the purpose of finding a way to fix the calendar. Little did the prelature know that this seemingly small matter would blow up into a mushroom cloud on the theological and scientific landscape. Galileo somehow became the fuse that would set the refuse pile on fire to blaze in front of the highest authorities in the world. In that day and time there was no entity with greater power than the Inquisition and no one who could direct its steps more authoritatively than the pope in Rome. The showdown had arrived.

The first on the scene was the philosopher and mathematician Lodovico delle Colombe. He was the main speaker for a group of Florentines who wanted to expose Galileo. Galileo's supporters satirically referred to this group as the "League of Pigeons," mocking Colombe's name that means "dove" in Italian. In his 1610 work *Trattato contro il moto della terra* ("Treatise Against the Motion of the Earth") Colombe based his attack against Galileo's cosmology by an appeal to the consensus of the Church Fathers and the traditional interpretation of Scripture. Colombe writes:

> Replies which assert that Scripture speaks according to our mode of understanding are not satisfactory: both because in explaining the Sacred Writings the rule is always to preserve the literal sense, when that is possible, as it is in this case; and also because all the Fathers unanimously take this passage to mean that the sun which was moving truly stopped at Joshua's request. An interpretation which is contrary to the unanimous consent of the Fathers is condemned by the Council of Trent, Session IV, in the decree on the edition and use of the Sacred Books. Furthermore, although the Council speaks about matters of faith and morals, nevertheless it cannot be denied that the Holy Fathers would be displeased with an interpretation of Sacred Scriptures which is contrary to their common agreement.[594]

By 1613 things became even more heated, as the Grand Duke of Tuscany, Cosimo II (Medici), and his mother the Grand Duchess, Christina of Lorraine (the grand daughter of Catherine Medici, queen of France), got into the picture.[595] On

[592] *Josue ab utero*, ch. 10, question 14, p. 238, as cited in *The Church and Galileo*, pp. 19, 32.

[593] "Antwort auf Roeslini Diskurs,"Kepler's *Gesammelte Werke*, 4:106, lines 18-20, translated by Michel-Pierre Lerner in *The Church and Galileo*, p. 19. Lerner also notes Kepler saying the same in 1605 (*ibid*, 15:183, no. 340, lines 95-102).

[594] *Le Opere di Galileo Galilei*, Vol. 5, p. 411, translation in Blackwell's *Galileo, Bellarmine and the Bible*, p. 63.

[595] Cosimo II had ascended the throne upon his father's death, Ferdinand I, in 1609. Ferdinand I had appointed

December 12 of that year, a friend of Galileo's, Benedetto Castelli, attended a luncheon with the Grand Duke and his mother. Prompted by a whispering in her ear from Cosimo Boscaglia (professor of philosophy at Pisa), the Duchess asked Castelli if a moving Earth was contrary to Scripture. One thing led to another and by the end of the evening Castelli had secured an admission from Boscaglia that heliocentrism was true. Taking advantage of this development from people in high places, Galileo saw this as an opportunity to add Scripture to his evidence and thus wrote a long letter to Castelli on the subject. He asserted, much to the dismay of Colombe, that Scripture had no intention of teaching about the order and motions of the celestial bodies. As noted in Chapter 12, however, Galileo also made the claim that the literal reading of Joshua 10:10-14 was in conformity to heliocentrism.[596] Once Galileo added Scripture to his arguments, it became a whole different issue. It was here that the tide really began to turn against him. A year later on December 21, 1614, Tommaso Caccini, a member of the League of Pigeons, preached against Galileo in Florence at the church of Santa Maria Novella. The next year, 1615, Galileo is now 50, perhaps old enough for him to contemplate sparring with the Catholic hierarchy over what appears to be his lifelong dream. But he receives a letter from **Federico Cesi** on January 12, 1615 telling him not to respond to Caccini due to the fact that Cardinal Bellarmine was resolute against defending Copernicanism from Scripture:

> As for the opinion of Copernicus, Bellarmine himself, who is the head of the congregation on these issues, has told me that it is heretical, and that the motion of the Earth is, without any doubt, contrary to Scripture.[597]

On March 7, 1615, Galileo received a letter from Monsignor Dini that portrays Bellarmine as a bit more accommodating:

> In respect to Copernicus the Cardinal said that he could not believe that he would be prohibited; rather he believes that the worst thing that could happen to Copernicus would be that some marginal notes might be added to the effect that his doctrine was introduced to save the appearances, or some such thing, similar to those who have introduced epicycles but do not believe in them.[598]

The balance between the two letters is easy to determine. Although Bellarmine was willing to accommodate Galileo by allowing Copernican theory as an appearance-saving model, the very reason he put such strict prohibitions on it was that he considered heliocentrism erroneous and heretical. In that respect, Bellarmine was quite adamant with

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Galileo to the professorship of mathematics at the university of Pisa in 1588. Galileo had tutored Cosimo during summers when he was a lad. Galileo dedicated his book *Siderius Nuncius* (the first public admission of his heliocentrism) to Cosimo in 1610 and Cosimo in turn gave Galileo a court position in the same year. Cosimo became ill in 1615 when Galileo's troubles with Bellarmine were just beginning, and he died in 1620. His son, Ferdinand (II), ascended the throne, but since he was only ten his grandmother, Christina, and mother, Maria Magdalena of Austria, governed the palace affairs. Ferdinand was not close to Galileo and did not involve himself in the cosmological disputes. He died in 1670.

[596] In *Le Opere di Galileo Galilei*, vol. 5, pp. 284, 286. The Italian reads: "Io dico che questo luogo [Js 10:12] ci mostra manifestamente la falsità e impossibilità del mondano sistema Aristotelico e Tolemaico, e all'incontro benissimo s'accomoda co'l Copernicano." The same is reiterated in the *Letter to Christina*, *ibid*., vol. 5, pp. 343-348, cited in *The Church and Galileo*, p. 33.

[597] Original Italian: "Quant' all' opinione di Copernico, Bellarmino istesso, ch' è de' capi nelle congregatione di queste cose, m' ha detto che l' ha per heretica, e che il moto della terra, senza dubio alcuno, è contro la Scrittura" (*Le Opere di Galileo Galilei*, vol. 12, p. 129).

[598] Original Italian: "E quanto al Copernico, dice S. S. Ill.^{ma} non poter credere che si sia per proibire, ma il peggio che possa accaderli, quanto a lui, crede che potessi essere il mettervi qualche postilla, che la sua dottrina fusse introdotta gli epicicli e poi non gli credone" (*Le Opere di Galileo Galilei*, vol. 12, p. 151).

Dini that Psalm 19:5-6[599] meant that the sun revolved around the Earth and not vice-versa. Galileo retorted with a lengthy letter to Dini on March 23, 1615 denying Bellarmine's claims, although with a large amount of deference to the Church as the final arbiter. Galileo insists that when Copernicus wrote his book he recognized that if the Ptolemaic system failed and could not be true to the appearances, "this other one would have acquired a much greater degree of truth and reality…the knowledge of the true arrangement of the parts of the world."[600]

Galileo then added:

> A little further on it is said [by Bellarmine] that the principal authors who introduced eccentrics and epicycles did not consider them to be true. I will never believe this…to wish to admit the mobility of the earth only with the same concessions and probability attributed to epicycles and eccentrics is to admit it most securely, truly, and irrefutably…. Thus in regard to Copernicus it is my opinion that the mobility of the earth and the stability of the sun are not open to compromise…[601]

On several occasions in the letter, however, Galileo voluntarily submits his opinion to the judgment of the Church:

> I now wish with the same zeal to offer them next at the feet of the Highest Pastor and to the infallible determination of the Holy Church…. My only intention is…to be obedient to the wishes of my superiors, and to submit all my work to their decision…I am inferior to all and place myself below all wise men."[602]

Regardless of his humble demeanor, considering that Galileo openly admitted that he believed Copernicus gave us the "true arrangement of the parts of the world," it was now time for the Church to step in and put the brakes on what appeared to be a runaway train. After hearing about Caccini's attack on Galileo, the Dominican friar, Niccolo Lorini, sought a copy of the letter Galileo wrote to Castelli. After reading it he was convinced that Galileo had overstepped his bounds regarding the interpretation of Scripture. He then sent a copy of the letter to Cardinal Paolo Sfondrati who was the Prefect of the Congregation of the Index, and it was then passed on to Cardinal Giovanni Millini who was Secretary of the Holy Office. It was now only a matter of time before Galileo would be silenced.

Official Sanctions Against Copernicanism

In 1615, 1616, 1633 and 1664 the Catholic Church issued various formal judgments against the Copernican theory, and especially against its main purveyor, Galileo Galilei. One of the first acts that led to an official censoring of heliocentric cosmology was that directed against the Dominican, **Tommaso Campanella** (d. 1639). Defending Galileo's 1610 work, *Siderius nuncius*, Campanella writes:

> Let us rejoice if the theologians protest; the Fathers of theology will defend you with their prophecies: Chrysostom and his master, Theodore, the Bishop of Tarsus, and Procopius of Gaza, who taught that the heaven is motionless…. Augustine taught that this opinion had been proven according to the rules of the astronomers of his day and said we should not

[599] "In them he has set a tent for the sun, which comes forth like a bridegroom leaving his chamber, and like a strong man runs its course with joy. Its rising is from the end of the heavens, and its circuit to the end of them," LXX Ps 18:5-6.

[600] Original Italian: "…molto più ciò si arebbe ottenuto dalla vera e reale…qual è il sapere la vera disposizione delle parti del mondo" (*Le Opere di Galileo Galilei*, letter to Dini, March 23, 1615, vol. 5, p. 298), from Blackwell's translation in *Galileo, Bellarmine and the Bible*, p. 209.

[601] *Ibid*., pp. 210-211.

[602] *Ibid*. pp. 211, 212.

> challenge it by relying on Holy Scripture and so become the laughingstock of the astronomers. This is a principle he himself ought to have followed when he denied the antipodes. You have on your side Origen, who taught that the earth and all the heavenly bodies are alive and who praised and proved the teachings of the Pythagoreans with the aid of the Scriptures.[603]

Campanella's defense was very weak. As noted in Chapter 13, Chrysostom gave no support to heliocentrism.[604] That Campanella would cite some ambiguous passage from Chrysostom for support of heliocentrism shows how desperate his case was. Additionally, contrary to Campanella's claims, neither Theodore of Tarsus nor Procopius of Gaza were in the heliocentric camp.[605] Augustine likewise offers him no support. Moreover, Augustine did not say that astronomy could not be challenged by Holy Scripture; rather, he said that unless astronomers had *proof* of their claims, no one was required to accept their theories, especially when those theories contradicted the literal reading of Scripture.[606] Additionally, Augustine's remark that Christianity might become a "laughingstock"[607] was certainly not directed against the belief in geocentrism. Augustine was one of the patristic era's most ardent geocentrists. It was directed, rather, to instances in which a Christian entered areas of both theology and science of which he was ignorant. As we will see in Chapter 15, when the issue of the authority of Scripture in a matter of science was at stake, Augustine put his full weight behind Scripture, as was the case, for instance, in his insistence on the existence of the waters above the firmament:

> But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity.[608]

Still, in his book, *Apologia pro Galileo*, Campanella sought to convince the Inquisition that heliocentrism was not contrary to Scripture. He also attempted to convince Bellarmine by appealing to the "political" dangers of condemning Galileo, as

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[603] *Lettere*, ed. V. Spampanato, Bari: Laterza, 1927, no. 31, p. 166-167, as cited in *The Church and Galileo*, pp. 21-22, 34.

[604] Chrysostom writes: "For they who are mad imagine that nothing stands still, yet this arises not from the objects that are seen, but from the eyes that see. Because they are unsteady and giddy, they think that the Earth turns round with them, which yet turns not, but stands firm. The derangement is of their own state, not from any affection of the element" (*Homily on Titus*, III).

[605] Campanella's reference to Theodore being the "master" of Chrysostom would require him to be in the 4th century, but the only one answering to that identity is Diodor (d. 393) who was the bishop of Tarsus and with whom Chrysostom and Theodore of Mopsuestia were associated in the Antiochian school of theology. Campenella may be confusing Chrysostom's belief, according to one author, that "…the vault of heaven was fixed and motionless over the earth. Sun, moon and stars circled day by day about the fixed orb of the world" (Rev. Chrysostomus Baur, John *Chrysostom and His Time*, trans. Sr. M. Gonzaga, Buchervertriebsanstalt, Notable and Academic Books 1988). Baur cites Chrysostom's *Homily XII* as the source, but as we noted in Chapter 13, Chrysostom merely says that the heavens are immobile, but that the sun and stars revolve around a fixed earth: "The heaven, for instance, hath remained immoveable, according as the prophet says, "He placed the heaven as a vault, and stretched it out as a tent over the earth." But, on the other hand, the sun with the rest of the stars, runs on his course through every day. And again, the earth is fixed, but the waters are continually in motion; and not the waters only, but the clouds, and the frequent and successive showers, which return at their proper season" (*Homilies to Antioch*, Homily XII, PG 49, 128). There is no evidence that Procopius of Gaza (d. 528) supported heliocentrism, rather, he contested the belief of antipodes (that there were two sides to the earth).

[606] But if they are able to establish their doctrine with proofs that cannot be denied, we must show that this statement of Scripture…is not opposed to the truth of their conclusions (*The Literal Interpretation of Genesis* Book 2, Chapter 9, paragraph 21.)

[607] "Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn" (*The Literal Meaning of Genesis*, Bk 1, Ch. 19, No. 39).

[608] *The Literal Meaning of Genesis*, Bk 2, Ch. 5, No 9.

well as the aforementioned argument that the Church would be "laughed at" by the world:

> I think that this [Galileo's] philosophical method should not be condemned. One reason for this is that it will be embraced even more enthusiastically by the heretics and they will laugh at us. For we know how greatly those who live north of the Alps complained about some of the decrees adopted at the Council of Trent. What will they do when they hear that we have attacked the physicists and the astronomers? Will they not immediately proclaim that we have done violence to both nature and the Scripture? Cardinal Bellarmine is well aware of this.[609]

The Church Confronts Fr. Paolo Antonio Foscarini

The above text from Campanella had reached Rome by March 1616, but in the prior year Bellarmine had already made up his mind that Copernicanism was to be rejected. This verdict was decided in the case of the Carmelite friar, Fr. Paolo Antonio Foscarini. The Inquisition's censor determined that Foscarini's 1615 work defending heliocentric cosmology, *Lettera sopra l'opinione de'Pittagorici e del Copernico*, was erroneous. The text of the censor's words are very intriguing, since they give us a unique look into the hermeneutical philosophy that was the foundation of the Church's judgments:

> This treatise excessively favors the rash opinion of the motion of the earth and the immobility of the sun, as is clear on pages 8 to 11. On page 9 the author not only refutes but also ridicules many things which are taught by the authors of the opposite opinion. On page 13 he openly says, 'the indicated opinion has a clear probability.' But what is clearly contrary to Sacred Scripture obviously cannot be probable.
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> On page 24 he says that the words of Genesis, 'Evening and morning came the first day,' should not be understood literally and as referring to nature, but only in relation to the earth and to us. But this cannot be said…. From page 29 to the end of the treatise the author tries to defend the indicated opinion by showing that Sacred Scripture can be reconciled with it, and thus anyone can embrace it without any fear of contradicting the sacred teachings. But his reconciliation contorts the Sacred Scriptures, and explains them contrary to the common explication of the Holy Fathers, which agrees with the more common, indeed the most common, and most true opinion of almost all astronomers.
>
> On page 29 he says that the words of Psalm 92 (93), 'For he has made firm the orb of the earth which will not move,' and those of Psalm 103 (104), 'He established the earth on its own foundation which will not move forever,' are to be understood according to appearances. But this explication cannot be accepted. For when a real reason or cause of some effect is assigned, it cannot be understood as only an appearance. And in those texts the Holy Spirit assigns the reason for the immobility of the earth, when he says that it is established on its own foundation.
>
> On pages 38 and 39 the author explains the above passages in a different way when he says that the earth is immobile in the sense that it is constant and stable in its own motions. Against this stands the fact that the same thing could be said of the moon and of the other celestial orbs and stars.
>
> On page 41 he explains the immobility of the earth in a third way, namely, that it moves in such a was that it does not leave the place which is natural to it. Against this likewise stands the fact that the author says nothing specifically about the earth which is not also found in the other elements and the celestial orbs.
>
> On page 45 he says that the heavens are very thin and tenuous, not solid and dense.

[609] Tommaso Campenella, *Apologia pro Galileo*, published in 1622 but perhaps reviewed by the Inquisition as early as March 1616. Cited in Blackwell's *Defense of Galileo*, p. 79, translation modified by Lerner in *The Church and Galileo*, pp. 23, 35.

> This is clearly contrary to Job 37,[610] 'Together with this you have created the heavens which are most solid and spread out like the air.' This cannot be explained as an appearance (as the author indicates) because the solidity of the heavens is not apparent to us.[611]

Foscarini sought to defend his views in a 4000-word reply to the censor. His main argument was one that was common during that day. For some reason the very scholars that could barely see craters on the moon were absolutely certain that "the earth moves…an opinion which has been confirmed by weighty arguments by many of the most learned astronomers of our day."[612] Consequently, it is no surprise that Foscarini subsequently argues that this celestial fact

> …agrees most fittingly with the Scriptures according to the methods and arguments used by the Holy Fathers, if one follows exactly the rules of the Holy Fathers and scholastic theologians which they themselves used most frequently in interpreting the Scriptures.

We see the same sort of reasoning still today. The objector begins from the position of being convinced that science has proven the Earth moves. Once this scientific premise is established, he has no choice but to assert the corollary point – that it is not necessary to interpret Scripture literally. Logically, he must then insist that the Fathers of the Church had agreed on using a non-literal hermeneutic. Similar to Campanella, Foscarini will cite Fathers who interpreted various passages in a non-literal way in the hopes of using the example as a sounding board for all the patristic writers and all the passages dealing with cosmology. The facts are these, however: (1) no one, especially in Foscarini's day, had proven that the Earth was in motion. Accordingly, we are not surprised that Foscarini cites no specific "astronomer" of his day who possessed such proof. As we have discovered, it is a fact of science that every phenomenon occurring in the heavens, be it eclipses, parallax, aberration, centrifugal force, *etc*., can be explained just as well from the perspective of a non-moving Earth and a rotating universe; (2) As we discovered in Chapter 13, all the Fathers of the Church were geocentrists. There was not one who advocated a heliocentric view, even though these same Fathers were aware that the Greeks from the Pythagorean school were advocating heliocentrism. Hence, if Foscarini's claim is true that we must "follow exactly the rules of the Holy Fathers…which they themselves used most frequently in interpreting the Scriptures," we should just as easily be able to conclude that their "exact rules" led them to interpret Scripture to teach geocentrism, since they were all geocentrists with no exceptions. What other conclusion could be drawn? Basically, Foscarini sought to employ the same argument we hear so often today against putting trust in Scripture to teach us true facts about the cosmos. Foscarini merely shifts this argument and places it against the Holy Fathers, arguing that they can only be trusted when they speak as one on matters of the Christian faith, not on cosmological information they glean from Scripture. He writes:

> Thus Vincent of Lérins, a most learned and zealous defender of the dogmas of the Church, in his golden booklet against the profane novelties of heretics, says that we should investigate and follow with great care the consensus of the Holy Fathers, not

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[610] Blackwell has "Tobit 37" but this is most likely a misreading of the original Latin, since Tobit's fourteen chapters say nothing about how the heavens were made. The proper translation of the censor's word is "Job 37:18" (which might look and sound like Tob..it 37). Job 37:18 reads: "Can you, like him, spread out the skies, hard as a molten mirror?" (RSV); "Thou perhaps hast made the heavens with him, which are most strong, as if they were of molten brass" (DR). The literal meaning is that the sky, the heavens or the firmament is not a tenuous, vaporous entity. Although ostensibly it is transparent and pliable, on another level (implied is the subatomic level) Jb 37:18 indicates the heavens are composed of a super dense material substance (as we noted in Volume I). At the beginning of creation it was expanded to fill the firmament, or became the firmament once it was expanded. Essentially, the heavens are both flexible and rigid. Foscarini's censor understood this dual nature of the firmament by noting that "the solidity of the heavens is not apparent to us."

[611] The censor's document is titled: *Judicium de spistola F. Pauli Foscarini de mobilitate terrae* (Lerner in *The Church and Galileo*, p. 24) and the text is provided by Blackwell in *Galileo, Bellarmine and the Bible*, pp. 253-254.

[612] As cited in Blackwell's *Galileo, Bellarmine and the Bible*, p. 255.

> in every little question of the divine law, but only or especially in the rules of faith. In *Contra Faustum*, Book 2, Chapter 13, St. Augustine says that the Holy Fathers and all the authors who fall outside of the canonical Scriptures sometimes perhaps say things which do not agree with truths that are rather hidden and difficult to know….while the connection to the faith is preserved, the best and most learned defenders of the Catholic rules sometimes disagree, as Augustine says in *Contra Julianum*, Book 1. Likewise some of the Fathers can occasionally teach something contrary to truth…Hence it is not rash to depart from the common interpretation of the Fathers in matters not pertaining to the faith, especially if this occurs because of a pressing and persuasive reason.[613]

We can safely assume that the "pressing and persuasive reason" that would convince Foscarini to "depart from the common interpretation of the Fathers" was what he stated in the opening lines of his letter: "the earth moves…an opinion which has been confirmed by weighty arguments by many of the most learned astronomers of our day." This assumed scientific fact forces Foscarini to find some rationale for discounting what he knows is a solid patristic consensus of both the literal interpretation of biblical cosmology and the immobility of the Earth. The only way to do so is for Foscarini to make a dichotomy between the spiritual and the corporeal, and declare that the Fathers were always right on the former but sometimes wrong on the latter.

Foscarini uses the same kind of argument to make a similar dichotomy in Scripture, which, incidentally, is the same argument used in modern times. He writes:

> Many authorities have shown that the Sacred Scriptures most wisely speak to the hearing of the common man, and in matters pertaining to the human sciences, it does not much care what opinion anyone holds; it accommodates itself to any opinion and to the common manner of speaking. Thus in his commentary on Jeremiah 28 St Jerome says that many things are said in the Scriptures according to the opinion of the time in which the events occurred, and not according to the truth of the matter.
>
> Thus when Scripture speaks of God's arm, the literal sense is not that he actually has such a bodily part, but rather what the bodily part signifies; namely, his operative power….

Perhaps sensing that he must give at least some room to the literal reading of Scripture, Foscarini then closes his argument by attempting to convince the censor that the Earth remains at rest not in the sense of motion but in its own peculiar way, a way which he never actually explains.

> When the Scriptures say that the earth is at rest and the sun moves, using the opinion of the common man and the common opinion of some of the ancient wise men, who did not perceive this as clearly as their successors…it does not say anything false because it describes them in this way. For the earth truly has a certain state of rest of its own, but in a different sense than is commonly thought. And the sun truly has motion of its own, for it rotates on itself around its own center in thirty days (as is seen from sunspots.) Therefore the earth is at rest and the sun moves, but not in the ways that the common man thinks nor as the common opinion of philosophers has held up to now, but is a more subtle way.

He then completes the case by drawing, once again, on what he believes is the scientific consensus of the Earth's movement.

> But the ancient sages up to the present have not known this because they did not observe or grasp (they were unable, not possessing the instruments recently invented by human ingenuity) those things which were reserved for the observation and apprehension of the present age by the singular and marvelous providence of God.[614]

[613] *Galileo, Bellarmine and the Bible*, pp. 256-258.

[614] *Galileo, Bellarmine and the Bible*, pp. 259-263.

When Solomon said "there is nothing new under the sun," we now know why. Five hundred years after Foscarini the same arguments are still being voiced for heliocentrism, only in more detailed and sophisticated ways. Today it is claimed that: (a) the Bible speaks with neither literalness nor authority on such mundane issues; (b) the Fathers made erroneous conclusions in their consensus on biblical cosmology; and (c) various scientific "proofs" show the Earth is moving. Where today a sophisticated telescope might detect a distant star with planets circling around it, in Foscarini's day the telescope was pointed toward Jupiter wherein one could watch its moons circling the Jovian giant. Both then and now the revolutions of the smaller around the larger would be used as "proof" that the Earth, because it is smaller than the sun, is required to revolve around it, and never vice-versa. Likewise, it was argued that if the sun itself rotates (since we can see black spots circling its circumference), analogously the Earth should also rotate. Galileo had also argued that, because the sunspots changed the angle of their path according to an annual cycle and not a daily one, the system had to be heliocentric. As we have discovered, however, there is science, and then there is *science*. As noted in Volume I, modern science has shown that the above arguments provide no proof for a moving Earth. In fact, it can be safely said that one of the only true facts of science is that science has not proven that the Earth moves. Unfortunately, however, if in spite of the factual evidence a person is convinced that science has proven the Earth moves, there is little that can persuade him otherwise. Neither Scripture, the patristic consensus nor the magisterium will trump what one believes is a fact of science, and the modern science community has made certain that the public believes that heliocentrism is a fact.

As was the case with Campanella, none of Foscarini's arguments impressed either the censors or **Cardinal Bellarmine**. They could easily see that these men were driven to disregard the patristic consensus and confine Scripture to spiritual matters because they were all under the mistaken notion that science had proven the Earth moved.

But Bellarmine knew that the burden of proof was on the challengers, not the Church, and a huge burden it was. No one had produced any proof of heliocentrism and thus Bellarmine wouldn't even consider, much less accommodate, any softening of his views on either Scripture or the patristics.

On April 12, 1615, Bellarmine wrote a personal letter to Fr. Foscarini answering his claims in three short rebuttals, the original written in Italian.

> To the Very Reverend Father Paolo Antonio Foscarini, Provincial of the Carmelite Order of the Province of Calabria:
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> My Very Reverend Father,
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> I was pleased to read the letter in Italian and the treatise in Latin which Your Reverence sent to me. I thank you for both of them, which indeed are quite full of ingenuity and learning. And since you have asked for my reactions, I will state them very briefly, for you now have little time to read and I have little time to write.
>
> Firstly, I say that it appears to me that Your Reverence and Sig. Galileo have acted prudently in being satisfied with speaking in terms of assumptions and not absolutely, as I have always believed Copernicus also spoke.[615] For to say that the assumption that the earth moves and the sun stands still saves all the appearances better than do eccentrics and epicycles is to speak well, and contains nothing dangerous. But to wish to assert that the sun is really located in the center of the world and revolves only on itself without moving from east to west, and that the earth is located in the third heaven and revolves with great speed around the sun,

615 "…facciano prudentemente a contentarsi di parlare *ex suppositione* e non assolutamente, come io ho sempre creduto che habbi parlato il Copernico" (*Le Opere di Galileo Galilei*, vol. 12, p. 171).

is a very dangerous thing, not only because it irritates all the philosophers and scholastic theologians, but also because it is damaging to the Holy Faith by making the Holy Scriptures false.[616] Although Your Reverence has clearly exhibited the many ways of interpreting the Holy Scriptures, still you have not applied them to particular cases,[617] and without doubt you would have encountered the very greatest difficulties if you had tried to interpret all the passages which you yourself have cited.

Second, I say that, as you know, the Council [of Trent] has prohibited interpretation of Scripture contrary to the common agreement of the Holy Fathers.[618] And if Your Reverence will read not only the Holy Fathers but also the modern commentaries on Genesis, the Psalms, Ecclesiastes, and Joshua, you will find that they all agree on the literal interpretation that the sun is in heaven and rotates around the earth with great speed, and that the earth is very far from the heavens and stands immobile in the center of the world.[619] Ask yourself then how could the Church, in its prudence, support an interpretation of Scripture which is contrary to all the Holy Fathers and to all the Greek and Latin commentators. Nor can one reply that this is not a matter of faith, because even if it is not a matter of faith because of the subject matter [*ex parte objecti*], it is still a matter of faith because of the speaker [*ex parte dicentis*].[620] Thus anyone who would say that Abraham did not have two sons and Jacob twelve would be just as much of a heretic as someone who would say that Christ was not born of a virgin, for the Holy Spirit has said both of these things through the mouths of the Prophets and the Apostles.

Thirdly I say that whenever a true demonstration would be produced[621] that the sun stands in the center of the world and the earth in the third heaven, and that the sun does not rotate around the earth but the earth around the sun, then at that time it would be necessary to proceed with great caution in interpreting the Scriptures which seem to be contrary,[622] and it would be better to say that we do not understand them than to say that what has been demonstrated is false. But I will not believe that there is such a demonstration, until it is shown to me.[623] To demonstrate that the assumption that the sun is located in the center and the earth in the heavens saves the appearances is not the same thing as to demonstrate that in truth the sun is located in the center and the earth in the heavens. The first demonstration, I believe, can be given; but I have the greatest doubts about the second. And in case of doubt one should not abandon the Sacred Scriptures

[616] "ma anco di nuocere alla Santa Fede con rendere false le Scritture Sante" (*ibid.*).

[617] "molti modi di esporre le Sante Scritture, ma non li ha applicati in particolare" (*ibid.*).

[618] "…il Concilio prohibisce esporre le Scritture contra il commune consenso de'Santi Padri" (*ibid*., p. 172).

[619] "…trovarà che tutti convengono in esporre ad literam ch'il sole è nel cielo e sta nel centro del mondo, iimmobile" (*ibid.*).

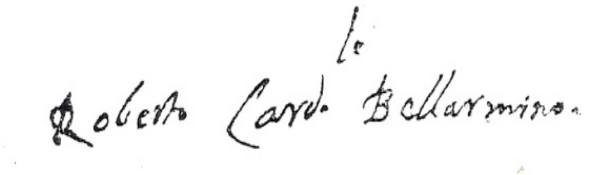
[620] "Nè si può rispondere che questa non sia material di fede, perchè se non è material di fede *ex parte obiecti*, è material di fede *ex parte decentis*" (*ibid.*).

[621] "…quando ci fusse vera demostratione…" (*ibid*).

[622] "…alhora bisogneria andar con molta consideratione in esplicare le Scritture che paiono contrarie…" (*ibid.*).

[623] "Ma io non crederò che ci sia tal dimostratione, fin che non mi sia mostrata" (*ibid*). We depart here from Blackwell's translation: "But I do not believe that there is such a demonstration, for it has not been shown to me," for two reasons: (1) the verb crederò is future and should be translated: "I will not believe" as opposed to "I do not believe," and (2) "fin" should be translated "until," not "for it has not." Normally "fino" is chosen, as it is in modern Italian, but classical Italian often left off the final "o." The correct translation of Bellarmine's words, then, are: "But I will not believe that there is such a demonstration until (or, until such time as) it is shown to me," which Fantoli adopts from Finocchiaro (*Galileo: For Copernicanism and for the Church*, pp. 184, 187).

> as interpreted by the Holy Fathers.[624] Let me add that the words, 'The sun rises and sets, and returns to its place…' were written by Solomon, who not only spoke as inspired by God, but who also was a man more wise and learned than all others in the human sciences and in the knowledge of created things, and all this wisdom he had from God.[625] Thus it is not likely that he would assert something which was contrary to demonstrated truth or to what could be demonstrated.[626] You might tell me that Solomon spoke according to appearances, since it appears to us that the sun revolves* when the earth turns, just as it appears to one on a ship who departs from the shore that the shore departs from the ship. To this I respond that, although to him who departs from the shore it does seem that the shore departs from him, nevertheless he knows that this is an error and he corrects it,[627] seeing clearly that the ship moves and not the shore. But in respect to the sun and the earth, there has never been any wise person who felt a need to correct such an error, because one clearly experiences that the earth stands still, and the eye is not mistaken when it judges that the sun moves, just as it is not mistaken when it judges that the moon and the stars move.[628] And this is enough for now. With cordial greetings, Reverend Father, and I pray for every blessing from God.[629]



As was his usual style, Bellarmine answered Foscarini with the same erudition that made him famous in other ecclesiastical and scholarly matters. This was not an answer that tried to stall or placate the objector. It was very straightforward and resolute. Simply put, Foscarini posed an alternate scenario to what had been believed up to that time and Bellarmine told him clearly that it had no merit and was to be rejected. He offered no compromise. Indeed, there could be none, for there were only two possibilities: either the Earth moves or it does not move. Bellarmine saw no convincing arguments that would force the Church to conclude that it had been wrong for fifteen centuries about the Earth's position in space. As McMullin rightly notes:

> Did he think that a demonstration might conceivably be found? It seems altogether unlikely that he did. Nor was his concession an evidence of open-mindedness with regard to this issue; it was evidence only of the innate courtesy for which Bellarmine was famous. He went on in the remainder of the letter to list several reasons why such a proof would not be forthcoming. Mathematical astronomy, the genre to which he thought Copernicus's constructions to belong, was inherently incapable of producing such a proof; the best it could do was to save the appearances….This had been Bellarmine's view when teaching astronomy long before in Louvain….He had not changed his mind in the years since….If Bellarmine, solicitous for the reputation of the Church as he was, had believed that there was the slightest possibility that the Copernican

[624] "…et in caso di dubbio non si dee lasciare la Scrittura Santa, esposta da' Santi Padri" (*ibid.*).

[625] "fu Salomone, il quale non solo parlò inspirato da Dio, ma fu huomo sopra tutti gli altri sapientissimo e dottissimo nelle scienze humane e nella cognitione delle cose create, e tutta questa sapienza l'hebbe da Dio" (*ibid.*).

[626] "…o che si potesse dimostrare." (*ibid.*).

[627] "…nondimeno conosce che questo è errore e lo corregge" (*ibid.*).

[628] "ma quanto al sole e la terra, nessuno savio è che habbia bisogno di correggere l'errore, perchè chiaramente esperimenta che la terra sta ferma e che l'occhio non s'inganna quando giudica che il sole si muove, come anco non s'inganna quando giudica che la luna e le stele si muovano." (*ibid.*).

[629] As translated by Richard Blackwell in *Galileo, Bellarmine and the Bible*, pp. 265-267, except for "fin" noted above, in addition to the word "rotates" which has been replaced by "revolves." Underlining has been added to emphasize the salient points.

> ordering of sun and earth might later prove correct, he would never have allowed the decree of 1616 to go through.[630]

Fr. George Coyne, in one of four criticisms of John Paul II's 1992 speech, expressed a similar conclusion:

> From the concluding sentences of the Letter it is clear that Bellarmine was convinced that there could be no demonstration of Copernicanism. A further indication of this conviction on Bellarmine's part is that he supported the Decree of the Congregation of the Index, which was aimed at excluding any reconciliation of Copernicanism with Scripture. If he truly believed that there might be a demonstration of Copernicanism, would he not have recommended waiting and not taking a stand, a position embraced at that time, it appears, by Cardinals Barberini and Caetani? And why did he agree to deliver the injunction to Galileo in 1616? This injunction prohibited Galileo from pursuing his research as regards Copernicanism. Galileo was forbidden to seek precisely those scientific demonstrations, which, according to Bellarmine, would have driven theologians back to reinterpret Scripture.[631]

Annibale Fantoli sees it the same way:

> As we know, Bellarmine in his response to Foscarini had faced the possibility, although with a considerable and basic skepticism, that a proof for Copernicanism might be given. But by signing, as he did, the ecclesiastical decisions of February-March 1616, he had himself by now come to preclude completely that possibility, however tenuous it might be. And, I repeat, the other Churchmen were also precluding it. Therefore, to hold that the provisions of 1616 were only intended to break the untimely zeal of Galileo for Copernicanism without blocking further careful scientific research on the matter appears to me to be completely untenable.[632]

Most importantly, Bellarmine assures Foscarini that he is well aware of the "many ways of interpreting the Holy Scriptures," but he implores Foscarini to become equally aware that no one can arbitrarily decide when a less than literal interpretation can be applied. Bellarmine reiterates over and over again in his letter that the all-important decision on when and where it is permissible to apply a non-literal interpretation to Scripture has been left to more divinely qualified and authoritative minds than Foscarini's. In effect, Bellarmine informs Foscarini that the decision on the meaning and intent of Scripture has already been made. The die is cast and cannot be changed. Bellarmine appeals to the witness of Solomon as his foundation, a man both inspired by the Holy Spirit and given the supernatural gift of wisdom and knowledge above all others. Although Bellarmine agrees that on certain occasions it was more convenient for various writers of Scripture to speak in the language of appearance and thus we should interpret their words accordingly, there are many cases in which this hermeneutic cannot be applied. Surely Solomon, whose writings are permeated with a scientific analysis of life, would not suddenly become unscientific when he was describing the cosmos. Similarly, the Fathers, who read both the heliocentric arguments from the Pythagorean school as well as the geocentric arguments from the

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[630] "The Church's Ban on Copernicanism," in *The Church and Galileo*, pp. 180-181. We quote McMullin only because he correctly assesses Bellarmine's absolute resolve on the issue, for McMullin himself holds that "He [Bellarmine] was wrong, and Galileo was right" (*ibid*., p. 181), since he believes modern science has proven heliocentrism.

[631] Lecture by Coyne, delivered at a conference titled: "The Galileo Case: Did the Church Make a Mistake?" held at the Polich Academy of Learning in Cracow, Nov. 14, 2002.

[632] *Galileo: For Copernicanism and the Church*, p. 481. Fantoli, Coyne and McMullin naturally think that Bellarmine's throwing down of the gauntlet ruined the Church's standing in the world, as does Richard Westfall, stating: "The net result of Cardinal Bellarmine's devoted effort to defend his Church was to place an incubus to its back that it struggles still to shake off" (*Essays on the Trial of Galileo*, Vatican City: Vatican Observatory Publications, 1989, p. 24). That conclusion, of course, would only be valid if Bellarmine was proven wrong and Copernicanism proven right.

Aristotelian school and thus had the option of interpreting Scripture's cosmological passages either phenomenally or realistically, chose the latter, without equivocation or debate amongst themselves. From Moses, through Solomon, to the Holy Fathers, and even to the magisterium of the Church, Bellarmine informs Foscarini "there has never been any wise person who felt the need to correct such an error." The burden of proof, then, rested solely on the objector to the literal hermeneutic, and what a tremendous burden it was.

Some have posited that Bellarmine was not being very scientific when he said: "one clearly experiences that the earth stands still, and the eye is not mistaken when it judges that the sun moves" as if were saying that one could know the Earth is motionless merely by standing on it. Such is not the case, however. Bellarmine is giving an *a posteriori* argument based on his previous *a priori* argument. That is, Bellarmine can say that he "knows" the Earth is motionless only because revelation and tradition have told him so, and it is only then that he can "clearly experience" the Earth standing still when he sees the sun, moon, and stars go around it. Obviously, he could not know the Earth is motionless without such revelation if, as he admitted earlier in the paragraph, either celestial option is possible based on pure relative motion.

Bellarmine advances these kinds of arguments because they were formulated earlier in his work, *De controversiis*, the treatise in which he outlined the principles of Scripture interpretation that were to guide the Church through the Protestant revolt and beyond:

> Scripture is the immediately revealed word of God, and was written as dictated by God…. Thus we say that the sacred writers had immediate revelation and wrote the words of God himself either because new things previously unknown were revealed to them by God…or because God immediately inspired and moved them to write things which they had seen or heard, and guided them lest they err in any way…
>
> There can be no error in Scripture, whether it deals with faith or with morals, or whether it states something general and common to the whole Church or something particular and pertaining to only one person.
>
> In the Scriptures not only the opinions expressed but each and every word pertains to the faith. For we believe that not one word in Scripture is useless or not used correctly.[633]
>
> In Scripture there are many things which of themselves do not pertain to the faith, that is, which were not written because it is necessary to believe them. But it is necessary to believe them because they were written, as is evident in all the histories of the Old Testament, in the many histories in the Gospel and in the Acts of the Apostles, in the greetings of Paul in his Epistles, and in other such things.[634]

We notice also that Bellarmine's argument to Foscarini does not center around whether it might be theoretically possible to interpret the geocentric passages of Scripture phenomenally. Bellarmine fully concedes that, in the art of hermeneutics, a non-literal or "as it appears" interpretation of a biblical passage is fully within the realm of theoretical possibility. Instead, Bellarmine's argument centers on whether we have the divine directive to do so. The answer to that question is an unequivocal no. This is precisely why Bellarmine can put himself on the line, as it were, and declare, in essence, that there is no scientific proof for heliocentrism: "But I will not believe there is such a demonstration until it is shown to me." Five hundred years of scientific endeavor following Bellarmine's bold declaration has shown him to be absolutely correct, for no scientist has ever proven that the Earth moves. Indeed, many experiments show the Earth is standing still in space.

Last but not least, Bellarmine assures Foscarini that the matter of whether the sun revolves around the Earth is certainly a "matter of faith." As McMullin notes:

> But now a new note was struck, one that would doom one of Galileo's main lines of defense. It might *seem* as though the sun's

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[633] *De controversiis*, II, II, 12, as found in Roberto Cardinal Bellarmino, S.J., *Opera omnia*, cited in Blackwell's *Galileo, Bellarmine and the Bible*, p. 31.

[634] *De controversiis*, I, I, 4, 12, *ibid*., p. 32.

> motion and the earth's rest were not matters of faith, he wrote. But they were because of the speaker – that is, because the text of the Bible as a whole had God as its primary author. Thus every passage with a clear literal intent (and Bellarmine always assumed that the earth/sun passages displayed such an intent) had the same status: it was a matter of faith. To challenge it would be, implicitly, to challenge the divine authorship of Scripture, and that was *explicitly* a matter of faith: it would be as "heretical to say that Abraham did not have two children" as to say that "Christ was not born of a virgin."[635]

As for Foscarini, since he had already published his book, it could not be corrected; and thus the Church's only choice was to condemn it, and it did so on March 5, 1616.[636] Foscarini died just three months later on June 10, 1616, although the date is uncertain.

The Church Confronts Galileo Galilei

The Church's case against Galileo was quite strong. As Cardinal Joseph Ratzinger (now Pope Benedict XVI), quoting Feyerabend, once stated:

> At the time of Galileo the Church remained much more faithful to reason than Galileo himself. The process against Galileo was reasonable and just.[637]

By the same token, Feyerabend notices the tremendous difference between how the modern Church handles scientific claims and how the Church of Galileo's day handled them. In a 1982 letter Feyerabend wrote to a Catholic priest who attended a debate in Zürich on the "the modern relation between the sciences and the Catholic Church," he remarks:

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[635] "The Church's Ban on Copernicanism," in *The Church and Galileo*, p. 179, emphasis in original. (NB: Abraham actually had more than two children, since he had at least six more with Keturah (Gn 25:1-2), but Bellarmine was only referring to the sons Abraham had with Hagar and Sarah, respectively). McMullin adds: "This extreme form of biblical literalism was not peculiar to Bellarmine, of course. It is best understood as the fruit of the bitter years of controversy between the Reform and the Counter-Reform, controversy in which Bellarmine himself played a leading role" (*ibid.*). What McMullin fails to consider, however, is that the same form of "extreme literalism" allowed Bellarmine to defend sacramental theology against Protestant attempts to deliteralize the interpretation of such passages as John 3:5; 6:53; 20:23 dealing with Baptism, the Eucharist and Confession, respectively.

[636] Foscarini published his work in Naples in 1615, titled: *Lettra Sopra L'Opinione de' Pittagorici e del Copernico, della Mobilita della Terra e Stabilita del Sole, e il Nuovo Pittagorico Sistema del Mondo*.

[637] From a speech given in Parma, Italy, March 15, 1990, partly reported in *Il Sabato*, March 31, 1990, pp. 80ff, and in the *Corriere della Sera*, March 30, 1990, and cited in *30 Days*, January 1993, p. 34, and referenced also by Atila S. Guimarães in "The Swan Song of Galileo's Myth," published by *Tradition in Action*, nd. Paul Feyerabend notes: "Cardinal Joseph Ratzinger, who holds a position similar to that once held by Bellarmine, formulated the problem in a way that would make a revision of the judgement [against Galileo] anachronistic and pointless. *Cf.* his talk in Parma of 15 March 1990….As witnesses the Cardinal quoted Ernst Bloch ('being merely a matter of convenience the scientific choice between geocentrism and heliocentrism cannot overrule the practical and religious centricity of the earth'), C. F. von Weizsäcker ('Galileo leads directly to the atom bomb') and myself (the chapter heading of the present chapter)" (*Against Method*, 3rd edition, Verso, London, New York, 1975, 1996, p. 134). Feyerabend's "chapter heading" states: "The Church at the time of Galileo not only kept closer to reason as defined then and, in part, even now; it also considered the ethical and social consequences of Galileo's views. Its indictment of Galileo was rational and only opportunism and a lack of perspective can demand a revision" (*ibid*., p. 125).

> Dear Father Rupert, I listened with interest to your talk of Thursday last. I was surprised by two features. The one is the speed with which the Church now retreats in the face of scientific results….When I was a student I revered the sciences and mocked religion and I felt rather grand doing that. Now that I take a closer look at the matter I am surprised to find how many dignitaries of the Church take seriously the superficial arguments I and my friends once used, and how ready they are to reduce their faith accordingly. In this they treat the sciences as if they, too, formed a Church…Best wishes, Paul Feyerabend.[638]

Other secular sources also recognize the distinction. In a letter from Thomas Huxley (d. 1895) to Catholic scholar George Mivart, he writes: "I looked into the [Galileo] matter when I was in Italy, and I arrived at the conclusion that the pope and the college of cardinals had rather the best of it."[639] That is quite an admission from a man who devoted himself to agnosticism and evolution for his entire scientific career. Historically speaking, what the "best of it" might include is that the Church of both 1616 and 1633 looked into every nook and cranny of Galileo's claims and found them not only highly erroneous but also "formally heretical."[640]

One can only begin to appreciate the seriousness with which the Church confronted the issue of whether the Earth revolved around the sun if he contemplates the actual number of documents that are catalogued in its archives on the Galileo affair, especially the manner in which these documents carry the official and solemn declarations of the pope and his Congregation of the Holy Office. Recent requisitions of the official records of the Inquisition that are contained in the Vatican archives reveal over 7,900 separate documents, and these are what remain after many had already been destroyed or confiscated. Many of them have never been read once they were put in storage.[641] In addition to the official documents are the unofficial ones, including personal letters back and forth between the major participants in the Galileo affair.[642] With such tremendous volumes of written material traversing back and forth through Europe, not to mention the unrecorded public or private conversations that occurred on a daily basis, it is no stretch of the imagination to conclude that the Church considered the issue of solar cosmology one of the most important it had ever faced, perhaps close to the Trinitarian or Christological disputes that occurred in its early centuries, or the matters regarding Salvation during the Protestant revolt. Although each of these doctrinal issues certainly had its own specific concerns, in general they all had one simple and common thread: how do we interpret the words of Scripture; and if there is a dispute, who has the final say on which interpretation is correct?

The matter of biblical interpretation was never made more pertinent than it was in the Galileo affair. Few of the participants got bogged down in theological minutia as they had in the early centuries of Christianity when they attempted to discern how three persons could exist in one God, or why St. Paul said a man was not justified by works (Rm 3:28) but St. James insisted that he was (Jm 2:24). The Galileo case was a simple matter of deciding, out of two equally plausible options of viewing the cosmos, neither of which had been proven scientifically, whether to interpret Scripture literally or figuratively. As we have documented, the Church clearly came down on the side of literal interpretation, and the rest of the Galileo affair is mere detail. Galileo knew this fact quite early in the game. On July 7, 1612, he received a letter from Cardinal Carlo Conti, prefect of the Holy Office, which more or less gave the official view on the

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[638] Paul Feyerabend, *Farewell to Reason*, pp. 263-264.

[639] T. H. Huxley, Letters and Diary 1885, Nov. 12, 1885. Huxley's comment is also cited in the *Catholic Encyclopedia* article on Galileo: "and Professor Huxley after examining the case avowed his opinion that the opponents of Galileo 'had rather the best of it'" (Robert Appleton and Co, 1910, Vol. VI, p. 344).

[640] The 1633 sentence against Galileo stated that heliocentrism was: è propositione assurda e falsa in filosofia, e formalmente heretica ("an absurd proposition and false in philosophy and formally heretical") cited in *Galileo E L'Inquisizione*, Favaro, p. 143.

[641] The best summary of the documentation on Vatican record keeping during the Inquisition is Francesco Beretta's "The Documents of Galileo's Trial: Recent Hypothesis and Historical Criticism" in *The Church and Galileo*, editor Ernan McMullin, pp. 191-212.

[642] Favaro has assembled twenty volumes of such official and unofficial correspondence, most averaging over 500 pages in each volume, in his massive *Le Opere di Galileo Galilei*, originally published in 1909, and republished in 1968.

matter of Scripture interpretation, specifically concerning whether Aristotelian principles were based on sound scriptural exegesis. Conti admits that neither Scripture nor the Fathers endorse such Aristotelian notions as the incorruptibility of the heavens,[643] but in regard to a moving sun around the Earth, both sources confirmed it as factual:

> Because, although those passages stating that the earth is firm and immovable can be understood as signifying the perpetuity of the earth, as Lorini noted in the place already cited, nevertheless, where it says that the sun revolves and the heavens move, the Scripture cannot be interpreted in any sense other than that which corresponds to the popular, common usage…Nevertheless, Diego Stunica says, regarding the ninth chapter of Job, verse 6, says that it is more in conformity to Scripture to have the Earth move, although his interpretation is not commonly followed. This is what it has been possible to discover up to this moment on the subject. But when your eminence [Galileo] desires some further clarification regarding the other Scriptural passages, please let me know and I shall send you a response.[644]

Here we see that four years before his confrontation with Bellarmine, Galileo got word of the party line, as it were. The significant aspect of Conti's answer is, although the Church was willing to bend a little and say that the scriptural passages concerning the fixity of the Earth might possibly be interpreted as referring to the Earth's steadfast existence in time as opposed to space (as Lorini suggested), still, the passages concerning the movement of the sun and stars around the Earth could not have a meaning beyond what had been commonly interpreted. Conti's distinction would play itself out both in 1616 and again in 1633, since assertions advocating that the Earth moved were put in the category of "erroneous in faith" while those asserting the sun's immobility were placed in the higher category of "formally heretical."

Bellarmine himself was also very critical of Aristotelian cosmology,[645] but when it came to the case of whether the Earth was fixed and the sun moved, as far as he was concerned Aristotle had little to do with the question of its veracity. In essence, Scripture was the judge of Aristotle, Ptolemy, Copernicus, Galileo and any other aspiring cosmologist. As McMullin notes: "The habitual literalism of the Fathers in their use of the Bible as a source of cosmological knowledge he [Bellarmine] never questioned."[646] On what basis *could* he question it, since the Council of Trent, probably the most dogmatic and incisive set of official documents the Catholic Church has ever produced, had told him quite clearly just fifty years earlier that the Church had the final say on biblical interpretation and she took her marching orders from the consensus of the patristic witness? Bellarmine had already put these principles into practice in the case of Giordano

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[643] Original Italian: "In quanto poi a quello che me rechiede, se la Scrittura Sacra favorisca a principii de Aristotele intorno la constitutione dell' universo; se V.S. parla dell' incorrottibilità del cielo, some pare che accenni nella sua, dicendo scoprirse ogni giorno nove cose nel cielo, le respondo non essere dubbio alcuno che la Scrittura non favorisce ad Aristotele, anzi più tosto alla sentenza contraria, sì che fu commune opinione de' Padri che il cielo fosse corruttibile" (*Le Opere di Galileo Galilei*, Vol. 11, p. 354).

[644] Original Italian: "Perchè, se bene quei luoghi dove se dice che la terra stii stabile et ferma, si possono intendere della perpetuità della terra, come notò Lorino nel luogo citato, nondimeno dove si dece che il sole giri et i ciele si movono, non puole havere altra interpretatione la Scrittura, se non che parli conforme al comun modo del volgo… Nondimeno Diego Stunica, sopra il nono capo di Giob, al versetto 6, dice essere più conforme alla Scrittura moversi la terra, ancor che comunemente la sua interpretatione non sia seguita. Che è quello si è potuto trovare fin hora in questo proposito; se ben quando V. S. desideri di havere altra chiarezza d'altri luoghi della Scrittura, me lo avisi, chè gli lo mandarò" (*Le Opere di Galileo Galilei*, Vol. 11, p. 355). The ellipsis contains a difficult and possibly a textually corrupt statement: "il qual modo d'interpretare, senza gran necessità non non si deve ammettere." The double negative (non non) renders it non sensical. With only one negative Conti may be saying: "But such interpretation are not to be admitted without great necessity."

[645] Here we side with Blackwell who says that Santillana's claim that "Bellarmine was semiconsciously frightened by a problem he had never faced: What if the Aristotelian substructure were to prove unreliable?" is "nonsense" (*Galileo, Bellarmine and the Bible*, p. 45).

[646] "The Church's Ban on Copernicanism," in *The Church and Galileo*, p. 177.

Bruno sixteen years earlier, having been one of the judges at his trial.[647]

Giovanni Ciampoli had warned Galileo of the same biblical principles from the mouths of both Cardinal Barberini and Cardinal Bellarmine. In two letters to Galileo written in early 1615, he states:

> Cardinal Barberini, who, as you know from experience, has always admired your competency, told me just last evening that in regard to these opinions he would advise greater caution in not going beyond the arguments of Ptolemy or Copernicus, and ultimately in not exceeding the limits of physics and mathematics, because the explication of the Scriptures is restricted to theologians who deal with such matters, and if new things are introduced, even though admired for their ingenuity, not everyone has the unbiased ability of regarding them just as they are said….Surely we can attest to having to remit to the authority of those who have jurisdiction over human reason in the interpretation of the Scriptures, and it is most necessary on this occasion due to other people's malice.[648]

[647] Among Giordano's more heretical ideas was pantheism, although he later rejected it for a more deterministic system in which "graded animate monads" were given some independence from the "informing" Source. He believed the "transcendent God" is known by faith, but the immanent is reflected in numerous animate unities that constitute reality. Bruno had a great influence on Spinoza, Leibniz and Descartes (*Encyclopedia of Religion*, p. 90). The work that brought Bruno before the Inquisition was *Spaccio de la Destia Trionphante*, which "attacked all religions of mere credulity as opposed to religions of truth and deeds" (Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory*, p. 50, from J. Lewis McIntyre, *Giordano Bruno*, London, 1903, pp. 16-40). It was a biting attack on the Roman Church. At the time, Bruno was in England, living at the same time as William Shakespeare (Robert Beyersdorf, Giordano Bruno and Shakespeare, Leipsic, 1889, pp. 8-36), but Shakespeare was a firm geocentrist, as noted in such passages as Troilus and Cressida, Act 1, scene 3; King John, Act III, scene 1; and Merry Wives, Act III, scene 2 (Stimson, *ibid*.), and he was a devout Catholic as well. Frances Yates, the Oxford scholar, investigated the original manuscripts at the Warburg Institute in London and determined that, based on the heliocentric theory, Bruno believed he could call down power from the sun. The Inquisition discovered that his plan was to reconcile Catholics and Protestants by recourse to Egyptian Sun-worship (and associated with the Greek god, Hermes). Bruno also sought the use of magic and astro-empowered images to achieve this goal. As such, the Freemasons and Kabbalistic Jews of the French Revolution idolized Bruno and carried his bust in street processions. Yates shows that much of Renaissance and Post-Renaissance science was based on magic and the occult. Yates also believed Bruno was executed, although she admits there is no official Vatican record of it (Frances A. Yates, *Giordano Bruno and the Hermetic Tradition*, University of Chicago Press, 1964, 1991, p. 349). Despite Yates' belief, there is substantial evidence leading to the conclusion that Bruno was never executed, least of all by Catholic authorities. According to one source: "The whole story is based on an alleged letter from Gaspard Schopp to his friend Conrad Rittenshausen, dated in Rome, Feb. 17, 1600…This letter was 'found' by a Lutheran pastor, Jean-Henri Ursin (1608-1667) in a book printed in Germany, a very rare book with a pseudonym for the author, as well as a false date and place of publication. No one has ever seen the original letter….No contemporary of Bruno's in Rome in 1600 ever mentioned an execution. Bruno was very famous throughout Europe, and his death, especially at the stake in Rome, would not go unnoticed, particularly by Protestant authors who would certainly have been all too happy to denounce Catholic intolerance. Moreover, there is absolutely no record of a trial or of any sentence against Bruno. All that is known is, after spending six years (1592-1598) in Venetian jails, Bruno came back to Rome. He might have been put under house arrest in some monastery, but no one knows how he died. Strangely enough, it is only from 1701 onwards that the story of Giordano Bruno made headlines, but without any new evidence about his fate….Pierre Bayle (1647-1706) the famous author of the Dictionnaire historique et critique…in his article on Bruno says he does not believe he was executed since the only source is Schopp's letter, which he considers a fake. In addition, Moreri (1643-1680), who wrote the *Grand Dictionnaire Historique*, does not believe Bruno was executed. Last but not least, the Venetian ambassadors in their diplomatic dispatches to the government never mentioned an execution of Bruno, yet he spent six years in their jails" (Source: Claude Eon, letter on file, November 2005, gleaned from the 1885 work of Théophile Desdouits).

[648] Cardinal Barberino, il quale, come ella sa per esperienza, ha sempre ammirato il suo valore, mi diceva pure hiersera, che stimerebbe in queste opinioni maggior cautela il non uscir delle ragioni di Ptolemy o del Copernicus, o finalmente che non eccedessero I limiti fisici o mathematici, perchè il dichiarar le Scritture pretendono I theology che tochhi a loro; e quando di porti novità, ben che per ingegno ammiranda, non ogn' uno ha il cuore senza passione, che voglia prender le cose come

> Signor Cardinal Bellarmine…he concluded that there should be no contradiction when one treats the system of Copernicus and his demonstrations without entering into Scripture, the interpretation of which is reserved to the professors of theology who are approved by the public authority.[649]

As it stands, the Galileo affair was just another tool that allowed the Church to reaffirm the same literal interpretation of Scripture that it had employed in all previous centuries. In that sense, Galileo was a welcome thorn that woke the sleeping giant. All the Church's doctrines (the Trinity, the Incarnation, original sin, transubstantiation, baptismal regeneration, hell, the bodily resurrection, *etc*.) were based on the literal interpretation of Scripture, and almost always in the face of objections from outsiders that it was absurd to interpret Scripture literally in such cases. The Church maintained, and the Galileo issue brought it out once again, that except for very obvious instances in which Scripture should not be interpreted literally, literal interpretation was to reign in all biblical exegesis, just as it had since the beginning of the Church. To depart from it one had to have an irrefutable reason for doing so, and no one either then or now could provide such a reason. As even Paul Feyerabend has defended the actions of the Church against Galileo:

> Besides, the Church, and by this I mean its most outstanding spokesmen…did not say: what contradicts the Bible as interpreted by us must go, no matter how strong the scientific reasons in its favor. A truth supported by scientific reasoning was not pushed aside. It was used to revise the interpretation of the Bible passages apparently inconsistent with it. There are many Bible passages which seem to suggest a flat earth. Yet Church doctrine accepted the spherical earth as a matter of course. On the other hand the Church was not ready to change just because somebody had produced some vague guesses. It wanted *proof* – scientific proof in scientific matters. Here it acted no differently from modern scientific institutions: universities, schools and even research institutes in various countries usually wait a long time before they incorporate new ideas into their curricula…But there was as yet no convincing proof of the Copernican doctrine. Hence Galileo was advised to teach Copernicus *as a hypothesis*; he was forbidden to teach it *as a truth*.
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> This distinction has survived until today. But while the Church was prepared to admit that some theories might be true and even that Copernicus' might be true, given sufficient evident,[650] there are now many scientists, especially in high energy physics, who view all theories as instruments of prediction and reject truth-talk as being metaphysical and speculative. Their reason is that the devices they use are so obviously designed for calculating purposes and that theoretical approaches so clearly depend on considerations of elegance and easy applicability that the generalization seems to make good sense. Besides, the formal properties of 'approximations' often different from those of the basic principles, many theories are first steps towards a new point of view which at some future time may yield them as approximations and a direct inference from theory to reality is therefore rather

son dette….Sì che l' attestare spesso di reimettersi all' autorità di quei che hanno iurisditione sopra gl' intelletti humani nell' interpretationi delle Scritture, è necessarissimo per levar questa occasione all' altrui malignità (*Le Opere di Galileo Galilei*, vol. 12, p. 146).

[649] S. Card. Bellarmino…e ci concludeva che quando ella tratterà del sistema Copernicano e delle sue dimostrationi senza entrare nelle Scritture, la interpretatione delle quali vogliono che sia riservata a I professori di theologia approvati con publica autorità, non ci doverà essere contrarietà veruna. (March 21, 1615, *Le Opere di Galileo Galilei*, vol. 12, p. 160).

[650] Here Feyerabend footnotes the letter Bellarmine wrote to Foscarini saying: "…if there were a true demonstration…that the sun does not circle the earth but the earth circles the sun, then we would have to proceed with great care in explaining the Scriptures that appear contrary, and say rather that we do not understand them than that what is demonstrated is false. But I will not believe there is a demonstration until it is shown me."

naïve.[651] All this was known to 16th and 17th century scientists. Only a few astronomers thought of deferents and epicycles as real roads in the sky; most regarded them as roads on paper which might aid calculation but which had no counterpart in reality. The Copernican point of view was widely interpreted in the same way – as an interesting, novel and rather efficient model. The Church requested, both for scientific and for ethical reasons, that Galileo accept this interpretation. Considering the difficulties the model faced when regarded as a description of reality, we must admit that 'logic was on the side of…Bellarmine and not on the side of Galileo,' as the historian of science and physical chemist Pierre Duhem wrote in an interesting essay.[652]

To sum up: the judgment of the Church experts was scientifically correct and had the right social intention, *viz*., to protect people from the machinations of specialists. It wanted to protect people from being corrupted by a narrow ideology that might work in restricted domains but was incapable of sustaining a harmonious life. A revision of the judgment might win the Church some friends among scientists but would severely impair its function as a preserver of important human and superhuman values.[653]

Galileo's Letter to Benedetto Castelli

We can obtain an enlightening view of Galileo's treatment of Scripture in his letter to Benedetto Castelli of December 21, 1613. He writes:

Galileo: In regard to the Grand Duchess' first general question, I agree, as you most prudently proposed, conceded, and established, that it is not possible for Sacred Scripture ever to deceive or to err; rather its decrees have absolute and inviolable truth. Only I would have added that, although Scripture itself cannot err, nevertheless some of its interpreters and expositors can sometimes err, and in various ways. The most serious and most frequent of these errors occurs when they wish to maintain always the direct meaning of the words, because from this there results not only various contradictions but even grave and blasphemous heresies.

Analysis: Although it is certainly possible to create a heresy by literally interpreting Scripture when it should be interpreted non-literally, in reality, few heresies have been created by such means. In actuality, the preponderance of Catholic dogmas have been forged by taking the words of Scripture in their "direct meaning." As noted, the Church would not have recognized the doctrine of baptismal regeneration had it not been decided that the words of Jesus in John 3:5 ("unless a man is born of water and the spirit he cannot enter the kingdom of God") should be interpreted literally. If the Church had not been guided by the Spirit of God it would have been very easy for her to conclude that John 3:5, and many other passages of Scripture, should be interpreted figuratively, not literally. In fact, the non-literal or symbolic interpretations of John 3:5 (*e.g*., that water represents spiritual cleansing as opposed to being the actual agent for procuring salvation) are much easier for the average mind to accept and apply. Ostensibly, it seems rather primitive to believe that water carries salvific power, but that is, indeed, the only truth that the Church dogmatized, in spite of ridicule from the world, both then and now. The reason the Church made the decision not to interpret such passages figuratively is that she, by guidance from the Holy Spirit, had long ago made a prior commitment to the literal interpretation of Scripture. Unless there was a sufficient reason not to do so, the literal interpretation ruled all exegesis. In the end, it is the Church who decides when a non-literal interpretation can be applied. This is a very serious matter and it cannot be treated lightly. Inevitably, grave problems will arise when men of no ecclesiastical authority decide for themselves that a certain scriptural passage should be interpreted figuratively against the Church's insistence it be interpreted literally. It is then that heresies are created. When it came time to make a formal and

[651] Here Feyerabend includes a footnote to the book *How the Laws of Physics Lie* by Nancy Cartwright, Oxford, 1983.

[652] Here Feyerabend cites Duhem's book, *To Save the Phenomena*, 1963, p. 78

[653] Paul Feyerabend, *Against Method*, pp. 132-133.

final decision on how to interpret Scripture's cosmological passages, the Church decided, in accord with two thousand years of Hebrew exegesis and fifteen hundred years of Catholic exegesis, that in the case of deciding whether the sun went around the Earth or vice-versa, this was an instance that required literal interpretation. As Feyerabend notes: "The Church, being the foremost guardian and interpreter of the Bible, also made it a boundary condition of reality."[654] These principles were outlined in detail in Bellarmine's dealing with the topic of biblical interpretation in his famous *De controversiis*:

> Now that it has been established that Scripture is obscure and needs interpretation, another question arises; namely, whether the interpretation of Scripture should be sought from some one visible and common judge, or should be left to the judgment of each individual person. This is indeed a most serious question, and all controversies depend, as it were, on it…
>
> Certain preliminaries must be noted in order to understand what is being asked. The first of these concerns the meanings of Scripture. For it is a peculiarity of Scripture, since it has God as its author, that it very often contains two meanings, the literal or historical, and the spiritual or mystical. The literal meaning is the meaning which the words immediately present; the spiritual meaning refers to something else other than that which the words immediately signify. This distinction is used by the Apostle in Corinthians 10:1f, where he says that everything that happened to the Jews is an example for our improvement. What is said about the exodus of the Jews from Egypt, the crossing of the sea, the manna rained in the desert, and the water which flowed from the rock, he applies spiritually to Christians. Also Jerome in *In Ezechielem*, Chapter 2, where he deals with the Apocalypse and Ezekiel 2, teaches that these two meanings are signified internally and externally by the written book….
>
> Furthermore there are two types of literal meaning: simple, which consists of the proper meanings of words; and figurative, in which words are transferred from their natural signification to another. There are as many types of the latter as there are types of figures. When the Lord says in John 10, "I have other sheep which are not of this fold," the meaning is literal; but the figurative meaning is that other men besides the Jews must be gathered into the Church, which is said properly at John 11; namely, that he would gather together in unity the children of God who were scattered. Regarding figurative locutions, see St. Augustine, *De doctrina christiana*, Book 3. But however this may be, spiritual meaning is not found in every sentence of Scripture, in neither the Old nor in the New Testament. For the words, "Love the Lord your God with all your heart," in Deuteronomy 6 and in Matthew 22, and similar precepts, have only one meaning, that is, the literal meaning, as Cassiano rightly teaches in *Collationes* 8, Chapter 3. This being so, we and our adversaries agree that effective arguments ought to be sought in the literal meaning alone. For it is certain that that meaning, which is taken immediately from the words, is the meaning of the Holy Spirit. But there are various mystical and spiritual meanings, and although they are edifying when they are not contrary to faith and good morals, nevertheless it is not always clear whether they were intended by the Holy Spirit…

In the following paragraph, Bellarmine shows that the Church's insistence on interpreting Scripture's cosmological passages literally is consistent and foundational to how she has interpreted Scripture's other difficult passages that one might be tempted to interpret non-literally:

> Doubts regarding the literal meaning itself arise occasionally for two reasons. The first is the ambiguity of words, as is seen in Matthew 26, "Drink all of you from this." The words "all of you" are ambiguous, if only the words are examined. For it is not known whether this signifies all men absolutely, or only all the faithful, or all the apostles. The second and

[654] Paul Feyerabend, *Farewell to Reason*, p. 253.

more serious case is the proper meaning of words. For since literal meaning is sometimes simple and sometimes figurative, as we said, it is doubtful in many places whether the true sense is simple or figurative. The words in Matthew 26, "This is my body," Catholics wish to be accepted simply according to the proper meaning of the words, but the followers of Zwingli take them in a metaphorical way. For this reason some have at times fallen into the gravest errors. An example is Origen who erred in this way by accepting figuratively what should have been taken simply, as Jerome teaches in his *Epistula ad Pammachium* concerning the error of John of Jerusalem…

Others have fallen into the contrary error of taking as simple and proper things which ought to be taken figuratively. An example is Papias, and those who followed him, Justinius, Irenaeus, Tertullian, Lactantius, and some others, who thought that what is said in Apocalypse 20, about the New Jerusalem and the thousand years in which the saints will reign with Christ, is to happen here on earth. Their error was condemned by Jerome in the preface to his *In Isaiam*, Book 18, and in *In Ezechielem*, Chapter 36, and by Augustine in his *De civitate Dei*, Book 20, Chapter 7.

Our adversaries agree with us that the Scriptures ought to be understood in the spirit in which they were written, that is, in the Holy Spirit. The Apostle Peter teaches this in 2 Peter 1, when he says, "Understand this first, that no prophecies are due to individual interpretation. For the prophecies are never derived from human effort; rather the holy men of God spoke as inspired by the Holy Spirit." By this St. Peter proves that the Scriptures ought not to be explained by the individual mind but according to the dictates of the Holy Spirit, because they were not written by the human mind but by the inspiration of the Holy Spirit.

The whole question, therefore, comes down to this: Where is that spirit? We maintain that, although this Spirit is often absent in many individual persons, still it is certainly to be found in the Church, that is, in a council of bishops established by the highest pastor of the whole Church, or in the highest pastor with a council of the other pastors. We do not wish to enter into a discussion here about the highest pontiff and councils, as to whether the pontiff alone or a council alone can define something. We will deal with this in its own place. Rather here we say in general that the judge of the true meaning of Scripture and of all controversies is the Church, that is, the pontiff with a council, on which all Catholics agree and which was expressly stated by the Council of Trent, Session 4.

But all contemporary heretics teach that the Holy Spirit which interprets Scripture is not a group of bishops or of any other class of persons. Hence each individual ought to be the judge, either by following his own spirit if he has the gift of interpretation, or by committing himself to someone else whom he sees as having that gift…[655]

The same things that Bellarmine, Trent, and the popes to the present day wrote about the inspiration and inerrancy of Scripture were also expressed in the 1994 *Catechism of the Catholic Church*, published by John Paul II two years after he gave his speech to the Pontifical Academy of Science.

Sacred Scripture is the speech of God as it is put down in writing under the breath of the Holy Spirit.[656]

[655] Bellarmine's *Disputations on the Controversies Over the Christian Faith Against the Heretics of the Day*, Controversy I: On the Word of God; Book 3: On the Interpretation of the Word of God; Chapter 3: The Question of the Judge of Controversies is Posed; also the Meanings of Scripture are Discussed, selected portions, as translated by Blackwell in *Galileo, Bellarmine and the Bible*, pp. 187-193, with my correction of "Corinthians 1:10" to "Corinthians 10:1f."

[656] *Catechism of the Catholic Church*, 2nd edition, Libreria Editrice Vaticana, 1994, 1997, ¶ 81.

> The task of giving an authentic interpretation of the Word of God, whether in its written form or in the form of Tradition, has been entrusted to the living, teaching office of the Church alone.[657]
>
> The Church's Magisterium exercises the authority it holds from Christ to the fullest extent when it defines dogmas, that is, when it proposes, in a form obliging the Christian people to an irrevocable adherence of faith, truths contained in divine Revelation or also when it proposes, in a definitive way, truths having a necessary connection with these.[658]
>
> It is clear therefore that, in the supremely wise arrangement of God, sacred Tradition, Sacred Scripture, and the Magisterium of the Church are so connected and associated that one of them cannot stand without the others. Working together, each in its own way, under the action of the one Holy Spirit, they all contribute effectively to the salvation of souls.[659]
>
> God is the author of Sacred Scripture. The divinely revealed realities, which are contained and presented in the text of Sacred Scripture, have been written down under the inspiration of the Holy Spirit.[660]
>
> The inspired books teach the truth. Since therefore all that the inspired authors or sacred writers affirm should be regarded as affirmed by the Holy Spirit, we must acknowledge that the books of Scripture firmly, faithful, and without error teach that truth which God, for the sake of our salvation, wished to see confided to the Sacred Scriptures.[661]
>
> In Sacred Scripture, God speaks to man in a human way. To interpret Scripture correctly, the reader must be attentive to what the human authors truly wanted to affirm and to what God wanted to reveal to us by their words.[662]
>
> In order to discover the *sacred authors' intention*, the reader must take into account the conditions of their time and culture, the literary genres in use at that time, and the modes of feeling, speaking, and narrating then current. For the fact is that truth is differently presented and expressed in the various types of historical writing, in prophetical and poetical texts, and in other forms of literary expression.[663]

We pause here to notice that, unlike many liberal interpreters of Scripture who appeal to the "author's intention" as a rationale for asserting that Scripture could contain propositional errors in its "various types" of writing (a common belief among those in the Pontifical Academy of Science and other higher echelons of academia), the Catechism makes absolutely no mention of such a possibility, here or in any other paragraph of its 904 pages. In fact, liberal interpreters who have attempted to turn the Catechism's clause "for the sake of our salvation" (¶107) into an assertion that Scripture is only inerrant when it speaks about salvation,[664] should be quite shocked to find that the Catechism makes no mention of such a meaning or intent among the sacred authors. In fact, in paragraph 95 the Catechism states the same truth as paragraph 107 concerning the goal of salvation, as it describes the outcome of the working together of Tradition, Scripture and the Magisterium. It states: "they all

[657] *Ibid*., ¶ 85.

[658] *Ibid*., ¶ 88.

[659] *Ibid*., ¶ 95.

[660] *Ibid*., ¶ 105.

[661] *Ibid*., ¶ 107.

[662] *Ibid*., ¶ 109.

[663] *Ibid*., ¶ 110.

[664] As we noted earlier, a good example of this new teaching are the works of the late Fr. Raymond Brown, editor of the *New Jerome Biblical Commentary*, and one of the most influential Catholic theologians in the world. He writes: "Scriptural teaching is truth without error to the extent that it conforms to the salvific purpose of God" (*New Jerome Biblical Commentary*, p. 1169). The Catholic Church has never officially taught Brown's view of biblical interpretation.

contribute effectively to the salvation of souls."[665] The suggestion that "for the sake of our salvation" means that Scripture's inerrancy is limited to matters of salvation is one of the most erroneous impositions ever foisted on Scripture and the Catholic Church. The correct meaning, as it has been established in every document the Church has ever produced on the issue, is that Scripture was made inerrant precisely because God wanted man to have a flawless source of divine information upon which he can seek and secure his salvation. In actuality, the liberal exegete's continual appeal to the "author's intention" is merely a psychological ploy to implant the idea that the biblical author may not have intended to tell factual truth and thereby left himself room to make historical mistakes. Rather, he intended to be less than truthful about the occurrences of an historical event, or that he intended as fiction what actually appears to be an historical narrative.[666] But the Catechism admits to no such "intention" among the biblical authors. It merely states that the sacred author's intention should be taken into account, and rightly so. Obviously, an exegete would want to know whether the author was speaking in prose or poetry, metaphors or literalism, so that he can adjust his thinking about how the material is being communicated to him. But the Catechism does not, in any way, shape or form, state that the intention of the author may have been to allow errors of fact in his writing; that he wanted to be less than truthful concerning what occurred; or that he intended as fiction what is displayed as an actual event. In fact, in not one magisterial document ever produced by the Catholic Church is the "sacred author's intent" ever stated to include errors, fictions or fabrications in Scripture's historical narratives.

The Catechism finishes with the same principle that Bellarmine taught concerning how we are to interpret Scripture within the context of the same Spirit that gave it:

> But since Sacred Scripture is inspired, there is another and no less important principle of correct interpretation, without which Scripture would remain a dead letter. Sacred Scripture must be read and interpreted in the light of the same Spirit by whom it was written.[667]
>
> Read the Scripture within the living Tradition of the whole Church.[668]

Lastly, the Catechism gives primacy to the literal interpretation:

> The literal sense is the meaning conveyed by the words of Scripture and discovered by exegesis, following the rules of sound interpretation: All other senses of Sacred Scripture are based on the literal.[669]
>
> **Galileo**: Accordingly it would be necessary to attribute to God feet and hands and eyes and even human and bodily feelings like anger, regret, hatred, and even occasional forgetfulness of the past and ignorance of the future. Many propositions are found in the Scriptures which, in respect to the bare meaning of the words, give an impression which is different from the truth, but they are stated in this way in order to be accommodated to the incapacities of the common man. As a

[665] *Ibid*., ¶ 95.

[666] For example, Raymond Brown writes: "If one correctly classifies a certain part of the Bible as fiction, one is not destroying the historicity of that section, for it never was history; one is simply recognizing the author's intention in writing that section" (*The New Jerome Biblical Commentary*, p. 1152). Of course, what Brown hasn't determined to anyone's satisfaction is *how* one "correctly classifies a certain part of the Bible as fiction." The only certain way this could be done is if the Bible itself states that a certain narrative is fictional (*e.g*., parables). All other attempts at determining fiction in the Bible are totally subjective and without the slightest proof. This issue becomes all the more egregious when exegetes such as Brown and his like-minded colleagues arbitrarily assign passages to the realm of fiction merely because they regard them as too fanciful for modern tastes, such as the story of Jonah and the whale, the flood of Noah's day, or any number of narratives that exhibit a certain amount of miraculous intrusion. Of course, included in Brown's wish for the "intent" of the biblical author to speak in non-literal ways are those passages that speak about the sun revolving around the Earth and the Earth being motionless in space.

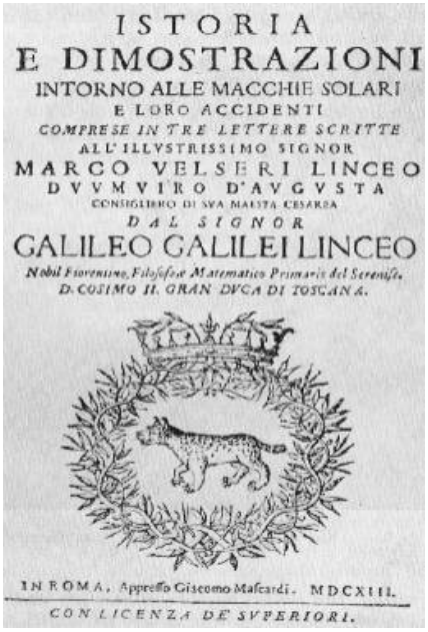
[667] *Ibid*., ¶ 111.

[668] *Ibid*., ¶ 113.

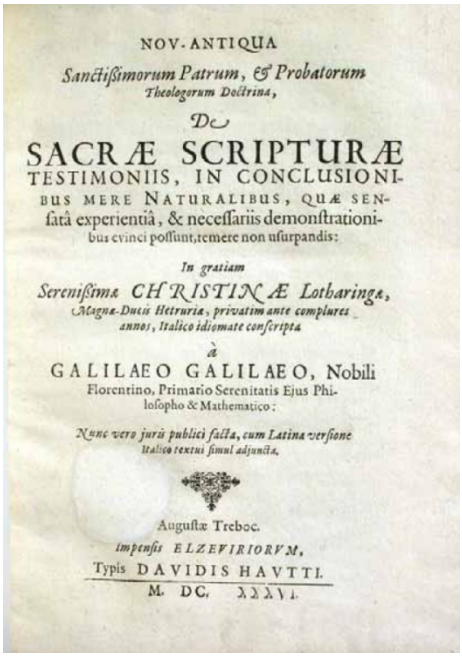
[669] *Ibid*., ¶ 116.

Covers of Galileo's Various Books and Letters

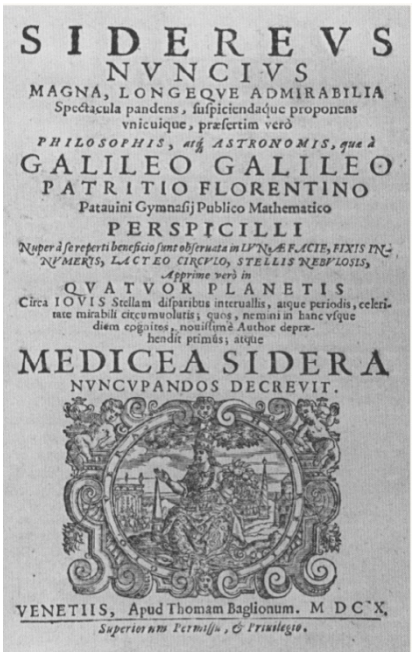
Dialogue on the Two Great World Systems



Book Concerning Sunspots



Letter to Duchess Christina



The Book *Siderius Nuncius*

result, for those few who deserve to be distinguished from the common people, it is necessary that wise expositors provide the true meanings and indicate the particular reasons why the Scriptures are expressed in such words.

Analysis: Objectors to the Church's literal interpretations of biblical cosmology often attempt to dismiss her claims by appealing to the many anthropomorphisms in Scripture that describe God's being and actions (*e.g.*, Gn 6:8: "eyes of the Lord"; Ex 6:6: "the arm of the Lord"; Dt 9:10 "finger of God"). As the argument goes, if we cannot interpret these kinds of passages literally, we have no obligation to interpret biblical cosmology literally. But the argument is fallacious. Early in her history the Church had already decreed that God does not have human body parts and thus there was no debate on how to interpret the aforementioned passages. Although it can safely be said that God, being omniscient and omnipresent, sees all our actions and hears all our words, he does not gather this information through human-like eyes or ears, otherwise he would be human. Likewise, even though there are many passages of Scripture in which men hear God speaking to them in their own language (*e.g.*, Mk 1:11: "Thou are my beloved Son; in Thee I am well pleased"), still, the sound waves that hit the human eardrum are not made by a human-like mouth. God makes the sounds in his own mysterious way. Therefore, because Church doctrine has already established that God does not have human body parts, the exegete is required to interpret such passages in an anthropomorphic manner.

At the other extreme, however, are instances when the Church insists on a literal interpretation, even when the resulting conclusion cannot be explained by science or does not agree with science. Such is the case with Transubstantiation. The Church insists that certain passages, such as Mt 26:26 ("This is my body") must be interpreted literally, even though science insists that such a phenomenon is impossible under ordinary physical laws.

The point to be gleaned from these two opposite poles of biblical exegesis is that interpretation is always subject to the principle known as 'the hierarchy of truths,' that is, a higher or confirmed truth sets the limits on how one can interpret other passages of Scripture that are more vague or ambiguous. As noted above, the higher truths concerning the nature of God prohibit the exegete from interpreting certain passages as teaching that God has human body parts. Similarly, the higher truths given by the Holy Spirit to the Church prohibit the same exegete from interpreting in a non-literal manner passages concerning the eating of Christ's flesh.[670]

As it stands, Cardinal Bellarmine explained to Foscarini and Galileo that the Church had long ago determined that Scripture's data concerning the fixity of the Earth and the movement of the sun had to be interpreted literally. From Solomon, to the Church Fathers, to the medieval theologians, and now the magisterium of the Church itself, all agreed that, of the two possible interpretations (literal or figurative), the Scripture must be interpreted literally in these particular cases. According to Bellarmine, there was no scientific proof to the contrary, and there never would be. He was right, since no modern scientist worth his reputation can claim that heliocentrism has been proven.

Interestingly enough, Galileo's appeal to Scripture's anthropomorphisms as the rationale to interpret Scripture's cosmological passages in a non-literal manner is very similar to modern science's attempt to eliminate the Church from today's discussion concerning whether evolution is a valid theory of science. Based on the claim that the Church was wrong about physics and astronomy in the case of Galileo, it has also concluded that because of similar ignorance about geology and paleontology, the Church is wrong about Darwin. This ploy has been used countless times in classrooms, books and general discussion. The Church is ridiculed and summarily dismissed as an authority on the subject of science and other modern issues (abortion, stem cell research, sexual relations, *etc*.) since, as the argument goes, 'it should have learned its lesson' about the supremacy of science when it erroneously chastised Galileo. Annibale Fantoli claims, for example, that

> …it seems to me erroneous, even from a religious point of view, to claim that by now the "Galileo Affair" is a thing of the past, a question closed forever. It remains, and should remain, "open," on the contrary, as a severe lesson of humility to

[670] *Cf.* Jn 14:16-17; 15:26; 16:13. Even Protestant denominations who do not interpret Mt 26:26 in a literal manner are, in a reverse manner, following the "hierarchy of truths" principle, since they have determined, *a priori*, that such passages cannot be interpreted literally.

> the Church at all levels and as a warning, no less rigorous, not to wish to repeat in the present or in the future the errors of the past, even the most recent past.[671]

Such sentiments are filled with theological and scientific presumption. As we have presented in meticulous detail, the Church was not wrong, Galileo was wrong, for he had no proof of heliocentrism and there never has been proof. The only lesson to be learned is this: as the Church put its faith in Scripture, the Fathers, and the guidance of the Holy Spirit for the fifteen hundred years prior to Galileo, it must do the same for the five hundred years after Galileo and beyond. Tradition and faithfulness are the Church's trademark; reinvention and revolution are the world's curse. In reality, whereas the world sought an apology from the Church for its censorship of Galileo, it is now the world that owes an apology to the Church for doubting its God-given authority to decide such matters for the good of the whole world.

> **Galileo**: Granting then that in many passages the Scriptures not only can be, but necessarily must be, interpreted differently from the apparent meaning of the words, it seems to me that in cases of natural disputes Scripture ought to be put off to the last place…. Moreover it is agreed that, to accommodate itself to the understanding of everyone, Scripture says many things which are different from absolute truth in the impression it gives and in the meaning of its words. On the other hand nature is inexorable and immutable and cares not whether its hidden causes and modes of operation are or are not open to the capacities of humans, and hence it never violates the terms of its established laws. As a result it seems that natural effects, which either sense experience places before our eyes or necessary demonstrations reveal, should never be placed in doubt by passages of Scripture whose words give a different impression; and further not everything said in the Scriptures ought to be associated strictly with some effect in nature. Because of this characteristic alone, *i.e.*, that Scripture accommodates itself to the capacity of uncouth and uneducated people, Scripture does not refrain from faintly sketching its most important dogmas, thus attributing to God himself conditions which are very far from, and contrary to, his essence. So who would wish to maintain with certainty that Scripture abandons this characteristic when it speaks incidentally of the earth or the sun or other creatures, and has chosen to restrain itself completely within the limited and narrow meaning of the words? – and especially when it speaks about those created things which are very far from the primary purpose of the Scriptures? – or even when it speaks of things which, when stated and presented as bare and unadorned truths, would quickly damage its primary intention by making the common man more stubbornly resistant to be persuaded of the articles concerning his salvation?

Analysis: We often hear the same arguments today concerning the so-called "uneducated peoples" of biblical times. The academic elite of our day have conditioned us to think of early man as a grunting and insipid hunter-gatherer who could only understand the simplest of concepts. This is far from the truth. In the early chapters of Genesis the biblical picture of early man is someone with vast intellectual capacity and the physical prowess to match it (Genesis 1-11).

In regard to understanding the mechanics of the heavens, even the so-called "educated" people of our modern day use the same phenomenal language as did early man when speaking about celestial phenomena. After thousands of years of language development and scientific advances we still say "the sun rises" and "the sun sets," just as ancient man did. Technically speaking, this choice of words is scientifically inaccurate. That being the case, should we then look upon ourselves as uneducated? Obviously not, since our very education teaches us that there is a vast difference between speaking figuratively and knowing the literal truth. The fact is, the sun neither literally rises nor literally sets in the heliocentric or geocentric systems. In the former the sun is the centerpiece and in the latter it is revolving around the Earth. Even though the sun is moving in the geocentric system, it is not literally "rising" or "setting"; rather, such terms merely describe the

[671] *Galileo: For Copernicanism and the Church*, p. 511.

contrasting movement of the sun as measured against the backdrop of the Earth's horizon. As the saying goes, one does not have to be a rocket scientist to know the difference between describing the end of the day as "the sun is setting" over against the fact that, of the two bodies (the Earth or the sun), one must be considered the centerpiece and the other the orbiting body. Those facts can easily be discerned by the human intellect whether the person is from 4000 B.C. or 2000 A.D.

As the people in ancient cultures spoke about the cosmos the same as we do today, similarly, as they once did, we still employ anthropomorphic language when we describe the attributes of God. We continue to refer to God's "eyes" watching us and God's "ears" hearing our words just as the so-called "uneducated" peoples of former years. All in all, it is a pure myth that peoples of former times were not able to distinguish phenomenal language from actual events.

By the same token, if God had put in Holy Writ the precise scientific explanation of each and every natural phenomenon, it is likely that few if any scientists today would be able to understand it. As we have painstakingly discovered in earlier chapters of our book, modern science has failed time after time to come to an adequate understanding of how the universe operates. Its two major theories of how the universe is constructed on macro- and micro-scales, namely, General Relativity and Quantum Mechanics, flatly contradict each other. As the history of science has shown, for every theory that is advanced as truth, another one is right behind waiting to dethrone it. As Max Planck once said: "Science proceeds funeral by funeral."

In light of the foregoing, one of the most important but overlooked dimensions of the problem between science and faith is the vast difference that exists between gathering scientific data and the correct interpretation of that data. Scientific data is plentiful and wide-ranging. We have thousands of modern instruments that gather millions of bits of data every day. But correctly interpreting the data into a unified and cohesive whole is much more difficult to accomplish and few have the gift to do so. The history of science is not only riddled with misinterpretations of scientific data but it remains the case that dozens of viable interpretations can be produced from a single scientific datum. We, for example, assign the word "gravity" to the simple phenomenon of an apple dislodging from a tree and suddenly falling to the ground. If we believe what our eyes show us, it is a scientific fact that apples fall toward the Earth. But there are about a half-dozen theories, and still counting, as to the nature of the force that brings the apple toward the Earth. Modern man does not know if it is a push, a pull, or both or neither. Simply put, for all his supposed scientific prowess, modern man has not been able to explain, to anyone's complete satisfaction, why an apple falls to the ground. Should we consider ourselves "uneducated" because we cannot answer that simple question? Perhaps a little humility would not hurt in this case. Perhaps then we would not be so sure of ourselves against Holy Writ's testimony of what is fixed and what is revolving. In any case, the point remains that science is not some monolithic consensus of belief and practice that produces right answers upon request. Science is prone to errors, especially in its interpretation of data. As one of the more respected and famous physicists, Richard Feynman, admitted: "Science is a culture of doubt."

Lastly, it is fallacious to argue that we force Scripture to stray "very far from its primary purpose" when we extract scientific facts from it. As we noted earlier, the *Declaration of Independence* and the *United States Constitution* are primarily political documents, but when they touch upon an area of religion (*e.g.*, God's existence and the fact that he created all men equal), these documents are vested with just as much authority as they have in their non-religious statements. Additionally, in regard to what is true, it is also erroneous to create a dichotomy in Scripture between a primary purpose and a secondary purpose. Merely because a certain fact is considered primary (*e.g.*, salvation, resurrection, eternity) does not mean that it is any truer than a secondary fact (*e.g.*, Jacob had twelve sons). If it were the case that a secondary fact were proven untrue, it would directly effect the veracity of primary facts, since logical reasoning would dictate that if the authoritative source could be wrong on a secondary fact why could it not be wrong on a primary fact? Obviously, an imperfect mind produced the one error so there is nothing to stop it from producing another. If anything, the veracity of the secondary facts upholds the veracity of the primary facts, and *vice-versa*. The Scriptural axiom understands this relationship very well, for as Jesus said: "He who is faithful in a very little is faithful also in much; and he who is dishonest in a very little is dishonest also in much."[672]

[672] Luke 16:10.

> **Galileo**: Granting this, and also granting that it is even more obvious that two truths can never be contrary to each other, it is the task of wise expositors to try to find the true meanings of sacred passages in accordance with natural conclusions which previously have been rendered certain and secure by manifest sensation or by necessary demonstrations. Furthermore, as I have said, although Scripture has been dictated by the Holy Spirit, for the reasons mentioned above it is open in many passages to interpretations far removed from the literal meaning; and moreover we cannot determine with certitude that all the interpreters speak with divine inspiration. As a result I believe that it would be prudent to agree that no one should fix the meaning of passages of Scripture and oblige us to maintain as true any natural conclusions which later sensation or necessary and demonstrative proofs might show to be contrary to truth. Who would we wish to place limits on human understanding? Who would wish to assert that everything which is knowable about the world is already known? And therefore, except for the articles concerning salvation and the foundations of the faith, against the strength of which there is no danger that any valid and forceful doctrine could ever arise, it would be perhaps the best advice not to add anything without necessity. Granting this, what greater confusion could arise than from the increase of questions from people who, besides our not knowing whether they speak with inspiration by heavenly power, we do know are totally barren of the intelligence needed not only to challenge but even to understand the demonstrations used by the most exact sciences to confirm their conclusions?

Analysis: Similar to many people who argue for the heliocentric position today, Galileo argued that either the proof had already been demonstrated, or, if it had not been demonstrated, it will someday be the case. For example, today when a person enters a scientific museum and observes the Foucault pendulum circling around every twenty-four hours, he is convinced this is an indisputable demonstration of the Earth's rotation beneath him. So convinced is he that he will argue the case just as vehemently as he will argue his own existence. It is not really his fault, however, since he has been unduly conditioned by the modern scientific establishment to think that the only solution to the turning pendulum is a rotating Earth. The vast majority of people do not even know that an equally viable alternative exists (*i.e.*, the rotation of the stars around a fixed Earth), much less would they be able to know how to argue for its validity against the scientific *status quo*. Galileo was of a similar mindset. Simply because of a few pieces of circumstantial evidence that suggested the Earth might be rotating and revolving,[673] coupled with the slight but inherent problems with the Ptolemaic model, Galileo was convinced that Copernicanism was a reality. He then expanded on this logic by arguing from Benito Pereyra's famous 16th century commentary on Genesis regarding four rules on biblical interpretation, the last being:

> Since every truth agrees with every other truth, the truth of Sacred Scripture cannot be contrary to the true arguments and evidence of the human sciences.

Galileo quotes Pereyra's rule in his 1615 *Letter to the Grand Duchess Christina*.[674] The problem, of course, is that geocentrism does not contradict the "human sciences," for the latter are so varied and uncertain about cosmological issues that no one should dare refer to them as a monolithic source of knowledge. The real truth, as we have clearly demonstrated in this book, is that no scientific proof for heliocentrism exists. Ironically, if modern science after Galileo has shown us anything worth knowing it is that it cannot disprove biblical cosmology.

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[673] As Galileo put in the mouth of Sagredo in his *Dialogo*: "In the conversations of these four days we have, then strong evidences in favor of the Copernican system, among which three have been shown to be very convincing – those taken from the stoppings and retrograde motion of the planets, and their approaches toward and recessions from the Earth; second, from the revolution of the Sun upon itself, and from what is to be observed in the sunspots; and third, from the ebbing and flowing of the ocean tides" (*Galileo's Daughter*, p. 177).

[674] As noted by Richard Blackwell in *Galileo, Bellarmine and the Bible*, p. 22, fn. 26.

Here, interestingly enough, is where we pause to note the same rationale in Galileo's thinking that he adopted near his death in 1641 when he told Francesco Rinuccini that he rejected Copernicanism. In the *Letter to the Grand Duchess Christina* (which is a letter Galileo wrote as an expanded version of his *Letter to Castelli*), Galileo admits the following:

> I should judge that the authority of the Bible was designed to persuade men of those articles and propositions which, surpassing all human reasoning, could not be made credible by science, or by any other means than through the very mouth of the Holy Spirit. Yet even in those propositions which are not matters of faith, this authority [Scripture] ought to be preferred over that of all human writings which are supported only by bare assertions or probable arguments, and not set forth in a demonstrative way. This I hold to be necessary and proper to the same extent that divine wisdom surpasses all human judgment and conjecture.[675]
>
> From the above words [of Augustine in *The Literal Interpretation of Genesis*, 1, 21] I conceive that I may deduce this doctrine: That in the books of the sages of this world there are contained some physical truths which are soundly demonstrated, and others that are merely stated; as to the former, it is the office of wise divines to show that they do not contradict the Holy Scriptures. And as to the propositions which are stated but not rigorously demonstrated, anything contrary to the Bible involved in them must be held undoubtedly false and should be proved so by every possible means.[676]
>
> Among physical propositions there are some with regard to which all human science and reason cannot supply more than a plausible opinion and probable conjecture in place of a sure and demonstrated knowledge; for example, whether the stars are animate. Then there are other propositions of which we have (or may confidently expect) positive assurances through experiments, long observation, and rigorous demonstration; for example, whether or not the earth and the heavens move, and whether or not the heavens are spherical. As to the first sort of propositions, I have no doubt that where human reason cannot reach – and where consequently we can have no science but only opinion and faith – it is necessary in piety to comply absolutely with the strict sense of the Scripture. But as to the other kind, I should think, as said before, that first we are to make certain of the fact, which will reveal to us the true senses of the Bible, and these will most certainly be found to agree with the proved fact (even though at first the words sounded otherwise), for two truths can never contradict each other. I take this to be an orthodox and indisputable doctrine, and I find it specifically in St. Augustine…[677]

Of course, Galileo appears to be what James describes as "a double-minded man,"[678] for in one breath he extols the authority of Scripture over the unproven claims of science; in the other he leaves himself one scientific exception that he claims Scripture did not address in a definitive way for him to cease from imposing heliocentrism upon it. The real irony is that Galileo employs Ecclesiastes 3:11 to help prove his point, but reverses the traditional meaning of the passage so that he can use it to support his favorite cosmological model. Thus he adds in the midst of the foregoing passages:

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[675] As translated by Stillman Drake in *Discoveries and Opinions of Galileo*, 1957, p. 183.

[676] *Ibid*., p. 194. Annibale Fantoli shows here, however, that Galileo misconstrued the words of Augustine, having read them from Pereyra's commentary on Genesis. Migne's Patrologia Latina has *qui calumniari Libris nostrae salutis affectant* ("those who pretend to calumniate the Books of our salvation") instead of Pereyra's *sapientes huius mundi* ("the wise ones of the world"). In other words, some make it appear as if certain propositions of science do not contradict Scripture when, in fact, they do. See *Galileo: For Copernicanism and for the Church*, pp. 195-198.

[677] *Ibid*., p. 197.

[678] James 1:7-8: "For that person must not suppose that a double-minded man, unstable in all his ways, will receive anything from the Lord."

> We have it from the very mouth of the Holy Ghost that God delivered up the world to disputations, 'so that man cannot find out the work that God hath done from the beginning ever to the end.' In my opinion no one, in contradiction to that dictum, should close the road to free philosophizing about mundane and physical things, as if everything had already been discovered and revealed with certainty…. One of these is the stability of the sun and mobility of the earth, a doctrine believed by Pythagoras and all his followers…amplified and confirmed with many observations and demonstrations by Nicholas Copernicus.[679]

Galileo's second argument in the *Letter to Castelli* (*i.e.*, that not all the speakers in the Bible spoke from divine inspiration) is also erroneous. The mere admission that not all spoke under divine inspiration means that some, indeed, *did* speak with divine inspiration. The only question is: who spoke under inspiration and who did not? Moses certainly spoke with divine inspiration when he wrote the first chapters of Genesis since he was not born until thousands of years after the creation. The only way he could have known how God created the cosmos is through the revelation provided by divine inspiration.[680] Moses' cosmology, if interpreted at face value, is geocentric, and thus Galileo's argument has been answered since no inspired biblical author following Moses contradicted what Moses wrote under divine inspiration. The same divine inspiration was working in all the remaining biblical writers who taught that the universe is geocentric. In reality, Galileo has little basis from which to form his objection since in the latter part of his letter to Castelli he already committed himself to viewing Joshua's account of the stoppage of the sun as a divinely inspired work, for otherwise he would have no reason to attempt to explain the account from a heliocentric perspective.[681] Accordingly, the Psalms, from which most of the geocentric witness originates, have always been accepted for their foundation in divine inspiration. In fact, the Psalms are quoted in the New Testament as a divinely authoritative source more than any other Old Testament book. Hence, if there is any book in the Old Testament that considers the speaker as one who was under direct divine dictation it is the Psalms, King David being the primary writer. The same divine inspiration was also given to Solomon, the author of the geocentric passages in Ecclesiastes and Proverbs. The same is true of Isaiah and his treatment of Hezekiah's sundial; and Habakkuk in his citing of Joshua's long day. The only time a question rises as to whether the speaker is under divine inspiration is in Job 22:13-14 when Eliphaz is speaking to Job, for later in the book, God chastises Eliphaz for not speaking truthfully (Jb 42:7). But even in that case, God is not faulting Eliphaz for his cosmological knowledge but only his misapplication of the evidence to the innocent Job. Even if there was some doubt as to whether one of the speakers was under divine inspiration, nevertheless, there are an abundance of passages in other parts of Scripture that we know positively the speaker was under divine inspiration. As it stands, Galileo did not have a case. His objection actually strengthens the geocentric case, for if he cannot prove that the writer is not inspired, he is bound to whatever that writer dictates as truth.

> **Galileo**: I believe that the authority of Sacred Scripture has the sole aim of persuading men of those articles and propositions which, being necessary for salvation but being beyond all human discourse, cannot come to be believed by any science or by any means other than by the mouth of the Holy Spirit himself. I do not think that it is necessary to have belief in cases in which God himself, who is the source of meaning, of discourse, and of intellect, has put the use of revelation to one side and has decided to give us in another way the knowledge which we can obtain through science. This is especially true of those sciences of which only a very small part, and then as projected in conclusions, is to be found in the Scriptures. Such is precisely the case with astronomy, of which there is such a small part in the Scriptures that the planets are not even mentioned. However if the sacred

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[679] Stillman Drake, *Discoveries and Opinions of Galileo*, pp. 187-188

[680] NB: Unlike modern exegetes who believe that the Jews coming back from the Babylonian captivity wrote Genesis 1, Galileo believed that Moses wrote Genesis.

[681] See Galileo's explanation of Joshua 10:10-14 in Chapter 12 of this book.

> writers had intended to teach us about the arrangements and movements of the celestial bodies, they would not have said so little, almost nothing, in comparison with the infinite, highest, and admirable conclusions contained in this science…[682]

Analysis: Galileo's argument is once again off the mark. His contention is that since Scripture does not cover the area of cosmology as vastly as it does other subjects of import, we can conclude that it did not intend its statements about cosmology to be taken too seriously or with the same authority as non-cosmological passages. This is another instance in which Galileo creates his own criteria so that he can then use it to dismiss ideas he does not like. The extent of Scripture's treatment of cosmology, or lack thereof, has nothing to do with the veracity of its statements on cosmology. Galileo's argument would be akin to saying that since the 26 volumes of the *Encyclopedia Britannica* treat the subject of spiders in just one volume, and in only certain pages of that volume, this puts in doubt the authority with which the Britannica speaks on the issue. The truth is, the Britannica will speak as authoritatively on spiders as it does on any other subject, even though it may only treat spiders in less than .01% of its words.

Galileo's argument is also erroneous based on the simple fact of how the Bible begins its address to man in its very first book. The opening words of the first chapter of Genesis do not begin with a description of God or man, but with a detailed account of the structure of the cosmos. Obviously, communicating the underpinnings of the celestial world was the most important piece of revelatory information God initially needed to tell mankind. Not coincidentally, the very first fact we are told about the cosmos is that the Earth was created first, before the sun and stars, thus implying a geocentric universe. If, as Galileo claims, (a) God did not consider the treatment of cosmology as a very important matter to address, and (b) that its resultant scarcity in Scripture meant we were not required to take the issue very seriously, why did God make it the foundation of Holy Writ's opening chapters?

[682] As translated by Richard J. Blackwell in *Galileo, Bellarmine and the Bible*, pp. 195-198. Galileo's concluding paragraph of the first section is left out because of its redundancy. The original Italian version appears in Favaro's *Galileo E L'Inquisizione*, pp. 39-41.

The Investigation of Galileo Continues

As we have noted in the aforementioned arguments, the interpretation of Scripture is key to grasping the implications of the Galileo affair. After Galileo's publication of *Sidereus nuncius* ("Starry Messenger") in 1610 with its forthright advocacy of heliocentrism and consequent dependence on a non-literal interpretation of Scripture, objections to his methodology were soon to be voiced. Two Dominican friars from Florence, Niccolò Lorini and Tommaso Caccini, took the first shots as investigators for the Inquisition. The archives reveal that their investigation began in February 1615.[683] A

[683] "Nel mese di Febraro 1615 il Padre Maestro Fra Nicolò Lorini, Domenicano di Fiorenza, trasmisse qua una scrittura del Galileo, che in quella città correva per manus, la quale seguendo le positioni del Copernico, che la terra si muova sando che tale scrittura fu fratta per occasione di contradire a certe lettioni fatte nell chiesa di S.ta Maria Novell dal P. Maestro Caccini sopra il X capitolo di Giosue, alle parole Sol, me movearis: fol. 2. La scrittura è in forma di lettera, scritta al P. D. Benedetto Castelli Monaco Cassinense, Matematico all'hora di Pisa, e contiene le infrascritte propositioni: Che nella Scrittura Sacra di trovano molte propositioni false quanto al nudo senso delle parole; Che nelle dispute naturali ella doverebbe esser riserbata nell' ultimo luogo; Che la Scrittura, per accommodarsi all' incapacità del populo, non si è astenuta di pervertire de' suoi principalissimi dogmi, attribuendo sin all' istesso Dio conditioni lontanissime e contrarie alla sua essen[tia]. Vuole che in certo modo prevaglia nelle cose naturali l' argomento filosofico al sacro. Che il commando fatto da Giosue al sole, che si fermasse, di deve intend[ere] fatto non al sole, ma al primo mobile, quando non si tenga il sistema Copernico. Per diligenze fatte non si potè haver l'originale di questa lettera: f. 25. Fu esaminato il Padre Caccini, qual depose, oltre le cose sodette, d'haver sentito dire alter opinioni erronee dal Galileo: fol. 11: Che Dio sia accidente; che realmente rida, pianga, etc.; che li miracoli quali dicesi essersi fatti da' Santi, non sono veri miracoli. Nominò alcuni testimony, dall' esame de' quali si deduce che dette propositioni non fussero assertive del Galileo nè de' discepoli, ma solo disputative. Veduto poi nel libro delle macchie solari, stampato in Roma dal medesimo Galileo, le due propoitioni: Sol est centrum mundi, et omnino immobilis motu locali; Terra non est centrum mundi, et secundum se totam movetur etiam motu diurno: fol. 34, furno qualificate per assured I filosofia: fol 35; e la prima, per heretica formalmente, come espressamente ripugnante alla Scrittura et opinione de'Santi; la 2a, almeno per erronea in Fide, attesa la vera

year later, on February 19, 1616, Caccini submitted two statements to the Holy Office that summed up his objections to the Copernican model:

1) The sun is at the center of the world and hence immobile in regards to local motion.

2) The Earth is not the center of the world and is not immobile, but moves according to the whole of itself, and also with diurnal motion.

Five days later, February 24, the Holy Office issued these censures:

Regarding the first proposition:

> All agreed that this proposition is foolish and absurd in philosophy and is formally heretical, because it explicitly contradicts sentences found in many places in Sacred Scripture according to the proper [literal] meaning of the words and according to the common interpretation and understanding of the Holy Fathers and of learned theologians.

Regarding the second proposition

> All agreed that this proposition receives the same censure in philosophy and in respect to theological truth, it is at least erroneous in faith.[684]

On February 25, 1616, **Pope Paul V** ordered Cardinal Bellarmine to summon Galileo and, "in the presence of a notary and witnesses lest he should prove recusant, warn him to abandon the condemned opinion and in every way abstain from teaching, defending or discussing it."[685] What is not commonly known is that the meeting of February 25 had three parts, and this sequence shows how great a part the pope played in the final decision against Galileo:

> As was customary, the meeting had three successive parts. During the first one, the assessor, accompanied by the commissary, informed the pope and the cardinals about the censures approved by the consultors and other questions to be dealt with in connection with the Copernican issue. After that, both of them left the hall and the secret second part of the meeting started, in the presence of the pope and the cardinals alone. This explains why the

teologia" (Antonio Favaro, *Galileo E L'Inquisizione*, pp. 33-34).

[684] Favaro records the original as follows: "Propositiones censurandae. Censura facta in S.to Officio Urbis, dei Mercurii 24 Februarii 1616, coram infrascriptis Patribus Theologis. Prima: Sol est centrum mundi, et omnino immobilis motu locali. Censura: Omnes dixerunt, dictum propositionem esse stultam et absurdam in philosophia, et formaliter haereticam, quatenus contradicit expresse sententiis Sacrae Scripturae in multis locis secundum proprietatem verborum et secundum communem expositionem et sensum Sanctorum Patrum et theologorum doctorum. 2.a: Terra non est centrum munid nec immobilis, sed secundum se totam movetur, etiam motu diurno. Censura: Omnes dixerunt, hanc propositionem recipere eandem censuram in philosophia; et spectando veritatem theologicam, ad minus esse in Fide erroneam." The names signed to the document are the eleven members of the papal commission.

[685] Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory of the Universe*, 1917, p. 58. Favaro has the following: "…supradictus P. Commissarius praedicto Galileo adhuc *ibid*em praesenti et constituto praecepit et ordinavit [proprio nominee] S. D. N Papae et totius Congregationis S. Officii, ut supradictam opinionem, quod sol sit centrum mundi et immbolilis et terra moveatur, omnino relinquat, nec eam de caetero, quovis modo, teneat, doceat aut defendat, verbo aut scriptis; alias, contra ipsum procedetur in S. Officio. Cui praecepto idem Galileus aquievit et parere promisit" (Antonio Favaro*, Galileo e l'Inquisizione,* 1907, p. 62).

only official document that is left about the meeting, published by Favaro, concerns solely the third part of it, which took place again in the presence of the assessor and the commissary. The necessity of informing those officials of the Holy Office about the decisions taken by the pope during the secret part of the session – as stated in the document – becomes fully understandable.[686]

The official document from the third part of the meeting stated the following:

> The Most Illustrious Cardinal Millini notified the Reverent Lord Assessor and Lord Commissary of the Holy Office that, after the reporting of the judgment by the Father Theologians against the propositions of the mathematician Galileo, to the effect that the sun stands still at the center of the world and the earth moves even with a diurnal motion, His Holiness ordered the Most Illustrious Cardinal Bellarmine to call Galileo before himself and warn him to abandon these opinions; and if he should refuse to obey, the Father Commissary, in the presence of notary and witnesses, is to issue him an injunction to abstain completely from teaching or defending that doctrine and opinion or from discussing it; and further, if he should not acquiesce, he is to be imprisoned.[687]

Galileo obeyed the order, which is recorded in the minutes of the Holy Office of March 3, 1616:

> The Most Illustrious Lord Cardinal Bellarmine having given the report that the mathematician Galileo Galilei had acquiesced when warned of the order of the Holy Congregation to abandon the opinion which he held till then, to the effect that the sun stands still at the center of the spheres but the earth is in motion.[688]

This was followed by a formal decree issued on March 5, 1616. According to the wording of the decree, Paul V's and Bellarmine's rejection of Copernicanism was not considered some private affair between them and Galileo. The decree stated very clearly that its information was to be "published everywhere" and that its specific audience was the "whole of Christendom":

> Decree of the Sacred Congregation of the most Illustrious Cardinals of the Holy Roman Church specially delegated by Our Most Holy Lord Pope Paul V and the Holy Apostolic See to publish everywhere throughout the whole of Christendom.[689]

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[686] "The Disputed Injunction and Its Role in Galileo's Trial," by Annibale Fantoli, in *The Church and Galileo*, p. 118. Fantoli adds: "The division in three parts of the meeting of *feria V* (Thursday), in the presence of the pope, is documented by several records on the functioning of the Holy Office in the first part of the seventeenth century…The absence of any mention of these three stages of the meeting…published by Favaro is due to the fact that these documents, as was customary, mention only the decisions taken, without any information about the way the meetings were held or about the discussions that took place during them" (*ibid*., p. 144).

[687] *Le Opere di Galileo Galilei*, vol. 19, p. 321, translated by Fantoli.

[688] *Le Opere di Galileo Galilei*, vol. 19, p. 278, translated by Fantoli.

[689] "Decretum Sacrae Congregationis Illustrissimorum S.R.E.Cardinalium, a S.D.N. Paulo Papa V Sanctaque Sede Apostolica ad Indicem librorum, eorumdemque permissionem, proibitionem, expurgationem et impressionem in universa Republica Christiana, specialieter deputatorum, ubique publicandum" (Antonio Favaro, *Galileo E L'Inquisizione*, p. 63; *Le Opere di Galileo Galilei*, vol. 19, p. 323).

It contained six explicit paragraphs reiterating the condemnation not only of the book written by "Nicolaus Copernicus" but, more specifically, the original Greek inventors of heliocentrism as represented by "the Pythagorean doctrine – which is false and altogether opposed to Holy Scripture – of the motion of the Earth and the immobility of the Sun." The Church was going right to the root of the problem, – the false ideas propagated by the Greeks. Beginning at line 31, the decrees states:

> And whereas it has also come to the knowledge of the said Congregation that the Pythagorean doctrine – which is false and altogether opposed to Holy Scripture – of the motion of the Earth and the immobility of the Sun, which is also taught by Nicolaus Copernicus in *De revolutionibus orbium coelestium*, and by Diego de Zúñiga [in his book] on Job, is now being spread abroad and accepted by many – as may be seen from a certain letter of a Carmelite Father, entitled *Letter of the Rev. Father Paolo Antonio Foscarini, Carmelite, on the Opinion of the Pythagoreans and of Copernicus concerning the Motion of the Earth, and the Stability of the Sun, and the New Pythagorean System of the World, at Naples, Printed by Lazzaro Scorriggio, 1615*; wherein the said Father attempts to show that the aforesaid doctrine of the immobility of the Sun in the center of the world, and of the Earth's motion, is consonant with truth and is not opposed to Holy Scripture. Therefore, in order that this opinion may not insinuate itself any further to the prejudice of the Catholic truth, the Holy Congregation has decreed that the said Nicolaus Copernicus, *De revolutionibus orbium*, and Diego de Zúñiga, *On Job*, be suspended until they be corrected; but that the book of the Carmelite Father, Paolo Antonio Foscarini, be altogether prohibited and condemned, and that all other works likewise, in which the same it taught, be prohibited, as by this present decree, it prohibits, condemns, and suspends them all respectively.[690]

Perhaps because of rumors that were spreading around Italy that the Holy Office had declared Galileo a heretic, Galileo wrote to Cardinal Bellarmine in May 1616 asking for a clarification of what occurred in the February and March sessions, prompting Bellarmine to write a certificate for Galileo saying that the Holy Office neither forced him to "abjure" his opinions nor was he punished for them:

> We, Robert Cardinal Bellarmine, have heard that Signor Galileo Galilei is being calumniated or alleged to have abjured in our hands and also to have been given salutary penances for this. Having been sought about the truth of the matter, we say that the above-mentioned Galileo has not abjured in our hands, or in the hands of others, here in Rome, or anywhere else that we know, any opinion or doctrine of his; nor has he received any penances, salutary or otherwise. He has only been notified of the declaration made by the Holy Father and published by the Sacred Congregation of the Index, whose content

[690] Original Latin: "….Et quia etiam ad notitiam praefatae Sacrae Congregationis pervenit, falsam illam doctrinam Pithagoricam, divinaeque Scripturae omnino adversantem, de mobilitate terrae et immobilitate solis, quam Nicolaus Copernicus De revolutionibus orbium coelestium, et Didacus Astunica in Job, etiam docent, iam divulgari et a multis recipe; sicuti videre est ex quadam Epistola impressa cuiusdam Patris Carmelitae, cui titulus: « Lettera del R. Padre Maestro Paolo Antonio Foscarini Carmelitano, sopra l'opinione de'Pittagorici e del Copernico della mobilità della terra e stabilità del sole, et il nuovo Pittagorico sistema del mondo. In Napoli, per Lazzaro Scoriggio, 1615 », in qua dictus Pater ostendere conatur, praefatam doctrinam de immobilitate solis in centro mundi et mobilitate terrae consonam esse veritati et non adversary Sacrae Scripturae; ideo, ne ulterius huiusmodi opinion in perniciem Catholicae veritatis serpat, censuit, dictos Nicolaum Copernicum De revolutionibus orbium, et Didacum Astunica in Job, suspendendos esse, donec corrigantur; librum vero Patris Pauli Antonii Foscarini Carmelitae omnino prohibendum atque damnandum; aliosque omnes libros, partier idem docentes, prohibendos: prout praesenti Decreto omnes respective prohibit, damnat atque suspendit. In quorum fidem praesens Decretum manu et sigillo Illustrissimi et Reverendissimi D. Cardinalis S. Caeciliae, Episcopi Albanensis, signatum et munitum fuit, die 5 Martii 1616." Part of above translation taken from de Santillana's *The Crime of Galileo*, as cited by Fantoli in *Galileo: For Copernicanism and For the Church*, pp. 223-224.

> is that the doctrine attributed to Copernicus (that the earth moves around the sun and the sun stands at the center of the world without moving from the east to the west) is contrary to Holy Scripture, and therefore cannot be defended nor held. In witness whereof we have written and signed this with our own hands, on the 26th day of May 1616.[691]

Once again, by the specific statement "the declaration made by the Holy Father" we see the prominent part played by the pope in the whole affair. According to Bellarmine's above official letter, the decision that disallowed anyone from asserting the Earth moved was not one formed by the Sacred Congregation and rubber stamped by the pope, but was first decided by the pope and then published by the Sacred Congregation. That Paul V and Cardinal Bellarmine were of one mind on Galileo and heliocentrism was revealed no better than in a letter written by the Tuscan ambassador in Rome, Piero Guicciardini, to Grand Duke Cosimo II, dated March 4, 1616. According to Finocchiaro's assessement, "Guicciardini appeared to have some inside information about the proceedings [against Galileo], since his position as ambassador gave him direct access to the pope himself as well as to cardinals and other well-connected diplomats." After verifying Guicciardini's factual knowledge of the pope's mind, Finocchiaro concludes: "The letter observes that Pope Paul V and Cardinal Bellarmine agreed that Copernicanism was erroneous and heretical. This was and remains precious information."[692]

The significance of the pope's part in the proceedings and the strictness of the admonition given to Galileo are made even more relevant in a second document Bellarmine wrote, a document that was rediscovered sixteen years later under the reign of Pope Urban VIII. This particular document mentions the "Commissary of the Holy Office," Michelangelo Segizzi, "in the name of his Holiness the Pope," as giving Galileo a legal "injunction" to refrain from asserting that the Earth moves. It reads:

> Friday, the 26th of the same month [February 1616], at the palace, the usual residence of the said Most Illustrious Lord Cardinal Bellarmine, and in the chambers of His Most Illustrious Lordship, and in the presence of the Reverend Father Michelangelo Segizzi of Lodi, O. P., Commissary of the Holy Office, having summoned the above-mentioned Galileo before himself, the same Most Illustrious Lord Cardinal warned Galileo that the above-mentioned opinion was erroneous and that he should abandon it; and thereafter, indeed immediately, before me and witnesses, the Most Illustrious Lord Cardinal himself being also present still, the aforesaid Father Commissary, in the name of His Holiness the Pope and the whole Congregation of the Holy Office, ordered and enjoined the said Galileo, who was himself still present, to abandon completely the above-mentioned opinion that the sun stands still at the center of the world and the earth moves, and henceforth not to hold, teach, or defend it in any way whatever, either orally or in writing; otherwise the Holy Office would start proceedings against him. The same Galileo acquiesced in the injunction and promised to obey.[693]

[691] Original Italian: "Noi Roberto Bellarmino, havendo inteso che il Sig. Galileo Galilei sia calunniato o imputato di havere abiurato in mano nostra, et anco di essere stato per ciò penitenziato di penitenzie salutary, et essendo ricercati della verità, diciamo che il suddetto S. Galileo non ha abiurato in mano nostra nè di altri qua in Roma, nè meno in altro luogo che noi sappiamo, alcuna sua opinione o dottrina, nè manco ha ricevuto penitenzie salutary nè d'altra sorte, ma solo gl' è stata denuntiata la dichiaratione fatta da Nostro Signore et publicata dalla Sacra Congregatione dell' Indice, nella quale si contiene che la dottrina attribuita al Copernico, che la terra si muova intorno al sole et che il sole stia nel centro del mondo senza muoversi da oriente ad occidente, sia contraria alle Sacre Scritture, et però non si possa difendere nè tenere. Et in fede di ciò habbiamo scritta e sottoscritta la presente di nostra propria mano, questo dì 26 di Maggio 1616. Il med. Di sopra Robert Card. Bellarmino" (Antonio Favaro, *Galileo e l'Inquisizione*, pp. 82, 88).

[692] As stated in *Retrying Galileo*, pp. 158-159. The March 4, 1616 letter from Guicciardini to Cosimo II was not published until 1773 by Angelo Fabroni in *Lettere inedited di uomini illustri*, Florence, two volumes, 1773-1775.

[693] *Le Opere di Galileo Galilei*, Antonio Favaro, vol. 19, pp. 321-322, translated by Annibale Fantoli in *The Church and Galileo*, pp. 119-120; the same version in Maurice Finocchiaro's *The Galileo Affair*, p. 147. An

Hence, although Bellarmine's initial document stated that Galileo "has not abjured in our hand nor in the hand of any other person in Rome," the second document indicates that there was, indeed, cause for some type of abjuration from Galileo since he both received a legal injunction to cease and desist teaching heliocentrism and "acquiesced" to the injunction. The importance of the second document came to light when the Holy Office of Pope Urban VIII confronted Galileo in 1633 for his persistent teaching of heliocentrism, namely, in his book, *Dialogue on the Two Great World Systems*. To defend his teachings, Galileo gave the pope the first document Bellarmine had written – the one that contained no reference to Galileo receiving an injunction from the Holy Office.

Galileo states to **Pope Urban VIII**:

> In the month of February 1616, Lord Cardinal Bellarmine told me that since Copernicus' opinion, taken absolutely, was contrary to Holy Scripture, it could be neither held nor defended, but it could be taken and used *ex suppositione* (suppositionally). In conformity with this I keep a certificate by Lord Cardinal Bellarmine himself, dated 26 May 1616, in which he says that Copernicus' opinion cannot be held or defended, being against Holy Scripture. I present a copy of this certificate, and here it is.[694]

During the interrogation, Galileo admitted: "there were some Dominican Fathers present" at the meeting of February 26, 1616. Galileo was then asked, "whether at that time, in the presence of those Fathers, he was given any injunction either by them or by someone else concerning the same matter, and if so what?" Galileo gave the following answer:

> As I remember it, the affair took place in the following manner. One morning Lord Cardinal Bellarmine sent for me, and told me a certain detail that I should like to speak to the ear of His Holiness before telling others, but then at the end he told me that Copernicus' opinion could not be held or defended, being contrary to Holy Scripture. I do not recall whether those Dominican friars were there at first or came afterward; nor do I recall whether they were present when Cardinal Bellarmine told me that the same opinion could not be held. Finally, it may be that I was given an injunction not to hold or defend the said opinion, but I do not recall it since this is something of many years ago.[695]

Prompted by the inquisitor to explain further, Galileo seems to have a convenient lapse of memory concerning the injunction. He adds:

injunction is a formal order from a court of law or canonical court ordering a person or group to do or not do something.

[694] *Le Opere di Galileo Galilei*, Antonio Favaro, vol. 19, p. 339, translated by Annibale Fantoli in *The Church and Galileo*, p. 127. Fantoli adds: "The Latin expression *ex suppositione* had a different meaning for Bellarmine than it did for Galileo. For the cardinal it meant that the Copernican theory could be used as a purely mathematical hypothesis for astronomical calculations and thus for 'saving the phenomena.' For Galileo, it meant that the Copernican theory could be used as a physical hypothesis, which might later on be shown to represent the real constitution of the world. Galileo relied on the latent ambiguity of this expression to justify the writing of the *Dialogue*" (*ibid*., p. 146).

[695] *Le Opere di Galileo Galilei*, Antonio Favaro, vol. 19, p. 339, translated by Annibale Fantoli in *The Church and Galileo*, p. 128.

> I do not recall that this injunction was given me any other way than orally by Lord Cardinal Bellarmine. I do remember that the injunction was that I could not hold or defend, and maybe even that I could not teach. I do not recall, further, that there was the phrase "in any way whatever," but maybe there was in fact…. Regarding the two phrases in the said injunction now mentioned, namely "not to teach" and "in any way whatever," I do not retain them in my memory, I think because they are not contained in the said certificate, which I relied upon and kept as a reminder.[696]

According to Bellarmine's second document of February 25, there is no mention that the "injunction" was given orally to Galileo. Perhaps Galileo had a different understanding of what, precisely, an injunction was. Perhaps Galileo did not understand the legal and formal authority an injunction carries, but at least Galileo is coming closer to the reality that an injunction was, indeed, given to him on that date. Galileo then refers to the injunction in more explicit terms when he is questioned regarding how he obtained an imprimatur for his *Dialogo* when, in fact, he had received an injunction seventeen years earlier from Pope Paul V not to hold or teach that the Earth moves. The implication is that Galileo hid the injunction from the censor in order to lessen the difficulty in obtaining an imprimatur. Galileo's explanation is as follows:

> After the above-mentioned injunction, I did not seek permission to write the above-mentioned book…because I did not think that by writing the book I was contradicting at all the injunction given me not to hold, defend or teach the said opinion, but rather that I was refuting it.[697]

The facts regarding the imprimatur are quite opposed to Galileo's rendition. The censor of the *Dialogo* was Fr. Niccolo Riccardi, a man quite favorable to Galileo and his ideas, although he believed the argument about celestial revolutions to be somewhat useless due to his idea that the angels moved the stars and planets. Still, Riccardi sensed that the *Dialogo* was a thinly veiled advancement of Copernicanism that on the face of it was coming to loggerheads with the 1616 decree of which he was very cognizant. His assistant, Fr. Raffaele Visconti, was given the job to edit the book, wherein he followed the advice of Bellarmine and the 1620 censors that all references to heliocentrism should be treated as hypothetical. Even with these changes, Riccardi was still troubled, however. His dilemma was compounded by the fact that he was receiving undue pressure from other quarters, namely, the papal secretary Giovanni Ciàmpoli and the Duke of Tuscany's ambassador, Niccolini.[698] Bowing to the pressure, Riccardi granted an imprimatur to the *Dialogo* in advance, on the condition that he would revise it himself, and then pass on each revised sheet to the printer. This action, of course, was completely devoid of proper protocol and Galileo took full advantage of this breach by seeking to have the book edited and published in Florence, the haven for all things heliocentric at this point in time. Riccardi refused, but Galileo insisted that he must do so because the outbreak of the bubonic plague made it impossible to come to Rome. He also enlisted the help of the Duke, his ambassador, and the papal secretary to put more pressure on Riccardi who eventually succumbed to the "beautiful cousin Caterina who made him yield over a bottle of Chianti at a dinner table." The assigned Florentine editor, the Dominican Fr. Jacinto Stefani, made only a few minor alterations for form's sake and thus Galileo's book was left virtually intact. Riccardi

[696] *Opere di Galileo Galilei*, Antonio Favaro, vol. 19, p. 340, translated by Annibale Fantoli in *The Church and Galileo*, p. 128. Also in *Galileo E L'Inquisizione*, p. 80, as follows: "Dopo il sodetto precetto io non ho ricercato licenza di scriver il sodetto libro, da me riconosciuto, perchè io non pretendo, per haver scritto detto libro, di haver contrafatto punto al precetto che mi fu fatto, di non tenere nè difender nè insegnare la detta opinione, anzi di confutarla."

[697] *Ibid*.

[698] Finocchiaro finds that Riccardi "excused himself by saying that he has approved the publication of the Dialogue because he had received an order from the pope to do so; the pope denied it saying that these were just words, not to be trusted; but finally the Father Master produced a note by monsignor Ciampoli, secretary to the pope, in which it was stated that His Holiness (in whose presence Ciampoli claimed to be writing) was ordering him to approve the book" (*Retrying Galileo*, p. 188).

tried to keep at least some control by delaying the submission of his required preface and concluding sections, but even then the subterfuge continued as Caterina was again commissioned to sway Riccardi, although he was said to be "dragged by the hair" when he finally relinquished the needed documents.[699] Needless to say, the printing of the *Dialogo* began in 1631 with the first copies being produced in February 1632. By August, Urban's Holy Office got wind of Galileo's shenanigans with Riccardi. The book was halted and confiscated and Galileo was summoned to Rome in October 1632, which he succeeded in delaying until early 1633.

As regards Galileo's claim that he was not going against the 1616 injunction because he was not defending Copernican doctrine but "refuting it" or that he…

> "…did not think it necessary to say anything, because I had no doubts about it; for I have neither maintained nor defended in that book the opinion that the Earth moves and that the sun is stationary but have rather demonstrated the opposite of the Copernican opinion, and shown that the arguments of Copernicus are weak and not conclusive"[700]

…is one of the most preposterous and risky excuses he had ever attempted to pass by the magisterium. Not only had he defended Copernicanism, but as Melchior Inchofer, one of the advisors of the Inquisition who thoroughly examined the *Dialogo*, put it:

> …if the defendant had not adhered firmly to the Copernican opinion and believed it physically true, he would not have fought for it with such asperity, nor would he have written the *Letter to the Grand Duchess*, nor would he have held up to ridicule those who maintain the accepted opinion, and as if they were dumb mooncalves [and] described them as hardly deserving to be called human beings…. he holds all to be mental pygmies who are not Pythagorean or Copernican, it is clear enough what he has in mind, especially as he praises by contrast William Gilbert, a perverse heretic and a quibbling and quarrelsome defender of this opinion.[701]

Inchofer had read Galileo correctly. Although feigning capitulation, the inner Galileo believed in heliocentrism as strongly as he believed his own name. Just a few years earlier in his very long and technical 1624 reply to Francesco Ingoli (a priest who had written a 1616 essay titled: "On the Location and Rest of the Earth, Against the Copernican System"), Galileo states: "I say I have other evidences not previously observed by anyone, which are necessarily convincing about the certainty of the Copernican system."[702] Shortly before he traveled to Rome to face his second trial, he wrote to Elia Diodati in 1633 the following words concerning Libert Froidmont who wrote a book against Copernicus:

> When Froidmont or others have established that to say the earth moves is heresy while demonstrations, observations, and necessary conclusions show that it

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[699] Koestler, *The Sleepwalkers*, pp. 488-490.

[700] Original Italian: "Io non dissi cosa alcuna al P. Maestro di S. Palazzo, quando gli dimandai licenza di stampar il libro, del sodetto precetto, perchè non stimavo necessario il dirglielo, non havend'io scropolo alcuno, non havend'io con detto libro nè tenuta nè diffesa l'opinione della mobilità della terra e della stabilità del sole; anzi nel detto libro io mostro il contrario di detta opinione del Copernico, et che le ragioni di esso Copernico sono invalide e non concludenti" (*Galileo E L'Inquisizione*, p. 81).

[701] Santillana, *The Crime of Galileo*, p. 267. The original Latin after the ellipsis is: "…omnes tanquam homunciones [mental pygmies] reputet, qui Pythagoraei aut Copernicani non sunt, satis evidens est quid animi great, eo praesertim quod Guilhelmum Gilbertum, haereticum perversum et huius sententiae rixosum et cavillosum patronum, nimio plus laudet ac ceteris praeferat" (*Galileo E L'Inquisizione*, p. 93). Koestler notes: "Both the judges and the defendant knew that he was lying: both the judges and he knew that the threat of torture (*territio verbalis*) was merely a ritual formula, which would not be carried out; and that the hearing was a mere formality" (*The Sleepwalkers*, pp. 499-500).

[702] Reply to Ingoli, 1624, *Le Opere di Galileo Galilei*, vol. 6, total letter contained in pages 509-561, this portion translated by M. Finocchiaro in *The Galileo Affair*, p. 182. Ingoli was the secretary to the newly created office of Congregation for the Propagation of the Faith.

> does move, in what swamp will he have lost himself and the Holy Church?[703]

But in front of the inquisitors Galileo adhered to his story, claiming as a final statement that he would "promise to resume the arguments already brought in favor of the said opinion which is false and has been condemned, and to confute them in such a most effectual manner."[704]

As the 1633 discovery of the second Bellarmine document shows, a written injunction was given to Galileo on February 25, 1616 not to teach the heliocentric system. As noted earlier, one of the "Dominican friars" that Galileo admits to being present at the 1616 meeting is Michelangelo Seggizi, who, as was his function as the Commissary of the Holy Office, would be the one who handed Galileo the injunction. When Galileo was finally summoned before Pope Urban, the existence and delivery of the injunction was confirmed. The 1633 sentence against Galileo stated:

> …after being informed and warned in a friendly way by the same Lord Cardinal [Bellarmine], you were given an injunction by the then Commissary of the Holy Office in the presence of a notary and witnesses to the effect that you must completely abandon the said false opinion, and that in the future you could neither hold, nor teach it in any way whatever, either orally or in writing; having promised to obey, you were dismissed.[705]

As was the case with Paul V, the present pope, Urban VIII, took the Galileo affair very seriously. There can be little doubt that Urban understood, as did his chief inquisitor, Robert Bellarmine, that nothing less than the veracity of Scripture was at stake. He was not about to let a relative upstart reverse fifteen centuries of Church teaching on little more than a scientific hunch. That the pope was interpreting Galileo's heliocentrism as a direct attack upon Scripture is noted in the text of the sentence against him that was approved by the pope:

> …the said certificate [from Bellarmine] you produced in your defense aggravates your case further since, while it says that the said opinion is contrary to Holy Scripture, yet you dared to treat of it, defend it, and show it as probable; nor are you helped by the license you artfully and cunningly extorted since you did not mention the injunction you were under.[706]

The pope's involvement and seriousness of mind is noted in how he communicated directly and privately with the Grand Duke of Tuscany's ambassador, Francesco Niccolini, who then reported his communications back to the Grand Duke's secretary of state, Andrea Cioli. Over the period of September 1632 to June 1633 the resolve of Pope Urban VIII against both heliocentrism and Galileo was made crystal clear for both the hierarchy of the Church and the Tuscany government. Beginning on September 5, 1632, Niccolini writes to Cioli:

> Yesterday I did not have the time to report to Your Most Illustrious Lordship what had transpired (in a very emotional atmosphere) between myself and the Pope in regard to Mr. Galilei's work….I too am beginning to believe…that the sky is about to fall. While we were discussing those delicate subjects of the Holy Office, His Holiness exploded in great anger, and suddenly he told me that even our Galilei had dared enter where he should not have, in the most serious and dangerous subjects which could be stirred up at this time. I

[703] *Le Opere di Galileo Galilei*, vol. 15, p. 25, as cited and translated in Richard Westfall's *Essays on the Trial of Galileo*, p 24. Fantoli, directing his remarks against McMullin's thesis (1967, pp. 33-34), contends that "Galileo is aware that such scientific certainty in favor of Copernicanism does not yet exist. But the least that one can say is that it remains possible in the future. Therefore, the choice between Ptolemaic view and that of Copernicus is to be left open in expectation of future 'proofs'" (*Galileo: For Copernicanism and for the Church*, p. 205). But it appears that in Galileo's characteristic duplicity, he would say whatever he could get away with, depending on the audience to whom he was speaking. If his audience believed in Copernicanism, Galileo treated Copernicanism as a scientific fact. If his audience rejected Copernicanism, Galileo would often treat it as a hypothesis.

[704] *The Crime of Galileo*, p. 277.

[705] *Le Opere di Galileo Galilei*, Antonio Favaro, vol. 19, p. 403, as cited in Fantoli, p. 137.

[706] *Le Opere di Galileo Galilei*, vol. 19, pp. 403-404, as cited in Fantoli, p. 138.

> replied that Mr. Galilei had not published without the approval of his ministers….He answered, with the same outburst of rage, that he had been deceived by Galileo and Ciampoli…[707]

Niccolini, clearly trying to make headway for Galileo, explained to Urban that Galileo's book, the *Dialogo*, was "dedicated to our Most Serene Patron," namely, the Grand Duke who, as was common in those days, had been secretly financing Galileo's work. But the pope's reply showed he was not going to budge an inch, and the reasons were theological in nature. Urban called Galileo's book nothing less than "the worst harm to religion…ever conceived." Niccolini describes the pope's reaction as follows:

> He said that he had prohibited works which had his pontifical name in front and were dedicated to himself, and that in such matters, involving great harm to religion (indeed the worst ever conceived), His Highness [the Grand Duke] too should contribute to preventing it, being a Christian prince….I retorted that…I did not believe His Holiness would bring about the prohibition of the already approved book without at least hearing Mr. Galilei first. His Holiness answered that this was the least ill which could be done to him and that he should take care not to be summoned by the Holy Office; that he has appointed a Commission of theologians and other persons versed in various sciences, serious and of holy mind, who are weighing every minutia, word for word, since one is dealing with the most perverse subject one could ever come across….Finally, he told me to write to our Most Serene Patron that the doctrine is extremely perverse, that they would review everything with seriousness, and that His Highness should not get involved but should go slow; furthermore, not only did he impose on me the secret about what he had just told me, but he charged me to report that he also was imposing it on His Highness [the Grand Duke].[708]

On September 11, Niccolini writes:

> In fact, the Pope believes that the Faith is facing many dangers and that we are not dealing with mathematical subjects here but with Holy Scripture, religion, and Faith….However, above all he says, with the usual confidentiality and secrecy, that in the files of the Holy Office they have found something which alone is sufficient to ruin Mr. Galilei completely; that is, about twelve years ago, when it became known that he held this opinion and was sowing it in Florence, and when on account of this he was called to Rome, he was prohibited from holding this opinion by the Lord Cardinal Bellarmine, in the name of the Pope and the Holy Office. So he says he is not really surprised that His Highness is acting with so much concern, for he has not been told all the circumstances of this business.[709]

On September 18, Niccolini reports that the pope has no qualms about his strong reaction against Galileo:

> He [the pope] retorted that in cases where religion might suffer damage, it was less harmful to overreact occasionally than to be remiss as a result of the reasons I

[707] *Le Opere di Galileo Galilei*, vol. 14, p. 383, translated by Finocchiaro in *The Galileo Affair*, p. 229. Original Italian: "Non hebbi tempo hieri di rappresentar a V. S. Ill. Quell che haveva passato meco a caso il Papa con gran sentimento a proposito dell'opera del S. Galilei, et io n'hebbi cara l'oportunità, perchè potetti dir qualche cosa a S. B. medesima, ben che senza alcun profitto; e quant'a me comincio a creder anch'io, come ben dice V. S. Ill, ch'il mondo habbia a cadere. Mentre si regionava di quelle fastidiose materie del S. Offizio, proroppe S. S. in molta collera, et all'improviso mi disse ch'anche il nostro Galilei haveva ardito d'entrar dove non doveva, et in materie le più gravi e le più pericolose che a questi tempi si potesser suscitare. Io replicai ch'il S. Galilei non haveva stampato senza l'approvattione di questi suoi ministry, et ch'io medesimo havevo ottenuto e mandato in costà I proemii a questo fine. Mi rispose con la medesima escandescenza, che egli et il Ciampoli l'havevano aggirata."

[708] *Le Opere di Galileo Galilei*, vol. 14, p. 384, translated by Finocchiaro in *The Galileo Affair*, p. 230.

[709] *Le Opere di Galileo Galilei*, vol. 14, p. 388, translated by Finocchiaro in *The Galileo Affair*, pp. 232-233.

> mentioned, and thus to endanger Christianity with some sinister opinion; furthermore, he had been told by His Holiness that, since we are dealing with dangerous dogmas, His Highness [the Grand Duke, Cosimo Medici] should put aside all respect and affection toward his Mathematician and be glad to contribute himself to shielding Catholicism from any danger.
>
> I replied by again humbly begging him to consider that Mr. Galilei is Mathematician to His Highness, currently employed and salaried by him, and also universally known as such. His Holiness answered that this was another reason why he had gone out of the ordinary in this case and that Mr. Galileo was still his friend, but these opinions were condemned about sixteen years ago and Galileo had gotten himself into a fix which he could have avoided; for these subjects are troublesome and dangerous, this work of his is indeed pernicious, and the matter is more serious than His Highness thinks….Then he added, telling me to report it fully to His Most Serene Highness, that one must be careful not to let Mr. Galilei spread troublesome and dangerous opinions under the pretext of running a certain school for young people…[710]

On November 13, 1632, Niccolini again shows the pope's resolve in silencing the Copernican doctrine and bringing Galileo to trial in Rome:

> …this morning I discussed it with His Holiness himself. After mentioning that Mr. Galilei is ready to obey and to comply with what he will be ordered to do, I undertook to explain to His Holiness the same things at great length, to move him to pity poor Mr. Galileo, who is now so old and whom I love and adore….However, His Holiness told me that…there was no way of avoiding Mr. Galilei's coming to Rome…for indeed it was necessary to examine him personally, and that God would hopefully forgive his error of having gotten involved in an intrigue like this after His Holiness himself (when he was cardinal) had delivered him from it….Finally, he reiterated that one is dealing with a very bad doctrine.[711]

On February 27, 1633, just a few months now before Galileo's trial, Niccolini reiterates the pope's resolve:

> Then he [the pope] went on to say that, in short, Mr. Galilei had been ill-advised to publish these opinions of his, and it was the sort of thing for which Ciampoli was responsible….His Holiness gives the impression that Mr. Galileo's doctrine is bad and that he even believes it, the task is not easy….His Eminence [Cardinal Antonio Barberini, brother of the pope] replied that he felt warmly toward Mr. Galilei and regarded him as an exceptional man, but this subject is very delicate for it involves the possibility of introducing some imaginary dogma into the world…[712]

As the time gets nearer to the trial, Pope Urban's resolve seems to strengthen even more. On March 13, 1633, Niccolini writes:

> I replied that I hoped His Holiness would double the obligation imposed on His Highness by exempting him from this [the trial]….but he again said he does not think there is any way out, and may God forgive Mr. Galilei for having meddled with these subjects. He added that one is dealing with new doctrines and Holy Scripture, that the best course is to follow the common opinion since he too is attracted to them and is a friend of the new philosophy; further, Mr. Galileo had been his friend, they have conversed and dined several

[710] *Le Opere di Galileo Galilei*, vol. 14, pp. 388-389, translated by Finocchiaro in *The Galileo Affair*, pp. 235-236.

[711] *Le Opere di Galileo Galilei*, vol. 14, pp. 428-429, translated by Finocchiaro in *The Galileo Affair*, pp. 238-239.

[712] *Le Opere di Galileo Galilei*, vol. 15, p. 55-56, translated by Finocchiaro in *The Galileo Affair*, pp. 245-246.

> times together familiarly, and he was sorry to have to displease him, but one was dealing with the interests of the faith and religion. I think I went on to add that if he is heard, he will easily give every satisfaction, though with the proper reverence which is due the Holy Office. He replied that Mr. Galilei will be examined in due course, but there is an argument which no one has ever been able to answer: that is, God is omnipotent and can do anything; but if He is omnipotent, why do we want to bind him? I said that I was not competent to discuss these subjects, but I had heard Mr. Galilei himself say that first he did not hold the opinion of the earth's motion as true and then that since God could make the world in innumerable ways, one could not deny that He might have made it this way. However, he got upset and told me that one must not impose necessity on the blessed God; seeing that he was losing his temper, I did not want to continue discussing what I did not understand, and thus displease him, to the detriment of Mr. Galilei.[713]

On April 9, 1633, Niccolini adds the same. By this time Galileo is suffering from arthritis:

> However, I could hide neither the ill health of this good old man, who for two whole nights had constantly moaned and screamed on account of his arthritic pains….This morning I spoke to His Holiness about it, and, after I expressed appropriate thanks for the advance notice he was so kind to give me, His Holiness said he was sorry that Mr. Galilei had gotten involved in this subject, which he considers to be very serious and of great consequence for religion. Nevertheless, Mr. Galilei tries to defend his opinions very strongly; but I exhorted him…not to bother maintaining them and to submit to what he sees they want him to hold or believe about that detail of the earth's motion. He was extremely distressed by this, and, as far as I am concerned, since yesterday he looks so depressed that I fear greatly for his life.[714]

On June 19, 1633, Niccolini reveals that it is the pope himself that formulated the conclusion that Galileo's cosmology was "erroneous and contrary to Holy Scripture":

> This morning His Holiness displayed very friendly feelings in innumerable ways….Again I pleaded that Mr. Galilei's trail be brought to an end….However, he said that in regard to the issue, there is no way of avoiding prohibiting that opinion, since it is erroneous and contrary to the Holy Scripture dictated by the mouth of God; and in regard to the person, as ordinarily and usually done, he would have to remain imprisoned here for some time because he disobeyed the orders he received in the year 1616.[715]

Niccolini's revelation about the pope's decision coincides with the minutes of the Inquisition's June 16, 1633 meeting which "reported a papal decision outlining the conclusion of the trial, including an injunction to never again discuss the topic on pain of being treated as a relapsed heretic."[716]

The Sentence and Punishment of Galileo

On Wednesday, June 22, 1633, with Galileo dressed in a white shirt to symbolize penitence, he knelt as the full text of the final sentence against him was read: [NB: the more significant parts are underlined and footnoted in the original Italian]

> **Sentence**: Whereas you, Galileo, son of the late Vincenzo Galilei, Florentine, age seventy years, were in the year 1615 denounced to this Holy Office for holding as true the false doctrine taught by some that the sun is the center of the world and immovable and that the Earth moves, and

[713] *Le Opere di Galileo Galilei*, vol. 15, p. 67-68, translated by Finocchiaro in *The Galileo Affair*, p. 247.

[714] *Le Opere di Galileo Galilei*, vol. 15, p. 84-85, translated by Finocchiaro in *The Galileo Affair*, p. 249.

[715] *Le Opere di Galileo Galilei*, vol. 15, p. 160, translated by Finocchiaro in *The Galileo Affair*, p. 255.

[716] As noted by Finocchiaro in *Retrying Galileo*, p. 272.

> also with diurnal motion;[717] for having disciples to whom you taught the same doctrine; for holding correspondence with certain mathematicians of Germany concerning the same; for having printed certain letters, entitled "On the Sunspots," wherein you developed the same doctrine as true; and for replying to the objections from the Holy Scriptures, which from time to time were urged against it, by glossing the said Scriptures according to your own meaning:[718] and whereas there was thereupon produced the copy of a document in the form of a letter, purporting to be written by you to one formerly your disciple, and in this divers propositions are set forth, following the position of Copernicus, which are contrary to the true sense and authority of Holy Scripture:[719]

Analysis: The seriousness with which Urban VIII had conducted the preliminary judgments against Galileo are now carried over and formalized in the final sentence. Note that both the revolution of the Earth around the sun and the rotation of the Earth on its axis are condemned. From the outset we see why the pope and his Holy Office considered this case one of the most serious issues facing the Church and why they spent so much time and energy to suppress it. The main issue is the veracity of Holy Scripture, something which Galileo "glossed" over with his "own meaning," and therefore did not discover its "true sense." Again, we need to be reminded that the pope and his Holy Office were certainly aware of the theoretical possibility of interpreting Scripture's cosmological passages in a figurative sense. It is not as if these clerics were blinded by having known only one methodology of biblical interpretation. The Alexandrian school of exegesis one thousand years prior had inundated the Church with all kinds of allegorical and figurative interpretations of Scripture, which also carried over into the medieval age. The early Fathers themselves were deep into mystical meanings and biblical numerology. But when it came to interpreting Scripture's cosmology, not a one of them dared turn it into figurative expression. Something held them back from doing so, and we are confident to say that it was the Holy Spirit who guides the Church in her doctrinal proclamations.

Galileo tried his best to get around this immovable obstacle. At one point he reinvented how the Church should regard the testimony of the Fathers, saying we were bound

> …only to those conclusions which the Fathers discussed and inspected with great diligence and debated on both sides of the issue and for which they then all agreed to reject one side and to hold the other. However, the earth's motion and sun's rest are not of this sort, given that in those times this opinion was totally forgotten as far from academic dispute and was not examined, let alone followed, by anyone; thus one may believe that the Fathers did not even think of discussing it…. Therefore, it is not enough to say that all the Fathers accept the earth's rest, etc., and so it is an article of faith to hold it; rather one would have to prove that they condemned the contrary opinion. For I can always say that their failure to reflect upon it and discuss it made them leave it stand as the current opinion, but not as something resolved and established.[720]

[717] "falsa dottrina, da alcuni insegnata, ch'il sole sia centro del mondo et imobile, e che la terra si muova anco di moto diurno" (*Galileo E L'Inquizisione*, Favaro, p. 143).

[718] "rispondevi glosando detta Scrittura conforme al tuo senso" (*ibid*).

[719] "si contengono varie propositioni contro il vero senso et auttorità della Sacra Scrittura" (*ibid*).

[720] *Le Opera di Galileo Galilei*, vol. 5, pp. 335-336, translated by Finocchiaro, cited in *Galileo: For Copernicanism*, pp. 201-202.

Galileo was on his usual fishing expedition, but it happened to be in a poisoned lake. From treating the Fathers as being ignorant of astronomy, to claiming that because they didn't "debate" geocentrism this now allows us to depart from their consensus, he has tried every possible means to escape their holy grip on his fortunes. In actuality, the Fathers did little debating amongst themselves on any topic. Their writings were preponderantly concerning debates with and about heretics and apostates. They even titled many of their works against the heretics they fought (*e.g.*, Irenaeus' *Against Heresies*, Augustine's *Against Manicheus*, Basil's *Against Eunomius*). Moreover, if the Fathers had been in debate amongst themselves it would have meant there was a controversy, and controversy creates doubt, and doubt leads to no consensus. But the reality is, the Fathers wrote over a span of about 600 years and from widely separated lands with very infrequent communications. Interestingly enough, with what little correspondence they could generate with one another, it is remarkable to see how much agreement they maintained over the doctrines of the Christian faith.

When it came to the issue of geocentrism, it was not, as Galileo would have it, that the Fathers just accepted this doctrine in a vacuum without any opposing propositions. Since Galileo hardly read the Fathers, he would have missed the frequent debates and admonitions they raised in their writing against the speculative science of the Greeks, including the push for evolution and heliocentrism in the Pythagorean school.

The only time the Church's leaders entered into intense debates was in sessions of an ecumenical council. But even then, what was resolved in the council chambers was that Catholics were obligated to adhere to the consensus of the Fathers. The obligation was reiterated at the Council of Trent, which was about sixty years prior to Galileo's above proposals on how to regard the patristics. Rest assured, no council ever stated that Catholics should listen to the consensus of the Fathers only after they had strenuous debate over a certain topic. It was Trent's belief that the Holy Spirit was guiding the Church, and if she was guided in such a way that all her major theologians taught one belief, it was a sure sign that divine providence was at work.

> **Sentence**: This Holy Tribunal being therefore of intention to proceed against the disorder and mischief thence resulting, which went on increasing to the prejudice of the Holy Faith, by command of His Holiness and of the Most Eminent Lords Cardinals of this supreme and universal Inquisition,[721] the two propositions of the stability of the sun and the motion of the Earth were by the theological Qualifiers qualified as follows:

Analysis: We note here that the Inquisition is understood as having "supreme" authority and "universal" jurisdiction. During this day and time when a close relationship existed between the civil magistrate and the ecclesiastical authorities, no one was exempt from the investigations and decisions of the Inquisition. This implies that, even though the decision against Copernicanism was directed against particular individuals (Foscarini, Galileo, Kepler, *et al*.), it applied to anyone in the world who might attempt to preach the same heliocentric doctrine. If such an attempt were made, another tribunal of the Inquisition would have been set up to deal with it. If a great number of individuals made such an attempt, the Church would most likely settle them all at once by making a formal and binding declaration to all the Christian faithful that no one is permitted to hold or teach that the Earth moves. Such a formal declaration is still a possibility. The passage of time, including the 375 years since the 1633 edict against Galileo, really has no effect on what may happen in the future. At any time it is so led, the Church could declare geocentrism as a formally infallible and binding doctrine on the whole Church. There are many examples of doctrines which, having been believed and practiced in the early centuries of the Church, were not formalized into dogmatic proclamations until hundreds or even thousands of years later (*e.g.*, transubstantiation, the canon of Scripture, justification, the Immaculate Conception of Mary, the Assumption of Mary). The unique quality of geocentric doctrine is that it possesses what the Church would consider the strongest possible evidence for declaring it a dogma of the Church. It has: (a) an indisputable consensus among the Fathers and medievals; (b) Scripture's exclusive testimony, in dozens of passages written in various ways, that declare the sun moves and the Earth is fixed; (c) high level magisterial decisions, enjoined, facilitated and authoritatively endorsed by several popes, that declare heliocentrism a formal heresy, opposed to Scripture, and a pernicious error. The only thing left to convince a doubting Thomas is the

[721] "di questa Suprema et Universale Inq.ne" (*ibid*.).

scientific evidence. With the very tools provided by modern science, we have painstakingly demonstrated that modern science has both no proof for heliocentrism and abundant evidence for geocentrism, facts which it is reticent to reveal to the public because of its admitted philosophical bias against doing so.

> **Sentence**: The proposition that the sun is the center of the world and does not move from its place is absurd and false philosophically and formally heretical, because it is expressly contrary to the Holy Scripture.[722]

Analysis: Here we see that even though Pope Paul V's 1616 injunction against Galileo did not use the word "heresy" that was recommended by the eleven cardinals who formed the papal investigatory commission, the term is here resurrected and applied in 1633, only this time it is increased to the level of being "formally" heretical, as opposed to, we assume, being materially heretical. Note that the judgment is not directed merely against Galileo; rather, the entire "proposition" of a non-moving sun, no matter who may countenance such a belief, is declared "formally heretical." Hence, anyone who would adopt heliocentrism would automatically open themselves up to the judgment of formal heresy, based on this 1633 sentence. For more clarification on the canonical meaning of these terms, Fr. Jerome Langford elaborates:

> The theologian Antonio of Cordova, writing in 1604, explains the generic meaning of these censures. The "formally heretical" in the first censure means that this proposition was considered directly contrary to a doctrine of faith. This shows that the apparent affirmations of Scripture and the Fathers, that the sun moves, was held by the Consultors to be a doctrine of faith. In other words, there is no room for apologetic excursions here. The Consultors tagged the proposition with the strongest possible censure, as being directly contrary to the truth of Sacred Scripture. In the second proposition, the motion of the earth was censured as "erroneous in the faith." This meant that the Consultors considered it to be not directly contrary to Scripture, but opposed to a doctrine which pertained to the faith according to the common consensus of learned theologians. In other words, Scripture was not as definite in stating the immobility of the earth. But the Holy Writ did reveal that the sun moved, and since human reason could conclude that the sun and the earth were not both moving around each other, the Consultors felt that the immobility of the earth was a matter which fell under the domain of faith indirectly, as a kind of theological conclusion.[723]

> **Sentence**: The proposition that the Earth is not the center of the world and immovable but that it moves, and also with a diurnal motion, is equally absurd and false philosophically and theologically considered at least erroneous in faith.[724]

Analysis: A central, non-moving Earth, similar to a moving sun, is judged as "absurd" and "false philosophically." The word "absurd" is employed because of the simple logic involved. If the sun moves around the Earth, then logically the Earth cannot move around the sun. It is a simple matter of choosing the right system. If A is right, it would be absurd to adopt B. "False philosophically" refers to the fact that the Pythagorean school of philosophy had adopted heliocentrism in opposition to the philosophical school of Aristotle. In medieval times, "philosophy" was a much more general term than its usage today. Lastly, the change from "formally heretical" with regard to the movement of the sun, to "at least erroneous in faith" with regard to movement of the Earth seems a bit inconsistent but there is a reason for it. First, as noted earlier, the Church admitted that certain Scriptures might possibly be interpreted as referring to the stability of

[722] "Che il sole sia centro del mondo et imobile di moto locale, è propositione assurda e falsa in filosofia, e formalmente heretica, per essere espressamente contraria alla Sacra Scrittura (*ibid.*).

[723] Jerome J. Langford, *Galileo, Science and the Church*, foreword by Stillman Drake, NY: Desclee Co., 1966, pp. 89-90, cited in Paula Haigh's private paper, *Galileo's Heresy*, p. 3.

[724] "Che la terra non sia centro del mondo nè imobile, ma che si muova etiandio di moto diurno, è parimente propositione assurda e falsa nella filosofia, e considerate in teologia ad minus erronea in Fide" (*ibid.*).

the Earth as opposed to its being immobile in space. As such, it would not be formally heretical to say that Psalm 104, for example, was speaking about Earth's longevity in time rather than its position in space. But since it was certain that the sun revolved around the Earth, it would still be "at least erroneous in faith" for one to claim that the Earth moved since obviously only one body can be revolving around the other. Second, normally ecclesiastical censures will be issued at three distinct levels of severity: (a) heresy; (b) erroneous in faith; (c) rashness. The difference between (a) and (b) in the case of Galileo is that there was some doubt about whether Galileo actually held, at least in the absolute sense, to the concepts that he put in his *Dialogo* since he sometimes gave the impression they were hypothetical. As such, Galileo is convicted for being "vehemently suspected of heresy" (see below) as opposed to being in actual heresy. This allows the sentence to maintain, on the one hand, that sun-fixed or that earth-moving cosmologies are, *de facto*, "formally heretical," and, on the other hand, allow room for judging whether the penitent really knew and believed what he was saying. Coinciding with this principle is the phrase "vehemently" in the statement "vehemently suspect of heresy," indicating the bare minimum of conviction that is assigned to Galileo and implying he is only a hair's breadth from being in the category of formal heresy. In any case, since Galileo was only suspected of heresy, he is then required to write a formal abjuration of his views, whereas if he were convicted of either "heresy" or "rashness" no abjuration would have been required.

> **Sentence**: But whereas it was desired at that time to deal leniently with you, it was decreed at the Holy Congregation held before His Holiness on 25 February 1616,[725] that his Eminence the Lord Cardinal Bellarmine should order you to abandon altogether the said false doctrine and, in the event of your refusal, that an injunction should be imposed upon you by the Commissary of the Holy Office to give up the said doctrine and not teach it to others, not to defend it, nor even discuss it;[726] and failing your acquiescence in this injunction, that you should be imprisoned. And in execution of this decree, on the following day, at the Palace, and in the presence of his Eminence, the said Lord Cardinal Bellarmine, after being gently admonished by the said Lord Cardinal, the command was enjoined upon you by the Father Commissary of the Holy Office of that time, before a notary and witnesses,[727] that you were altogether to abandon the said false opinion and not in future to hold or defend or teach it in any way whatsoever,[728] neither verbally nor in writing; and, upon your promising to obey, you were dismissed.

Analysis: The close involvement of Pope Paul V is duly noted, as well as the written legal injunction that is stated to have been given to Galileo by the Commissary of the Holy Office, not, as Galileo had claimed, verbally given to him by Cardinal Bellarmine. The proof that it was written is noted by the sentence's appeal to the "notary and witnesses" who would be required to sign their names to the injunction. The injunction specifies that Galileo was not to disseminate the heliocentric system "in any way whatsoever," which obviously included making theatrical musings of the opposing forces in the debate, as was the case in his *Dialogo*.

> **Sentence**: And, in order that a doctrine so pernicious might be wholly rooted out and not insinuate itself further to the grave prejudice of Catholic truth,[729] a decree was issued by the Holy Congregation of the Index prohibiting the books which treat of this doctrine and declaring the doctrine itself to be false and wholly contrary to the sacred and divine Scripture.[730]

[725] "fu decretata nella Sacra Congre.ne tenuta avanti N. S. a' 25 di Febr.o 1616" (*ibid*). "N.S." is the abbreviation for "His Holiness" used each time it appears in the decree.

[726] "che dal Comissario del S. Off.o ti dovesse esser fatto precetto di lasciar la detta dotrina, e che non potessi insegnarla ad altri nè difenderla nè trattarne" (*ibid.*).

[727] "benignamente avvisato et amonito, ti fu dal P. Comissario del S. Off.o di quell tempo fatto precetto, con notaro e testimoni" (*ibid*. p. 144).

[728] "in qualsivoglia modo" (*ibid.*).

[729] "Et acciò che si togliesse affatto così perniciosa dottrina, e non andasse più oltre serpendo in grave pregiuditio della Cattolica verità" (*ibid.*)

Analysis: Here we must realize that the pope and the Holy Office are not trying to dress up their convictions with a superfluity of convincing words; rather, they are expressing their deepest and most solemn concerns about an error they know in their heart of hearts could break the very foundations of Christianity, mainly because of the direct attack on the veracity and proper interpretation of Scripture that the Galileo affair would unleash upon mankind unless it were properly identified and summarily curtailed. Like a dragon that must be cast into the bottomless pit and sealed over so that it cannot escape, so the magisterium of the 17th century, given the task by God himself to set the precedent for ages to come, viewed the "pernicious" doctrine of Galileo as one of the greatest threats ever to face the Church. Like a cancer waiting to metastasize, the doctrine of Galileo had to be "wholly rooted out" before it sucked the life out of the Church. As we have seen earlier in analyzing the Church's subsequent decisions, the judgments against the heliocentric system as being "formally heretical" and "opposed to Scripture" have never been officially overturned, even though, by some sleight of hand concerning the dubious claims of stellar parallax in the 1830s Copernicus and Galileo managed to get their books off the Index. The fact is, however, that the Index, although it is related to the injunction of 1616 and the sentence of 1633, is a separate document with its own life and death, as it were. As such, dispensing with the Index or removing names from it does not dispense with the formal judgment that the magisterium made against the heliocentric theory itself. The sentence of 1633 makes clear that there are two separate but related issues at stake. The first deals with the fallacious tenets of heliocentrism itself; the second deals with what Galileo believed and taught and how he was to be censured. The sentence makes clear that there is no negotiation on the first issue, and on the second it decided to give a more lenient judgment. It is only the second of these issues that is up for discussion in the following years. The first issue has never come up for discussion again, save the commission John Paul II formed in 1981 and the informal address he subsequently gave to the Pontifical Academy of Science in 1992 but which made no official attempt to overturn previous magisterial decisions on the theological status of heliocentrism.

> **Sentence**: And whereas a book appeared here recently, printed last year at Florence, the title of which shows that you were the author, this title being: "Dialogue of Galileo Galilei on the Great World Systems: Ptolemy and Copernicus"; and whereas the Holy Congregation was afterwards informed that through the publication of the said book the false opinion of the motion of the Earth and the stability of the sun was daily gaining ground,[731] the said book was taken into careful consideration, and in it there was discovered a patent violation of the aforesaid injunction that had been imposed upon you, for in this book you have defended the said opinion previously condemned and to your face declared to be so, although in the said book you strive by various devices to produce the impression that you leave it undecided, and in express terms probable:[732] which, however, is a most grievous error, as an opinion can in no wise be probable which has been declared and defined to be contrary to divine Scripture.[733]

Analysis: After "weighing every minutia, word for word" of Galileo's book, the outcome was predictable, but the language used to condemn it was not. Here in the final sentence approved by the pope even the "probability" of heliocentrism is categorized as "an opinion declared and defined contrary to Divine Scripture." This was the same argument that Cardinal Bellarmine had given Galileo in 1616 when he explained to him that, based on the veracity of Scripture and the consensus of the Fathers, not only did no person bring proof of heliocentrism to him, he did not believe that any person *could* do so.[734] Pope Urban's 1633 judgment

[730] "et essa dichiarata falsa et omninamente contraria alla Sacra et divina Scrittura" (*ibid.*).

[731] "che con l'impressione di detto libro ogni giorno più prendeva piede e si disseminava la falsa opinione del moto della terra e stabilità del sole" (*ibid.*).

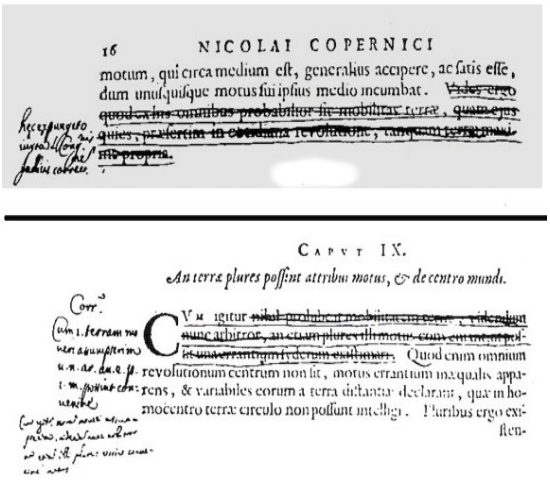
[732] "avvenga che tu in detto libro con varii ragiri ti studii di persuadere che tu la lasci come indecisa et espressamente probabile" (*ibid.*).

[733] "non potendo in niun modo esser probabile un'opinione dichiarata e difinita per contraria alla Scrittura divina" (*ibid.*).

seems to go one step further than Bellarmine's, for it declares that heliocentrism is not even to be considered probable, thus curtailing all claims to those having scientific proof to support it. In drawing this line in the sand the sentence uses language that is normally reserved for decisions that possess a very high degree of authority in dogmatic proclamations, that is, Urban VIII approves and facilitates language saying that heliocentrism is "*declared* and *defined* contrary to Divine Scripture." When a controversial issue is "defined" it is more or less set in stone, unless a higher authority changes it. In that case, only a formal and universal statement given *ex cathedra* by Pope Urban, or a future pope, would have had higher authority to do so, and, needless to say, no such *ex cathedra* pronouncement has ever been made.

> **Sentence**: Therefore by our order you were cited before this Holy Office, where, being examined upon your oath, you acknowledged the book to be written and published by you. You confessed that you began to write the said book about ten or twelve years ago [1621-1623], after the command had been imposed upon you as above; that you requested license to print it without, however, intimating to those who granted you this license that you had been commanded not to hold, defend, or teach the doctrine in question in any way whatever.

Analysis: This means that Galileo, in his typical temerity, began writing the *Dialogo* just five to seven years after the injunction had been given to him in 1616. In fact, parts of the *Dialogo* were written as far back as 1610.[735] The timing would put a dim light on Galileo's 1633 excuse that he did not "recall" receiving the injunction from the Holy Office since a lapse of memory could hardly be the case for one of the most serious moments in his life. Perhaps with malice aforethought Galileo began writing the *Dialogo* in hopes that the tide against him would someday turn.



16 NICOLAI COPERNICI

motum, qui circa medium eſt, generalius accipere, ac ſatis eſſe, dum unuſquiſque motus ſui ipſius medio incumbat. ~~Vides ergo quod ex his omnibus probabilior fit mobilitas terræ, quam ejus quies, præſertim in cotidiana revolutione, tanquam terræ mul. ~~ ~~proprio.~~

CAPVT IX.

An terræ plures poſſint attribui motus, & de centro mundi.

CVm igitur ~~nihil prohibeat mobilem ita esse, videndum nunc arbitror, an etiam plures illi motus eius ut mundi~~ ~~ſit universitati, debeant adhiberi.~~ Quod enim omnium revolutionum centrum non ſit, motus errantium maxime apparens, & variabilis eorum a terra diſtantia declarat, quæ in homocentro terræ circulo non poſſunt intelligi. Pluribus ergo exiſten-

Or even more likely, Galileo got wind of the decision by the magisterium in 1620 to allow the publishing of Copernicus' book, *De revolutionibus*, if the proper corrections were added that would clearly make heliocentrism a hypothesis rather than give any hint that it was a scientific fact. Bellarmine had already suggested this approach both to Foscarini and Galileo, so it is not surprising that it was applied just a few years later.[736] On May 15, 1620, the "List of the corrections of the work *De revolutionibus orbium celestium* of Nicholas Copernicus" was released. Nine corrections were amended to the original text. One example of a correction (see facsimile on next page) regards Copernicus' statement in Book 1, Chapter 9: "Therefore, since nothing hinders the mobility of the Earth, I think we should now see whether more than one movement belongs to it, so that it can be

[734] Bellarmine stated: "But I will not believe that there is such a demonstration, until it has been shown to me. To demonstrate that the assumption that the sun is located in the center and the earth in the heavens saves the appearances is not the same thing as to demonstrate that in truth the sun is located in the center and the earth in the heavens. The first demonstration, I believe, can be given; but I have the greatest doubts about the second. And in case of doubt one should not abandon the Sacred Scriptures as interpreted by the Holy Fathers."

[735] Arthur Koestler, *The Sleepwalkers*, p. 605.

[736] Gingerich posits this possible motivation: "*De revolutionibus* included observations of the Sun and Moon, of potential value to the Church, so it was inadvisable to ban the book outright. Nor could the heliocentrism simply be excised, for it was too firmly embedded in the text. The only path was to change a few places to make it patently obvious that the book was to be considered strictly hypothetical" (*The Book that Nobody Read*, p. 144).

regarded as one of the wandering stars"[737] as it appeared in the 1617 edition of *De Revolutionibus* by Nicolai Mulerii, published in Amsterdam. Mulerii shows the line in which the censor crossed out the above sentence and changed it in the margin, which then read: "Therefore, with the *assumption* that the earth moves, I think we should now see whether more than one movement belongs to it…"[738]

Sentence: You likewise confessed that the writing of the said book is in many places drawn up in such a form that the reader might fancy that the arguments brought forward on the false side are calculated by their cogency to compel conviction rather than to be easy of refutation, excusing yourself for having fallen into an error, as you alleged, so foreign to your intention, by the fact that you had written in dialogue and by the natural complacency that every man feels in regard to his own subtleties and in showing himself more clever than the generality of men in devising, even on behalf of false propositions, ingenious and plausible arguments.

And, a suitable term having been assigned to you to prepare your defense, you produced a certificate in the handwriting of his Eminence the Lord Cardinal Bellarmine, procured by you, as you asserted, in order to defend yourself against the calumnies of your enemies, who charged that you had abjured and had been punished by the Holy Office, in which certificate it is declared that you had not abjured and had not been punished but only that the declaration made by His Holiness and published by the Holy Congregation of the Index had been announced to you, wherein it is declared that the doctrine of the motion of the Earth and the stability of the sun is contrary to the Holy Scriptures and therefore cannot be defended or held.[739] And, as in this

[737] Cum igitur nihil prohibet mobilitatem terra, videndum nunc arbitror, an etiam plures illi motus convenire ut poffint una errantium siderum enuntiare.

[738] "Cum igitur terram moveri assumpserim, videndum nunc arbitror, an etiam illi plures possint convenire motus…" The correction is also noted in Favaro's *Galileo e l'Inquisizione,* p. 141. Gingerich notes the correction in Book 1, chapter 11, from Galileo's personal copy of *De revolutionibus* which reads: "De triplici motu telluris demonftratio" ("The Demonstration of the Three-Fold Motion of the Earth") was crossed out and replaced with "De hypothesi triplicis motus terre ciusq demonstratione" ("The Hypothesis of the Three-Fold Motion of the Earth and its Demonstration"). Other corrections include: (1) In the Preface where Copernicus says: "There may be triflers who though wholly ignorant of mathematics nevertheless abrogate the right to make judgments about it because of some passage of Scripture wrongly twisted to their purpose, and will dare to criticize and censure this undertaking of mine. I waste no time on them, and indeed I despise their judgment as thoughtless…" This paragraph was to be deleted. (2) In Bk. 1, Ch. 1, p. 6 (corrected by Favaro to Bk. 1, Ch. 5, p. 3) Copernicus states: "Among the authorities it is generally agreed that the Earth is at rest in the middle of the universe, and they regard it as inconceivable and even ridiculous to hold the opposite opinion. However, if we consider it more closely the question will be seen to be still unsettled, and so decidedly not to be despised." This was to be changed to: "However, if we consider the question more closely, we think it is immaterial whether the Earth is placed at the center of the world or away from the center, so long as one saves the appearances of celestial motion." (3) All of chapter 8 was problematic because it spoke explicitly of the earth's motion and refuted arguments for its rest. Corrections were made to pages 6 and 7 making the chapter hypothetical. (4) In Ch. 10, p. 9 Copernicus wrote: "Consequently we should not be ashamed to admit that everything that the Moon encircles, including the center of the Earth, passes through that great sphere between the other wandering stars in an annual revolution around the Sun, and the center of the universe is in the region of the Sun." In this case the word "admit" was to be changed to "assume." In the same place, Copernicus wrote: "That the Sun remains motionless and whatever apparent motion the Sun has is correctly attributed to the motion of the Earth." In this case, the word "correctly" was to be changed to "consequently." (5) In Ch. 10, p. 10, the words "Such truly is the size of this structure of the Almighty's," since in the preceding words Copernicus claims that the stars are far away and do not move. (6) In Bk. 4, Ch. 20, p. 122, the title: "The size of these three stars, the Sun, the Moon, and the Earth, and a comparison of them with each other," was to delete "these three stars" since the Earth was not a star. These corrections were signed in Rome at the Apostolic Palace on May 20, 1620 by Fr. Franciscus Capiferreus, O.P., Secretary of the Holy Congregation of the Index. A complete list in the original Latin is in Favaro's *Le Opera di Galileo Galilei*, vol. 19, pp. 400-401.

[739] "la dichiaratione fatta da N. S.^{e} e publicata dalla Sacra Congre.^{ne} dell'Indice, nella quale si contiene che la dottrina del moto della terra e della stabilità del sole sia

certificate there is no mention of the two articles of the injunction, namely, the order not "to teach" and "in any way," you represented that we ought to believe that in the course of fourteen or sixteen years you had lost all memory of them and that this was why you said nothing of the injunction when you requested permission to print your book.[740] And all this you urged not by way of excuse for your error but that it might be set down to a vainglorious ambition rather than to malice. But this certificate produced by you in your defense has only aggravated your delinquency, since, although it is there stated that said opinion is contrary to Holy Scripture, you have nevertheless dared to discuss and defend it and to argue its probability;[741] nor does the license artfully and cunningly extorted by you avail you anything, since you did not notify the command imposed upon you.

And whereas it appeared to us that you had not stated the full truth with regard to your intention, we thought it necessary to subject you to a rigorous examination at which (without prejudice, however, to the matters confessed by you and set forth as above with regard to your said intention) you answered like a good Catholic. Therefore, having seen and maturely considered the merits of this your case, together with your confessions and excuses above-mentioned, and all that ought justly to be seen and considered, we have arrived at the underwritten final sentence against you:

Invoking, therefore, the most holy name of our Lord Jesus Christ and of His most glorious Mother, ever Virgin Mary, by this our final sentence, which sitting in judgment, with the counsel and advice of the Reverend Masters of sacred theology and Doctors of both Laws, our assessors, we deliver in these writings, in the cause and causes at present before us between the Magnificent Carlo Sinceri, Doctor of both Laws, Proctor Fiscal of this Holy Office, of the one part, and you Galileo Galilei, the defendant, here present, examined, tried, and confessed as shown above, of the other part –

We say, pronounce, sentence, and declare[742] that you, the said Galileo, by reason of the matters adduced in trial, and by you confessed as above, have rendered yourself in the judgment of this Holy Office vehemently suspected of heresy,[743] namely, of having believed and held the doctrine – which is false and contrary to the sacred and divine Scriptures – that the sun is the center of the world and does not move from east to west and that the Earth moves and is not the center of the world;[744] and that an opinion may be held and defended as probable after it has been declared and defined to be contrary to the Holy Scripture;[745] and that consequently you have incurred all the censures and penalties imposed and promulgated in the sacred canons and other constitutions, general and particular, against such delinquents. From which we are content that you be absolved, provided that, first, with a sincere heart and unfeigned faith, you abjure, curse, and detest before us the aforesaid errors and heresies[746] and every other error and heresy contrary to the

contraria alle Sacre Scritture, e però non si possa difendere nè tenere" (*ibid*., p. 145).

[740] "e che per questa stessa cagione havevi taciuto il precetto quando chiedesti licenza di poter dare il libro alle stampe" (*ibid.*).

[741] "hai non di meno ardito di trattarne, di difenderla e persuaderla probabile" (*ibid.*).

[742] "Diciamo, pronuntiamo, sententiamo e dichiaramo" (*ibid.*).

[743] "vehementemente sospetto d'heresia" (*ibid.*).

[744] "falsa e contraria alle Sacre e divine Scritture, ch'il sole sia centro della terra e che non si muova da oriente ad occidente, e che la terra si muova e non sia centro del mundo" (*ibid.*).

[745] "dopo esser stata dichiarata e diffinita per contraria alla Sacra Scrittura" (*ibid.*).

[746] "li sudetti errori et heresie" (*ibid*., pp. 145-146).

> Catholic and Apostolic Roman Church in the form to be prescribed by us for you.

Analysis: Once again it is made clear that the notion of a moving Earth and a fixed sun is to be categorized as a "heresy," and its opposition to Scripture is duly "declared and defined." This is direct and unambiguous language. The only saving grace for Galileo is that his judgment is lessened to one who is "*vehemently suspected* of heresy" but only because the Holy Office cannot determine whether Galileo had deliberately gone against the will of the pope. In effect, the sentence decided two related but separate issues. It made a formal declaration that heliocentrism is a "heresy," and it determined that Galileo's condemnation falls just short of embracing that heresy. Irrespective of what happens to Galileo, the fact remains that the highest authority in the Church of that day – the Holy Office under the direction and approval of the reigning pontiff – had declared heliocentrism heretical. Although names of individuals and their books would eventually be removed from the Index, the formal declaration that heliocentrism is heretical has never officially been rescinded by any other pope or his Holy Office. The extent to which the Christian faithful are presently bound by this set of facts is something that must be decided by the magisterium itself.

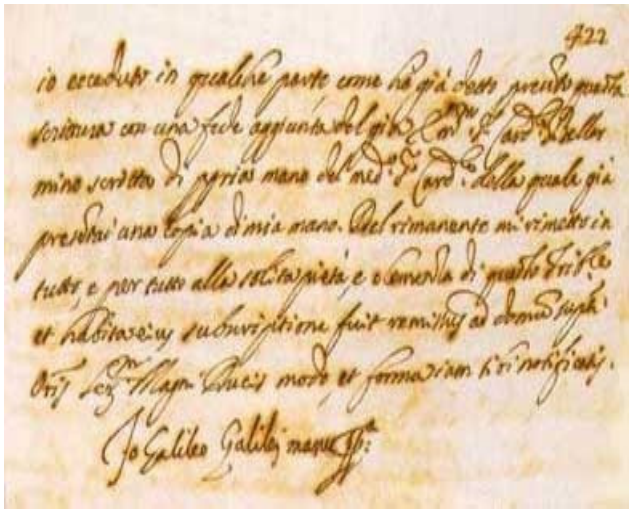
> **Sentence**: And, in order that this your grave and pernicious error and transgression may not remain altogether unpunished and that you may be more cautious in the future and an example to others that they may abstain from similar delinquencies, we ordain that the book of the "Dialogue of Galileo Galilei" be prohibited by public edict.
>
> We condemn you to the formal prison of this Holy Office during our pleasure, and by way of salutary penance we enjoin that for three years to come you repeat once a week the seven penitential Psalms. Reserving to ourselves liberty to moderate, commute, or take off, in whole or in part, the aforesaid penalties and penance.
>
> And so we say, pronounce, sentence, declare, ordain, and reserve in this and in any other better way and form which we can and may rightfully employ.[747]

On June 22, 1633, because he was "vehemently suspected" of holding the "formal heresy" that the sun was fixed and the Earth moved, the pope required Galileo to renounce his views and write a detailed abjuration. He writes as follows:

> I, Galileo, son of the late Vincenzo Galilei, Florentine, aged seventy years, arraigned personally before this tribunal and kneeling before you, Most Eminent and Reverend Lord Cardinals Inquisitors-General against heretical pravity throughout the entire Christian commonwealth having before my eyes and touching with my hands the Holy Gospels, swear that I have always believed, do believe, and by God's help will in the future believe all that is held, preached, and taught by the Holy Catholic and Apostolic Church. But, whereas – after an injunction had been judicially intimated to me by this Holy Office to the effect that I must altogether abandon the false opinion that the sun is the center of the world and immovable and that the Earth is not the center of the world and moves and that I must not hold, defend, or teach in any way whatsoever, verbally or in writing, the said false doctrine, and after it had been notified to me that the said doctrine was contrary to Holy Scripture – I wrote and printed a book in which I discuss this new doctrine already condemned and adduce arguments of great cogency in its favor without presenting any solution of these, I have been pronounced by the Holy Office to be vehemently suspected of heresy, that is to say, of having held and believed that the sun is the center of the world and immovable and that the earth is not the center and moves:
>
> Therefore, desiring to remove from the minds of your Eminences, and of all faithful Christians, this vehement suspicion justly conceived against me, with sincere heart and unfeigned faith I

[747] As translated by Giorgio de Santillana in *The Crime of Galileo*, 1955, 1962, *Time*, Inc., pp. 332-336.

abjure, curse, and detest the aforesaid errors and heresies and generally every other error, heresy, and sect whatsoever contrary to the Holy Church, and I swear that in future I will never again say or assert, verbally or in writing, anything that might furnish occasion for a similar suspicion regarding me; but, should I know any heretic or person suspected of heresy, I will denounce him to this Holy Office or to the Inquisitor or Ordinary of the place where I may be. Further, I swear and promise to fulfill and observe in their integrity all penances that have been, or that shall be, imposed upon me by this Holy Office. And, in the event of my contravening (which God forbid!) any of these my promises and oaths, I submit myself to all the pains and penalties imposed and promulgated in the sacred canons and other constitutions, general and particular, against such delinquents. So help me God and these His Hoy Gospels, which I touch with my hands.



I, the said Galileo Galilei, have abjured, sworn, promised, and bound myself as above; and in witness of the truth thereof I have with my own hand subscribed the present document of my abjuration and recited it word for word at Rome, in the convent of the Minerva, this twenty-second day of June, 1633. I, Galileo Galilei, have abjured as above with my own hand.[748]

Urban then sent a formal letter to the inquisitors and papal nuncios of Europe announcing Galileo's abjuration and requiring them to heed the Vatican's condemnation of Copernicanism.[749] One important fact that should not be missed in understanding the sternness of Urban's judgment against Galileo is that in 1616 when the pope was a cardinal (Maffeo Barberini), he had opposed the decree against Galileo that was issued under the aegis of Pope Paul V, and actually attempted to intervene on Galileo's side. In 1620, Barberini had written an ode in honor of Galileo titled *Adulatio Perniciosa* ("Perilous Adulation"). When he became pope in 1623, a year later he paid homage to Copernicus in an audience with Cardinal Hohenzollern remarking that heliocentrism would not be condemned as heretical, only as rash.[750] He lavished Galileo with favors, gave a pension for his son, as well as an expensive painting and medals of gold and silver. When in May 1630 Galileo came to Rome with his book titled *Dialogue on the Flux and Reflux of the Tides*, it was Urban VIII who suggested that he retitle the book *Dialogue on the Two Great World Systems*, although he had not read the book.[751] But Pope Urban, as we see in stark detail above, did a 180-degree turn against his former opinion. Not only was "rash" not chosen as a final judgment, in 1633 Urban revived the title of "heresy" against Copernicanism left over from the 1615 papal commission, and then added the adjective "formal" to specify its severity. Although from a human perspective there is a temptation to attribute Urban's change of mind to what some suspect was his understanding of being ridiculed as a simpleton in Galileo's *Dialogo*,[752]

[748] *Ibid*., pp. 337-338. Also recorded in the original Italian and Latin in Favaro's, *Galileo e l'Inquisizione,* pp. 76-85; 142-151.

[749] Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory of the Universe*, p. 59. Finocchiaro adds: "The Church's unprecedented effort to promulgate Galileo's sentence and abjuration is evidence of the attempt to generalize Galileo's case, to derive general prescriptions from his condemnation" (*Retrying Galileo*, p. 65).

[750] Giorgio de Santillana, *The Crime of Galileo*, New York, *Time* Inc., 1962, p. 172.

[751] Koestler, *The Sleepwalkers*, p. 487.

[752] Finocchiaro has the best analysis of the possibility of such a sentiment in Urban VIII, but concludes that it may be just a myth because he has found no solid

from a divine perspective it can safely be concluded that Urban, despite whatever vainglory with which his human character had been flawed, was being guided from above to answer one of the most serious threats the Church had ever faced.

Galileo Converts to Geocentrism

As we introduced Galileo's conversion to geocentrism in Chapter 1 (Volume 1), we will add excerpts of it here as we finish the story of Galileo.

Unbeknownst to almost every modern reader, and even most historians, is the fact that just one year prior to his death Galileo made it very clear to his former allies where he now stood on the subject of cosmology. On the 29th of March 1641, Galileo responded to a letter that he received from his colleague Francesco Rinuccini, dated the 23rd of March 1641, containing discoveries made by the astronomer Giovanni Pieroni concerning the parallax motion of certain stars, from which both Rinuccini and Pieroni believed they had uncovered proof of the heliocentric system. Rinuccini writes to Galileo:

> Your Illustrious Excellency, Signor Giovanni Pieroni has written to me in recent months telling how he had clearly observed with an optical instrument the movement of a few minutes or seconds in the fixed stars, but with just that level of certainty that the human eye can attain in observing a degree. All this afforded me the greatest pleasure - witnessing such a conclusive argument for the validity of the Copernican system! However, I have felt no little confusion because of something I read a few days ago in a bookshop. I happened to look at a book that is just now on the verge of being published. According to the author, if it were true that the sun is the center of the universe, and that the Earth travels around it once every year, it would follow that we would never be able to see half of the whole sky by night, because the line passing through the center and the horizons of the Earth, touching the periphery of the great orb, is a cord of a piece of the arc of the circle of the starry heavens, the diameter of which passes through the center of the sun. And since I have always believed it to be true - not having personally witnessed it - that the first [star] of Libra rises at the same moment as the first [star] of Aries sets, my limited intelligence has been unable to arrive at a solution. I therefore implore you, in your very great kindness, to remove this doubt from my mind. I will be very greatly obliged to you. Reverently kissing your hand, *etc*. Francesco Rinuccini."[753]

Galileo, not being particularly moved by the assertions, writes this surprising response to Rinuccini:

> The falsity of the Copernican system should not in any way be called into

documentation for its existence (See *Retrying Galileo*, 1633-1992, pp. 185-188). Indeed, the running dialogue between September 1632 and June 1633, cited earlier, that Urban VIII had with the Duke of Tuscany's ambassador, Francesco Niccolini, clearly demonstrated that Urban's resolve was based solely on the biblical, theological and scientific inadequacies of Galileo's arguments.

[753] The original Italian reads: "Dal Sig[r] Cap. Giovanni Pieroni mi fu scritto a' passati mesi [3960, 3966, 3980], come haveva chiaramente osservato con l'occhiale il moto nelle stelle fisse di alquanti minuti secondi, ma con tanta sicurezza quanta con l'occhio si saria potuto osservare un grado; che fu da me inteso con sommo gusto, per vedere così concludente argomento per la validatà del sistema Copernicano. Ma mi è vento non poco intorbidato dalla lettura che a questi giorni feci, in bottega di un libraro, casualmente di un libro che sta per uscire in luce, dove lessi che se fusse vero che il sole fusse nel centro e la terra gli girasse intorno per l'orbe magno nello spatio di un anno, seguirebbe che da noi non si vedrebbe mai la notte la metà del cielo, poichè la linea che passa per il centro e per gli orizzonti della terra, toccando la periferia dell'orbe magno, è una corda di un pezzo d'arco del cerchio del cielo stellato, il cui diametro passa, per il centro del sole. E perchè io ho sempre creduto che sia vero, non l'havendo visto per esperienza, che quando nasce il primo di Libra tramonti il primo di Ariete, non arrivo con la mia poca intelligenza a trovarne la solutione. Supplico dunque l'immensa sua gentilezza a rimuovere dalla mia mente questa dubitatione, che glie ne restero con soma obbligatione: e gli bacio reverentemente le mani. Venetia, 23 marzo 1641. Di V.S. molto Ill.[re] et Ecc.[ma] Aff.[mo] et Obb.[mo] Se.[re] S.[r] Galileo Galilei. Fran.[co] Rinuccini" (*Le Opere Di Galileo Galilei*, Antonio Favaro, reprinted from the 1890-1909 edition by Firenze, G. Barbèra – Editore, 1968, vol. 18, p. 311, translated by Fr. Brian Harrison.

> question, above all, not by Catholics, since we have the unshakeable authority of the Sacred Scripture, interpreted by the most erudite theologians, whose consensus gives us certainty regarding the stability of the Earth, situated in the center, and the motion of the sun around the Earth. The conjectures employed by Copernicus and his followers in maintaining the contrary thesis are all sufficiently rebutted by that most solid argument deriving from the omnipotence of God. He is able to bring about in different ways, indeed, in an infinite number of ways, things that, according to our opinion and observation, appear to happen in one particular way. We should not seek to shorten the hand of God and boldly insist on something beyond the limits of our competence…. D'Arcetri, March 29, 1641. I am writing the enclosed letter to Rev. Fr. Fulgenzio, from whom I have heard no news lately. I entrust it to Your Excellency to kindly make sure he receives it."[754]

Search as one might, few today will find Galileo's retraction of Copernicanism cited in books or articles written on the subject of his life and work.[755] Fewer still are those in public conversation about Galileo who have ever heard that he recanted his earlier view. The reason is, quite simply, that the letter has been obscured from the public's eye for the last four centuries. As Galileo historian Klaus Fischer has admitted: "The ruling historiographers of science cannot be freed from the reproach that they have read Galileo's writings too selectively."[756] Fortunately, Galileo's retraction managed to escape censorship and find its way among the rest of his letters in the twenty-volume compendium *Le Opere di Galileo Galilei* finally published in 1909 with a reprint in Florence in 1968. Centuries prior to its publication, there was a concerted effort by either Rinuccini or someone behind the scenes to cover up the fact that the letter was, indeed, written and sent

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[754] The original Italian reads: "Ill.^{mo} Sig.^{r} et P.ron mio Col.^{mo}. La falsità del sistema Copernicano non deve essere in conto alcuno messa in dubbio, e massime da noi Cattolici, havendo la inregragabile autorità delle Scritture Sacre, interpretate da I maestri sommi in teologia, il concorde assenso de' quali ci rende certi della stabilità della terra, posta nel centro, e della mobilità del sole intorno ad essa. Le congetture poi per le quali il Copernico et altri suoi seguaci hanno profferito il contrario si levono tutte con quell saldissimo argumento preso dalla onnipotenza di Iddio, la quale potendo fare in diversi, anzi in infiniti, modi quallo che alla nostra oppinione e osservazione par fatto in un tal particolare, non doviamo volere abbreviare la mano di Dio, e tenacemente sostenere quello in che possiamo essere ingannati.…D'Arcetri, li 29 Marzo 1641. Scrivo l'alligata al R. P. Fulgenzio, dal quale è un pezzo che non ho nuove, e la raccomando a V. S. per il sicuro ricapito" (*Le Opere Di Galileo Galilei*, 1968, vol. 18, p. 316). A note added by the editor states: "Bibl. Naz. Fir. Banco Rari, Armadio 9, Cartella 5, 33. – Originale, di mano di Vincenzio Vivani." This means that the letter is stored in the rare archives of the National Library at Florence in the rare books department, in cabinet #9, folder #5, 33 and written in the original hand of Vincenzio Viviani, since Galileo was blind in both eyes in 1641. Viviani was Galileo's last pupil and first biographer. NB: Viviani had performed the first Foucault-type pendulum experiment in 1661. Galileo's letter to Rinuccini was translated into English by Fr. Brian Harrison upon request. Stillman Drake contains a similar translation in *Galileo At Work: His Scientific Biography*, Chicago, London, The University of Chicago Press, 1978, p. 417.

[755] Even Maurice Finocchiaro, who is considered, and considers himself, one of the more thorough and detailed Galileo historians, fails to mention Galileo's conversion in any of his many books. In his latest book, *Retrying Galileo* (2005), Finocchiaro gives a comprehensive history of the Galileo affair from 1633 to 1992, concentrating in Chapter 3 on the years up to 1642, but makes no mention of Galileo's letter to Francesco Rinuccini concerning Pieroni's claim to discovering parallax, nor is Rinuccini's name included in the book's index. Rinuccini is only mentioned in passing on page 28. Finocchiaro is quite aware of Pieroni, however, since he mentions him on pages 67, 69: "…the efforts, activities and reports of Giovanni Pieroni. Born in Tuscany, he had studied with Galileo in Padua….In August 1635, Pieroni tried to convince Galileo to dedicate the *Two New Sciences* to Ladislaus…" On page 261, Finocchiaro makes reference to an apologetic article in *L'Osservatore Romano* of April 23, 1887, which stated: "You should believe Galileo himself, who, in the last years of his life, regretted having engaged in arbitrary interpretations of the Bible based on private judgment, which were especially dangerous at that time when this was the practice of the heretics in many parts of Europe." Rather than referring this to Galileo's 1642 conversion letter to Rinuccini, Finocchiaro says: "The last reference is unclear, but it probably referred to the Renieri apocryphal letter…" See also page 156 where Favaro agrees that the Renieri letter is apocryphal.

[756] Klaus Fischer, *Galileo Galilei*, Munich, Germany, Beck, 1983, p. 114.

by Galileo. We know this to be the case since a rather obvious attempt was made to erase Galileo's name as the signatory of the letter. The compiler of the original letter makes this startling notation: "The **signature 'Galileo Galilei'** has been very deliberately and repeatedly rubbed over, with the manifest intention of rendering it illegible."[757]

Stillman Drake, one of the top Galileo historians in the world, noticed the subterfuge and commented:

> Among all Galileo's surviving letters, it is only this one on which his name at the end was scratched out heavily in ink. I presume that Rinuccini valued and preserved Galileo's letters no matter what they said, but did not want others to see this declaration by Galileo that the Copernican system was false, lest he be thought a hypocrite.[758]

Judging from the contents of his letter to Rinuccini, for quite some time it seems that Galileo had been contemplating the problems inherent in the Copernican system, as well as his desire to convert back to an Earth-centered cosmology. The wording in his letter is rather settled and direct, as it does not reflect someone who is confused or equivocating. It holds the convictions of a man who has been swept off his feet by a more convincing position.

So startling are Galileo's remarks that Drake attempts to soften their impact and do his best to rehabilitate Galileo as a heliocentrist. Commenting on the letter, Drake says:

> Galileo's reply to Rinuccini on 29 March may at first astonish the reader…. Yet there was nothing hypocritical in Galileo's saying that all science, including astronomy, is a fiction to the extent that it lies beyond the range of practicable observations; indeed, astronomy as Copernicus left it could not be reconciled with many actually observed facts known to Galileo…more important yet is Galileo's flat statement that the traditional geocentric astronomy was even more erroneous than the heliocentric.[759]

Here we see Drake implying that Galileo was denying Copernicanism merely because he saw both it and the Ptolemaic system as unable to explain the motions of the sun and planets. This is based on the part of Galileo's letter that says:

> And just as I deem inadequate the Copernican observations and conjectures, so I judge equally, and more, fallacious and erroneous those of Ptolemy, Aristotle, and their followers, when [even] without going beyond the bounds of human reasoning their inconclusiveness can be very easily discovered.[760]

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[757] *Le Opere Di Galileo Galilei*, p. 316, footnote #2, translated by Fr. Brian Harrison.

[758] *Galileo At Work: His Scientific Biography*, pp. 418-419. Drake adds: "Thanks to Galileo's own telescopic discoveries that was certainly true, while that astronomical instruments could not establish stellar parallax was not only true in his time but remained so for two centuries afterward." Although this is true, Drake is basing his defense on the mistaken notion that authentic measurements of stellar parallax would have proved the case for heliocentrism. It would not, since, as we saw in Volume I, stellar parallax is easily explained from a geocentric model of the universe, and which fact honest scientists readily admit. Of note here also is that in 1669 Robert Hooke, and John Flamsteed a few years afterward, attempted to prove the motion of the Earth by stellar parallax, yet both failed (John Flamsteed, *Historia Coelestis Britannica*, 1725, ed., Allan Chapman, trans., Alison D. Johnson, National Maritime Museum Monograph, No. 52, 1982, pp. 179-180). Hooke writes about this experience in his book: *An Attempt to Prove the Motion of the Earth by Observation*, London, 1674. It was also in this book that Hooke presented the Inverse Square Law of the force of gravity, thirteen years before Newton published the same law in his famous *Principia*.

[759] *Galileo At Work: His Scientific Biography*, pp. 418-419.

[760] Original Italian: "E come che io stimi insuffizienti le osservazioni e conietture Copernicane, altr'e tanto reputo più fallacy et erronee quelle di Tolomeo, di Aristotele e de'loro seguaci, mentre che, senza uscire de'termini de'discorsi humani, si può assai chiaramente scoprire la non concludenza di quelle" (*Le Opere Di Galileo Galilei*, vol. 18, p. 315).

But Galileo's wording is much more explicit than what Drake admits. Even if we were to grant to Drake that Galileo saw various problems in the Ptolemaic system, his letter to Rinuccini is clearly setting in opposition the entire "Copernican system" over against "the unshakeable authority of the Sacred Scripture, interpreted by the most erudite theologians, whose consensus gives us certainty regarding the stability of the Earth, situated in the center, and the motion of the sun around the Earth." These carefully chosen words are not, as Drake would have it, merely an attempt to point out the difficulties in the Copernican system prior to Kepler's discovery of the elliptical orbits of the planets. Rather, Galileo's words are identical to those of St. Robert Bellarmine stated some twenty-five years earlier, when the heliocentric system was first condemned under Pope Paul V and the Holy Office because it attempted to put the Earth in motion against the solemn words of Holy Scripture. Whereas in 1616 Galileo was arguing that Scripture should *not* be taken literally when it spoke on cosmology, now, in 1641, Scripture's literal interpretation is Galileo's hammer, just as it was for Bellarmine.

That Galileo is renouncing the entire foundation of heliocentric cosmology is noted both in his unqualified acceptance of the "stability of the Earth, situated in the center, and the motion of the sun around the Earth," and his reference to "the conjectures of Copernicus *and other followers*," of whom Kepler, having been the first astronomer publicly to endorse Copernicus, was indeed one of his most ardent "followers," and one to whom Galileo was in correspondence on brief occasions. Not only is Galileo condemning Copernicanism by indicating that it is contrary to Scripture, he reinforces his line of reasoning by arguing that "the omnipotence of God" is "able to bring about in different ways, indeed, in an infinite number of ways" things we regard as improbable or impossible.

Galileo concludes his letter to Rinuccini by two other revealing statements. In the first, Galileo asserts that he can discredit the findings of Pieroni by an *a priori* assumption – that the Earth is in the center of the universe; and in the second, by renouncing his "unfortunate Dialogue" – the now famous book, titled more fully *The Dialogue Concerning the Two Chief World Systems* that Pope Urban VIII and the Sacred Congregation condemned in 1633 for its unqualified support of heliocentrism. He writes:

> And since you say you are perplexed and disturbed by [that is, in answering] the argument taken from our always seeing one-half the sky above the horizon from which it can be concluded with Ptolemy that the Earth is in the center of the stellar sphere…reply to the author [Pieroni] that truly one-half the sky is not seen, and deny this to him until he makes you certain that exactly half is seen – which he will never do. For whoever has said positively that half the sky is seen, and that therefore the Earth is established at the center, has it in his head to begin with that the Earth is established at the center, which is why he says that half the sky is seen – because that is what would have to happen if the Earth were at the center. So it is not from seeing half the sky that the Earth's being in the center is inferred [by these men], *but it is deduced from the assumption that the Earth is at the center that half the sky is seen…*[761]
>
> Now let us add that if the observations of Captain Pieroni be true about the motions of some fixed stars, made through a few seconds of arc, [then] small as these are, [this] implies to human reasoning changes by the Earth different from any that can be attributed to it [while] retained at the center. And if there is such a change, and it is observed to be less than one minute of arc, who wants to guarantee to me that

[761] Translation by Stillman Drake, *Galileo At Work*, pp. 417-418, emphasis added. Original Italian without the ellipsis reads: "E poi che V. S. Ill. Dice restar perplessa e perturbata dall'argumento preso dal vedersi continumente la metà del cielo sopra l'orizonte, onde si possa con Tolomeo concludere la terra esser nel centro della sfera stellata, e non da esso lontana quanto è il semidiametro dell'orbe magno, risponda all'autore che è vero che non si vede la metà del cielo, e glie lo neghi sin che egli non la rende sicura che si vegga giustamente tal metà; il che non farà egli già mai. Et assolutamente chi ha detto, vedersi la metà del cielo, e però esser la terra collocata nel centro, ha prima nel suo cervello la terra stabilita nel centro, e quindi affermato vedersi la metà del cielo, perchè così doverebbe accadere quando la terra fusse nel centro; sì che non dal vedersi la metà del cielo si è inferito la terra esser nel centro, ma raccolto dalla supposizione che la terra sia nel centro, vedersi la metà del cielo" (*Le Opere Di Galileo Galilei*, vol. 18, p. 315)..

> when the first point of Aries rises, the first point of Libra sets so precisely that there is not even a difference to us of one minute of arc? Hence what should we want to deduce, in a very delicate and subtle observation, from experiences that are crass and even impossible to make? I might add other things on this subject, *but what was already said in my unfortunate* ***Dialogue*** *may suffice*.[762]

Hence, far from being a hero of modern cosmology, shortly before his death Galileo had become its worst adversary – a fact of history that has been either quietly ignored or deliberately suppressed. Of course, there are some who might refute this dramatic conversion of the former troublemaker by pointing out that Galileo was under house arrest beginning in 1633 by order of Pope Urban VIII. One might conjecture that, not wishing to agitate the pope, Galileo was merely speaking under duress and thus his words are not to be considered convincing evidence that he had abandoned his former views of cosmology. Although such a rationale is certainly possible, we get no hint of it in Galileo's carefully chosen words. Drake certainly didn't see Galileo's letter that way, since he interprets it with all the seriousness with which he assumes Galileo wrote it. Being the proud man Galileo was known to be, if his motive was merely to keep peace with the pope and preserve his fortunes, a simple and polite denial to Rinuccini's claims was all that was necessary. Instead, Galileo is defending the immobility of the Earth with such an exuberance of spirit and logic that he appears to be the epitome of a man who has had his 'eureka' moment and will not be denied. Charlatans have few convictions; those under duress guard their words and often equivocate; politicians tend to play favorites and say what will bring them popularity; but Galileo exhibits none of these vices in his letter. He takes sides with no one; rather, he equally condemns Ptolemy, Copernicus and Kepler, for he realizes that none of them have answered all that he has seen in his telescope, and only God Himself

[762] Translation by Stillman Drake, *Galileo At Work*, p. 418, emphasis added. Original Italian without the ellipsis reads: "Aggiunghiamo hora che sia vera la osservazione del Sig. Capitan Pieroni del moto di alcuna fissa, fatto con alcuni minuti secondi: per piccolo che egli sia, inferisce, a gli humani discorsi, mutazione nella terra diversa da ognuna che, ritenendola nel centro, potesse essergli attribuita. E se tal mutazione è, et si osserva esser meno di un minuto primo, chi vorrà assicurarmi se, nascendo il primo punto d'Ariete, tramonti il primo di Libra così puntualmente che non ci sia differenza nè anco di un minuto primo? Sono tali punti invisibili; gli orizonti, non così precisi in terra, nè anco tal volta in mare; strumenti astronomici ordinarii non possono essere così esquisiti che ci assicurino in cotali osservazioni dall'errore di un minuto; e finalmente, le refrazioni appresso all'orizonte posson fare alterazioni tali, che portion inganno non sol di uno, ma di molti e molti minuti, come questi medisimi osservatori concederanno. Adunque, che vogliamo raccorre in una delicatissima e sottilissima osservazione da esperienze grosso lanissime et anco impossibili a farsi? Potrei soggiugner alter cose in questo proposito, ma il già detto nel mio Dialogo sfortunato dice tanto che può bastare" (*Le Opere Di Galileo Galilei*, pp. 315-316). The final paragraph appearing in *Le Opere Di Galileo Galilei* is: "Il Sig.^{r} Liceti debbe star rispondendo a quella mia lettera, la quale gli darà campo di portare nuovi et acutissimi pensieri; et il medesimo Sig.^{r} Liceti haverà comoda occasione di farsi sentire ancora ad un altro suo antagonista, coiè al nostro qua Sig.^{r} midico Nardi, il quale ha mandato nuovamente in luce un trattato de' fuochi sutterranei, al quale egli Annette cento problemi naturali con le loro resoluzioni. Vegga V.S. Ill.^{ma} il libro, et in particolare I problemi, che son tutti investigati dal proprio ingegno dell'autore; et in una lettura di poco più di un' ora vedrà la soluzione di tanti mirabili effetti della natura, che un solo mi ha messo in disperazione di intenderlo con la contemplazione del tempo di tutta mia vita. Nè mi occorrendo altro per ora, finisco con augurargli felice questa Santa Pasqua, con confermarmegli devotissimo servitore." The following is its translation: "Signor Liceti should be responding to that letter of mine, which will afford him the opportunity to contribute new and very penetrating ideas. And the same Signor Liceti will thus have a convenient occasion to get his message through once again to another of his opponents, namely, our medical friend Signor Nardi. The latter has just published another treatise on the fires beneath the Earth's surface, this time with an Addendum setting out one hundred problems of natural science, together with their solutions. I warmly recommend that Your Excellency look at this book, especially the aforesaid problems, all of which the author has investigated personally, and with great skill. In a little over an hour's reading you will see the explanation of a great number of marvelous natural phenomena. Just one of these had been the object of my own studies over a lifetime, but I had despaired of ever being able to understand it. Since I have nothing more to add at this moment, I will end by wishing you a happy and holy Easter. While assuring you that I remain, Your most devoted servant, Galileo Galilei" (Translation by Fr. Brian Harrison).

knows how it fits together.[763] Hence, he rests his case not with *any* scientific theory but with the "omnipotence of God," Who merely speaks and all is accomplished. In fact, Rinuccini, after reading Galileo's letter, was so thoroughly convinced of its sincerity that it became the very reason he attempted to scratch Galileo's signature off what he knew would change the course of history had it been revealed to the public.

Where might Galileo have heard the persuasive "omnipotence of God" line of argumentation? It most likely came from Pope Urban VIII in 1633. Scientifically speaking, by this time Urban was already armed with Tycho de Brahe's alternative model of cosmology, which was presented to the world a half century earlier and which graphically demonstrated how easy it is to envision the sun and planets circling the Earth while adhering to all the proportions and motions that were in Galileo's heliocentric model.[764] Knowing this, Urban could then speak quite confidently from both a scientific and theological perspective, and thus assure Galileo that not only was the weight of the evidence against him, but in refusing to accept the Church's verdict he would then find himself contending with the Almighty. In the pope's words to Galileo:

> Let Us remind you of something that We had occasion to tell you many years ago, speaking as one philosopher to another; and, if We remember, you were not willing then to offer Us any definite refutation.
>
> Let Us grant you that all of your demonstrations are sound and that it is entirely possible for things to stand as you say. But now tell Us, do you really maintain that God could not have wished or known how to move the heavens and the stars in some other way? We suppose you will say 'Yes,' because We do not see how you could answer otherwise. Very well then, if you still want to save your contention, you would have to prove to Us that, if the heavenly movements took place in another manner than the one you suggest, it would imply a logical contradiction at some point, since God in His infinite power can do anything that does not imply a contradiction. Are you prepared to prove as much? No? Then you will have to concede to Us that God can, conceivably, have arranged things in an entirely different manner, while yet

[763] Here Galileo shows reflections of his earlier views recorded in *The Assayer*, published in 1623. As Feyerabend notes: "Replying to an adversary who had raised the issue of Copernicanism he remarks that 'neither Tycho, nor other astronomers nor even Copernicus could clearly refute [Ptolemy] inasmuch as a most important argument taken from the movement of Mars and Venus stood always in their way.' …. He concludes that 'the two systems' [the Copernican and the Ptolemaic] are 'surely false' …. He emphasizes that not only Ptolemy, but Copernicus as well, is refuted by the facts…" (*Against Method*, p. 80). Imre Lakatos adds: "One can hardly claim that Copernicus deduced his heliocentrism from the facts. Indeed, now it is acknowledged that both Ptolemy's and Copernicus's theories were inconsistent with known observational results" (*The Methodology of Scientific Research Programmes*, p. 170). Lakatos adds a comment from Gingerich: "'…in Tycho's observation books, we can see occasional examples where the older scheme based on the Alfonsine Tables yielded better predictions than could be obtained from the Copernican Prutenic Tables'" ("The Copernican Celebration," *Science Year*, 1973, pp. 266-267).

[764] Galileo was well aware of the influence Tycho's model had on his contemporaries. In his 1624 letter to Francesco Ingoli, Galileo complains several times about "Tycho's authority" to which Ingoli and many others were siding (see Finocchiaro's *The Galileo Affair*, pp. 170, 174, 175). In 1612, Christoforo Borro, known as the "Doctor of Mathematical Sciences," published *De astrologia universa tractatus*, which asserted the Tychonic model over the Ptolemaic and Copernican models. As it was, the Jesuits were beginning to side with the Tychonic model at least twenty years before Galileo made known his telescopic evidence in his 1610 book *Siderius nuncius*. As Ernan McMullin notes: "It seems likely, then, that the availability of the Tychonic alternative played a modest role, at least, in the assurance with which Rome issued its ban on the Copernican propositions, foreseeing no danger in consequence that the evidence from astronomy could call that ban into question at a later time….they could have responded that all of the evidence from planetary motions that told for the Copernican cosmology could be handled equally well by the Tychonic alternative….Such, for example, was Christopher Scheiner, perhaps the most accomplished Jesuit astronomer of his generation. The availability of the Tychonic alternative was decisive for him" (*The Church and Galileo*, pp. 164-165). In a similar way, the Tychonic model probably influenced Cardinal Robert Bellarmine, Galileo's chief antagonist. In a letter to Federico Cesi on August 25, 1618 Bellarmine writes: "Thus it is possible for us to select among them the one which best corresponds to the Sacred Scriptures" (Richard Blackwell, *Galileo, Bellarmine and the Bible*, p. 42).

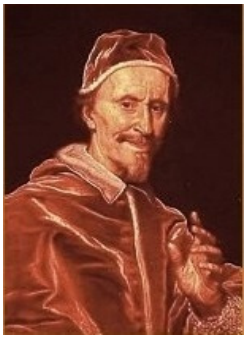
> bringing about the effects that we see. And if this possibility exists, which might still preserve in their literal truth the sayings of Scripture, it is not for us mortals to try to force those holy words to mean what to Us, from here, may appear to be the situation.
>
> Have you got anything to object? We are glad to see that you are of Our opinion. Indeed, as a good Catholic, how could you hold any other? To speak otherwise than hypothetically on the subject would be tantamount to constraining the infinite power and wisdom of God within the limits of your personal ideas [*fantasie particolari*]. You cannot say that this is the only way God could have brought it about, because there may be many, and perchance infinite, ways that He could have thought of and which are inaccessible to our limited minds. We trust you see now what We meant by telling you to leave the theology alone.[765]

Additionally, Galileo's appeal to the "omnipotence of God" against the claims of Rinuccini was not being used in the same sense that he had ridiculed it in his *Dialogo*. In the *Dialogo*, which he had begun writing between 1621-1623 and was thus far removed from the controversy of 1633, Galileo attempted to confuse the issue by equating omnipotence with the miraculous. He writes:

> Surely, God could have caused birds to fly with their bones made of solid gold, with their veins full of quicksilver, with their flesh heavier than lead, and with wings exceedingly small. He did not, and that ought to show something. It is only in order to shield your ignorance that you put the Lord at every turn to the refuge of a miracle.[766]

Now, of course, in 1641, he saw things differently. God could make the Earth the central and immobile dot in the universe by natural means, not miraculous, for He, by his omnipotence, would know very easily how to accomplish such a task.[767]

Pope Alexander VII and the 1664 Index of Forbidden Books



Thirty-one years after Pope Urban VIII and his Sacred Congregation of the Index condemned heliocentrism as "formally heretical" and "erroneous in faith," on March 5, 1664, Pope Alexander VII attached condemnations of the works of Copernicus, Galileo, and Kepler to a papal bull appropriately

[765] Giorgio de Santillana, *The Crime of Galileo*, New York, *Time* Inc., 1962, pp. 175-176. Santillana adds: "Historians usually date this idea from the conversation of 1630. But we have seen (p. 135) that it is mentioned in Oregius' *Praeludium*, whence we have paraphrased the statement quoted below. The passage in question, according to Berti, occurs also in the first edition of 1629. Hence the argument dates back at least to 1624 and probably, as Oregius implies, was used for the first time in 1616."

[766] Giorgio de Santillana, *The Crime of Galileo*, New York, *Time* Inc., 1962, p. 176.

[767] In 1641 Galileo's 1632 book *Dialogo sopra i due massimi sistemi del mundo* (*Dialogue on the Two Chief World Systems*), which was originally written in Italian, was republished in Latin in Lyons, France and retitled *Systema Cosmicum: in quo Dialogis*. It was then republished in London in 1663 under the title *Diologus de Systemate Mundi*. Except for his 1632 version, Galileo had nothing to do with these later publications, although some authors erroneously assert that Galileo published the 1641 edition. Not only did Galileo convert to geocentrism, he was under the edict of Pope Urban VIII until his death the next year in 1642. The French and English publishers were known for circumventing the *Index of Forbidden Books*, but Galileo's *Dialogo* remained on the Index until 1835. Finocchiaro adds: "Protestants and progressive and liberal-minded Catholics came to Galileo's defense and started using his arguments and image in the struggle for individual freedom….Practitioners of astronomy, mathematics, and natural philosophy became polarized into pro-Galilean and anti-Galilean camps…" (*Retrying Galileo*, p. 85)

titled *Speculatores domus Israel* ("Watchman over the House of Israel"), signed by the pope himself and which declared that the *Index of Forbidden Books* was part of the papal bull and thus bore his direct papal authority.[768] In this way, the pope's decree against books teaching heliocentrism was in the *forma specifica* venue, one of the highest magisterial vehicles for the dissemination of papal authority. The pope also mentions past decrees against heliocentrism, which implies that the decree of 1633, which stated that heliocentrism was "formally heretical" and "erroneous in faith," were personally and canonically confirmed by Alexander VII. Needless to say, this highly authoritative bull was the chosen means the pope determined to be a "Watchman" for the Church, to protect it from heretical and erroneous ideas that would damage the faith of its people. Below is an English translation of the papal bull, *Speculatores Domus Israel*, with important parts underlined for emphasis:

Alexander VII's Papal Bull
Speculatores Domus Israel

Having been constituted, in the mysterious designs of divine Providence, as watchman over the house of Israel, that is, the holy Church of God, We continually strive with particular zeal to exercise Our pastoral vigilance by alerting the Lord's flock to imminent dangers, so that the sheep redeemed by the precious blood of our Lord and Savior Jesus Christ shall not be seduced from the path of truth, but rather, may continue their happy journey toward the goal of eternal blessedness by persevering in that path under the guidance of salutary doctrine.

1.Thus, it is of very great importance in the governance of the Church to teach sound morality and to condemn false doctrines; for the former activity promotes upright conduct, while the latter enables the pure light of faith to shine forth. The Apostolic See, therefore, realizing clearly that reading is an excellent way for men to learn what they should believe and how they should behave, exercises – as it has always exercised – a particularly alert vigilance in laying down norms for the reading of books. For by means of these norms – designating by name authors and writings which faithful Christians should abstain from reading – discernment is effected between good and evil literature, that is, between harmless and harmful books.

2. In this matter, Our venerable brethren the cardinals of the Holy Roman Church who have been appointed to supervise the Index of books deserving prohibition (in whole or in part), have been devoting their attention – not only by their own will and initiative, but also in attentive obedience to Our own special command – to the following problem. After Our predecessor of happy memory Pope Clement VIII promulgated an Index of forbidden books that followed the form of the earlier Index ordered by the holy Council of Trent, many more books were prohibited, and their authors condemned, both by the Roman Pontiffs who succeeded the said Pope Clement and by their congregation of cardinals. Nevertheless, there has been no officially compiled and published catalog setting out in a clear and well-ordered manner *all* these prohibited books and condemned authors, with the result that great confusion has arisen regarding this matter –

[768] ¶6: "All these things were ordered to be carried out carefully and accurately according to Our mind, and the resulting general Index, including all the Tridentine and Clementine documentation, has now been composed. By Our order, it has also been revised and printed at the press of Our apostolic household, with the insertion of this present Bull. Therefore, on the advice of the aforesaid cardinals, We, by Our apostolic authority, and by means of this present Bull, confirm and approve the said general Index, with each and every thing contained in it." *Index Librorum Prohibitorum et Expurgandorum Novissimus, Pro Catholicis Hispaniarum*, Regnis Philippi IV, Regis Cathol., Ill., AC. R. D.D. Antonii A Sotomaior O.P., Supremi Præsidis, & in Regnis Hispaniarum, Siciliæ, & Indiarum Generalis Inquisitoris, c. jussu ac studiis, luculenter & vigilantissimè recognitus, Madriti [Madrid], Ex Typographæo Didaci Diaz, Subsignatum Lldo Huerta, M. DC. LXVII [1667]. "*Index Librorum Prohibitorum*, Alexandri Septimi [Alexander VII] Pontificis Maximi jussu editus: Copernicanæ Astrologiæ Epitome. *vide*, Ioannis Kepleri; Copernicus. *vide*, Nicolaus." (p. 30); "Galileo Galilei. *Vide*, Dialogo di Galileo." (p. 52); "Ioannis Keppleri Epitome Astronomiæ Copernicanæ" (p. 73), attached to: "…Bullam Alexandri VII, P. M. qualis est in limine Editonis Superioris Anni, qui est M, DC, LXIV [1664]. Nam licèt nonnulla contineat, quæ ad illam Editionem, ejusque dispositionem speciatim pertinent, non sufficiebat tamen ea ratio, vt ejus lectione non fruerentur hic Fideles. Alexander Papa VII, Ad perpetuam rei Memoriam. Speculatores Domus Israel…" (p. 137).

confusion that will only keep increasing in the future unless opportune provisions are made.

3. Therefore, desirous of confronting the difficult task of finding a true solution, and after mature and diligent deliberation which has involved a number of the aforesaid cardinals who were designated to deal with this problem more effectively, We have decreed, firstly, that they undertake to compose a new Index including not only those books that have been prohibited (or otherwise censured) *after* the promulgation of the most recent Index by Our predecessor Clement, but also those contained in his own list and the earlier one. Secondly, as regards the method of ordering the names of authors and subjects, We have decided that a simple list in alphabetical order will henceforth be used instead of the previous threefold system of classification. Although that original system had features that were initially praiseworthy, experience has shown that a simpler format, unencumbered with additional annotations – many of them becoming less relevant over the course of time – will be more convenient. Readers will now be able to find any given author in the Index without difficulty, and this will be of special benefit to booksellers. It is in the public interest that they, above all, have at their disposition an Index that is clear and easy to use; for a mistake on their part may well cause many others to fall into error.

4. As things turned out, the system used previously for distinguishing the various categories of books often proved deceptive for many readers – learned as well as simple. For they thought the order in which the books were condemned corresponded to the degree of gravity – as if persons reading books listed in the first pages of the Index would always incur more severe sanctions than those who might read the books appearing further down the list. Actually, it can easily be inferred from the Council of Trent's system of classification that this is not the case. For what it gave precedence to was only the distinction between books condemned on account of the vices and defects of their authors and those reprobated because of the pernicious doctrine and errors they contained. This was followed by distinguishing books that give the author's own name from those published under a pseudonym. So it has happened that many books, placed in this third and last category solely because their authors were unknown, are much worse than some others mentioned in the first and second categories. Hence, We have decided to eliminate completely this source of confusion, lest it become the occasion of dangerous laxity in these matters.

5. While ordering this previous system of classification to be discontinued, We have decided, nevertheless, that some acknowledgment of it should still be retained. Hence, in the censure of each book, the aforesaid earlier classifications and annotations (wherever these exist) will be cited, along with the decrees by which the books were originally censured. In this way the case history of each censured book will be made known.

6. For the same reason, We have seen to it that the Tridentine and Clementine Indices, together with their appendices, have been reproduced in this new general Index, along with all relevant decrees promulgated up till now since the publication of our predecessor Clement's Index. In this way, nothing that might be useful in satisfying the investigative zeal of even the most studious Catholic reader could seem to have been omitted. All these things were ordered to be carried out carefully and accurately according to Our mind, and the resulting general Index, including all the Tridentine and Clementine documentation, has now been composed. **By Our order, it has also been revised and printed at the press of Our apostolic household, with the insertion of this present Bull**. Therefore, on the advice of the aforesaid cardinals, We, by Our apostolic authority, and by means of this present Bull, confirm and approve the said general Index, with each and every thing contained in it. Furthermore, We command and admonish all persons residing in whatever place, collectively and individually, to observe its prescriptions inviolably and unswervingly, under pain of incurring the penalties contained in the Constitution published by order of our predecessor of happy memory Pope Pius IV in regard to the aforesaid Tridentine Index.[769] And in order to do away with the variations

[769] From "All these things" to "aforesaid Tridentine Index" the Latin is: Quae omnia, cum iuxta mentim nostram diligenter et accurate fuerint exequutioni mandata, composito Indice generali huiusmodi, dui etiam regulae Indicis Tridentini, cum observationibus et instructione memorato Indici Clementino adiectis appositae fuerunt: nos, de praedictorum cardinalium consilio eumdem Indicem generalem, sicut praemittitur, iussu nostro compositum atque revisum, et typis camerae nostrae apostolicae iam impressum, et quem praesentibus nostris pro inserto haberi volumes, cum omnibus et

found in older decrees laying down penalties for transgressors, We also restore by the present Bull each and every one of the penalties inflicted in any form whatsoever by previous apostolic constitutions and other documents dealing with these matters – without prejudice, however, to those prescriptions regarding condemned books and authors which are customarily published each year on Holy Thursday in an Apostolic Letter. These prescriptions We do not intend to change, or even discuss, in any way at all.

7. Consequently, We command each and every one of our venerable brethren, the patriarchs, archbishops, bishops and other Ordinaries of places, as well as those beloved sons who are their vicars and officials, the inquisitors of heretical depravity, the superiors of every kind of religious Order, congregation, society, or institute, and all others who are, or will be in future, in any way concerned, to do all in their power to see that this general Index is made widely available and observed. Let them be mindful that the office committed to them involves the duty of both keeping the sheep of the Lord's flock away from poisonous pastures, and filling them with nourishing food. God forbid that any of these shepherds, through malice or negligence, should cease to fulfill this duty! For then they will find themselves obliged to give an account, before a severe Judge, for all the enormous and very grave evils that inevitably arise from their failure.

8. Notwithstanding anything contrary to the above: that is, any constitutions or edicts – whether apostolic or published by general, provincial or synodal councils in either general or special form – and regardless of any apostolic confirmation or other kind of backing, even by an oath, of any statutes, customs or privileges, indults and apostolic letters, in any shape or form or with any kind of clauses or decrees, that may have been in any way conceded, confirmed, approved or introduced; We specially and expressly derogate each and every one of these, sufficiently for their own derogation and that of their whole import – special, specific, express and singular – and indeed, word for word.

9. It is Our will that copies or exemplars of this present Bull, including printed copies, once they have been signed by a public notary and stamped with the seal of an ecclesiastical dignitary, are to be given exactly the same credence, in all places and by all peoples, as would be given to this original if it were shown or exhibited.

Given in Rome, at St. Mary Major's, under the ring of the Fisherman, on the 5th day of March 1664, in the 9th year of Our pontificate.

What is significant about the genre of Alexander VII's decree is not only its *forma specifica* venue but also how popes following him regarded Alexander's previous decrees. For example, in Pius IX's dogmatic declaration on the Immaculate Conception in 1854, he cites as supporting documentation the writings of Alexander VII more than any other pope. In reference to Alexander VII's apostolic constitution, *Sollicitudo Omnium Esslesiarum* of December 8, 1661, Pius IX says Alexander VII "*authoritatively and decisively declared the mind of the Church*" when he wrote: "Concerning the most Blessed Virgin Mary, Mother of God…her soul, in the first instant of its creation and in the first instant of the soul's infusion into the body, was, by a special grace of God…preserved free from all stain of original sin."[770] Here we see that Alexander VII's apostolic constitution, which could not have been considered on the same level as an infallible dogma since Pius IX lays sole claim to doing so in 1870, is, nevertheless, categorized as an official document that "authoritatively and decisively declared the mind of the Church." (NB: the doctrine of papal infallibility had not yet been defined and established for either *Sollicitudo* or *Ineffabilis*. That important wrinkle in Catholic magisterial protocol would only be formally established in 1870, and the Church reserves the right to make papal infallibility retroactive to any previous papal document. Prior to 1870, *Ineffabilis Deus* was designated as an "apostolic constitution"). As such, the logical question is: should not Alexander VII's 1664 papal bull, *Speculatores Domus Israel*, which is on the same or similar level of papal authority as his previous 1661 apostolic constitution, be given the same designation of a "authoritative and decisively declaring the mind of

singulis in eo contentis, auctoritate apostolicâ, tenore praesentium, confirmamus et approbamus, ac ab omnibus tam universalibus quam singularibus personis, ubicumque locorum existentibus, inviolabiliter et inconcusse observari mandamus et praecipimus, subpoenas in constitutione recolendae memoriae Pii Pappae IV etiam praedecessoris nostri super dicti Indicis Tridentini confirmatione editâ contentis.

[770] *Ineffabilis Deus*, Pope Pius IX, December 8, 1854.

the Church," especially since in the prior fifty years (1616-1664) the "mind of the Church" had already been "declared and defined" stating that heliocentrism was "formally heretical" and "erroneous in faith"?

Some might argue that since Pius IX made *Ineffabilis Deus* (the doctrine of the Immaculate Conception) "infallible" this implies that Alexander VII's apostolic constitution of 1661 was not infallible, and neither was his papal bull of 1664. Argumentation along those lines, however, is self-defeating, since the only way Pius IX could have used Alexander VII's apostolic constitution as support for *Ineffabilis Deus* is if Pius IX held to the absolute truthfulness of Alexander's apostolic constitution on the Immaculate Conception, *Sollicitudo Omnium Esslesiarum*, regardless whether it is "infallible" under the 1870 definition. At this point it must also be understood that categorizing the Immaculate Conception as an infallible dogma doesn't make it any more true. Truth as truth, at least from the divine perspective, doesn't change with the level of authoritative format given to it by the Church. The various levels of authority given to certain doctrines are more for our limitations and weaknesses than an admission that there are degrees of truth. When a dogma is declared "infallible" it means that all debate and doubt among human beings must stop, and those who deliberately reject the dogma will now be excommunicated. As such, the "infallibility" of a dogma does not make it truer, *per se*; rather, it makes our required allegiance to the doctrine absolute and unequivocal. In regard to doctrinal propositions, there can only be truth or error. If the Church regards a certain doctrine on the lowest rungs of authority (*e.g.*, as either "safe," "very common," or "probable") this does not make the doctrine any less true if it is indeed already true. It only shows that the Church has either not studied the doctrine sufficiently or that no divine revelation has been given regarding its truth or falsity. Be that as it may, there has been no time in history where one pope has declared a previous pope's apostolic constitution false, and for all intents and purposes, it will never happen. By the same token, no pope has ever declared Alexander VII's bull, *Speculatores Domus Israel* false, and never will.

Interestingly enough, in his apostolic constitution on the Immaculate Conception, Alexander VII refers back to Paul V, the pope who dealt with Galileo in 1616, for support of the doctrine. He writes: "we renew the Constitutions and Decrees issued by the Roman Pontiffs, our predecessors, especially Sixtus IV, Paul V and Gregory XV in favor of the doctrine asserting that the soul of the Blessed Virgin…was preserved from original sin." Alexander VII also adds penalties for those who would disobey his 1661 decree on the Immaculate Conception:

> …we hereby declare that in addition to the penalties and censures contained in the Constitutions issued by Sixtus IV…we hereby decree that they be deprived of the authority of preaching, reading in public, that is to say teaching and interpreting…and hereby renue the above Decrees and Constitutions of Paul V and Gregory XV.

He then adds a reference to the *Index* in connection with his decree on the Immaculate Conception:

> Moreover, as regards those books in which the said sentence, feast and relative veneration are called into question or are contradicted in any way whatsoever, according to what has already been stated, either in writing or verbally, in discourses, sermons, lectures, treatises and debates – that may have been printed after the above-praised Decree of Paul V, or may be printed hereafter we hereby prohibit them, subject to the penalties and censures established by the *Index of Prohibited Books*, and *ipso facto*, without any further declaration, we desire and command that they be held as expressly prohibited.[771]

Here we see that Paul V's decrees are considered as authoritative as Alexander VII's, and it is no coincidence that both these popes issued and/or approved strong condemnations against heliocentrism; and they, along with Urban VIII, were just as adamant to preserve the explicit scriptural truth that the sun revolved around the Earth as they were to protect the implicit scriptural truth that Mary was immaculately conceived. It is obvious that none of them considered their decrees on either subject "reformable."

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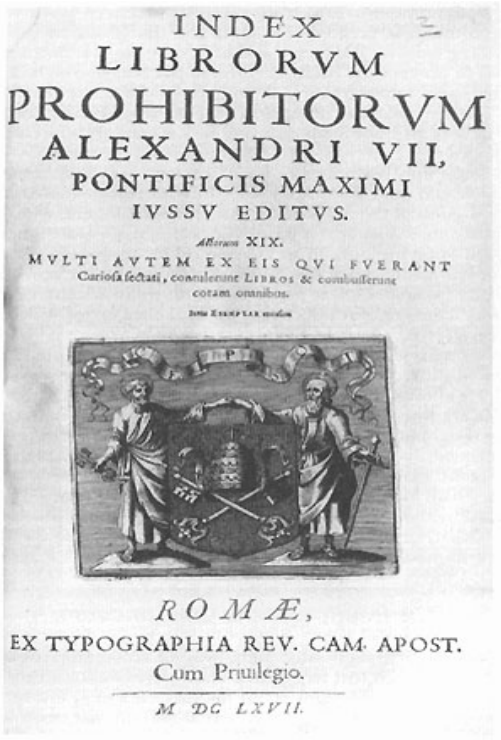
[771] Alexander VII: *Sollicitudo Omnium Esslesiarum*, December 8, 1661.

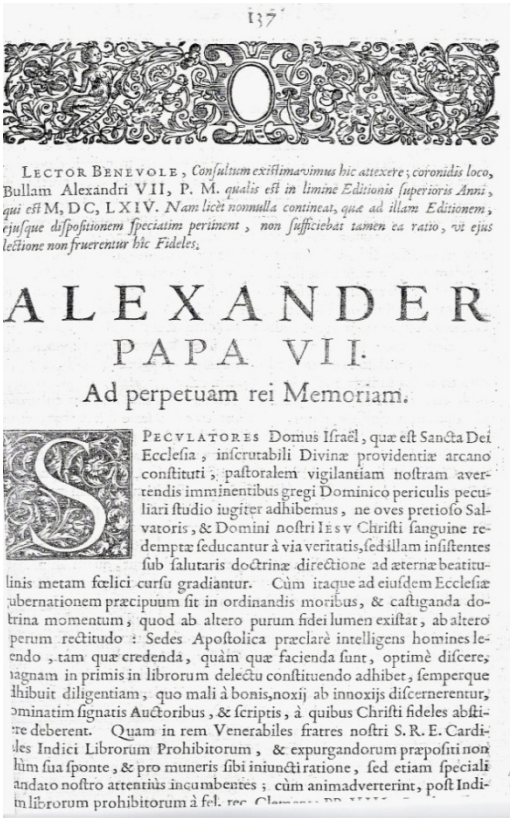


INDEX
LIBRORVM
PROHIBITORVM
ALEXANDRI VII.
PONTIFICIS MAXIMI
IVSSV EDITVS.

Actorum XIX.
MVLTI AVTEM EX EIS QVI FVERANT
Curiosa sectati, contulerunt LIBROS & combusserunt
coram omnibus.

ROMÆ,
EX TYPOGRAPHIA REV. CAM. APOST.
Cum Priuilegio.
M DC LXVII.

Above: Cover page of Alexander VII's *Index of Forbidden Books*
Below: First page of the papal bull, *Speculatores Domus Israel*



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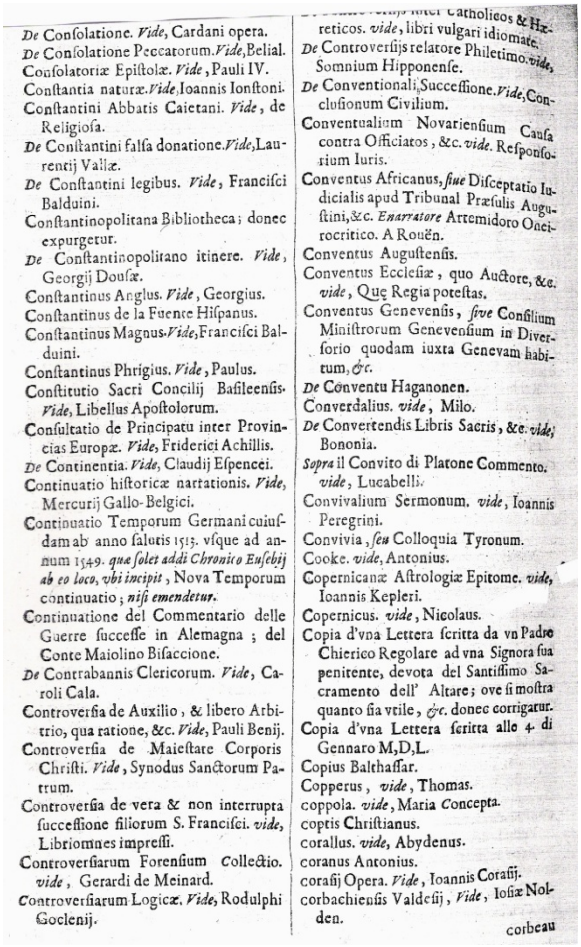
LECTOR BENEVOLE, *Consultum existimauimus hic attexere; coronidis loco,* Bullam Alexandri VII, P. M. *qualis est in limine Editionis superioris Anni, qui est* M, DC, LXIV. *Nam licèt nonnulla contineat, quæ ad illam Editionem, ejusque dispositionem speciatim pertinent, non sufficiebat tamen ea ratio, vt ejus lectione non fruerentur hic Fideles.*

ALEXANDER
PAPA VII.
Ad perpetuam rei Memoriam.

SPECVLATORES Domus Israël, quæ est Sancta Dei Ecclesia, inscrutabili Divinæ providentiæ arcano constituti; pastoralem vigilantiam nostram avertendis imminentibus gregi Dominico periculis peculiari studio iugiter adhibemus, ne oves pretioso Salvatoris, & Domini nostri IESV Christi sanguine redemptæ seducantur à via veritatis, sed illam insistentes sub salutaris doctrinæ directione ad æternæ beatitudinis metam fœlici cursu gradiantur. Cùm itaque ad eiusdem Ecclesiæ gubernationem præcipuum sit in ordinandis moribus, & castigandæ doctrina momentum, quod ab altero purum fidei lumen existat, ab altero perum rectitudo: Sedes Apostolica præclarè intelligens homines legendo, tam quæ credenda, quàm quæ facienda sunt, optimè discere, magnam in primis in librorum delectu constituendo adhibet, semperque adhibuit diligentiam, quo mali à bonis, noxij ab innoxijs discernerentur, ominatim signatis Auctoribus, & scriptis, à quibus Christi fideles abstinere deberent. Quam in rem Venerabiles fratres nostri S. R. E. Cardines Indici Librorum Prohibitorum, & expurgandorum præpositi non ùm sua sponte, & pro muneris sibi iniuncti ratione, sed etiam speciali andato nostro attentiùs incumbentes; cùm animadverterint, post Indin librorum prohibitorum à fel. rec.

Within the Index attached to the bull there are separate pages of condemnation for the books of Copernicus, Galileo, and Kepler.

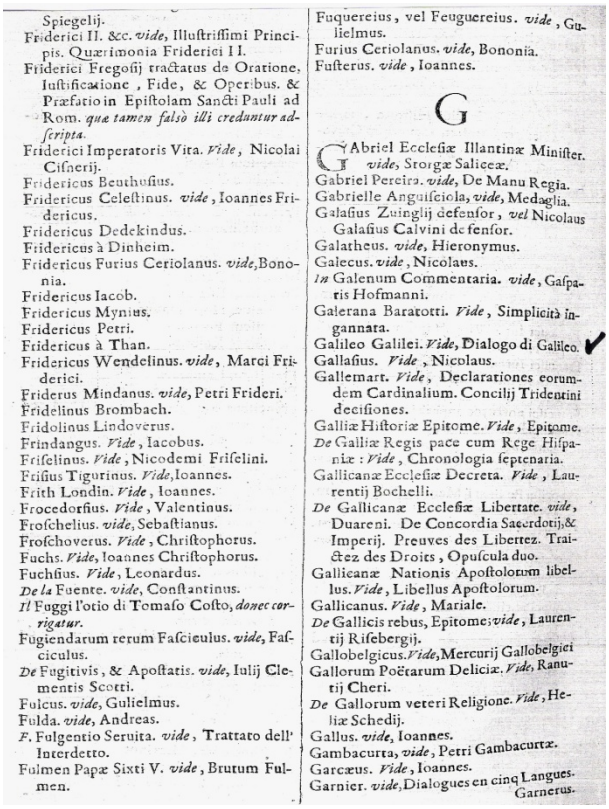
- Copernicus is on page 30:
- Galileo is on page 52:
- Kepler is on page 73



De Conſolatione. *Vide*, Cardani opera.
De Conſolatione Peccatorum. *Vide*, Belial.
Conſolatoriæ Epiſtolæ. *Vide*, Pauli IV.
Conſtantia naturæ. *Vide*, Ioannis Ionſtoni.
Conſtantini Abbatis Caietani. *Vide*, de Religioſa.
De Conſtantini falſa donatione. *Vide*, Laurentij Vallæ.
De Conſtantini legibus. *Vide*, Franciſci Balduini.
Conſtantinopolitana Bibliotheca; donec expurgetur.
De Conſtantinopolitano itinere. *Vide*, Georgij Douſæ.
Conſtantinus Anglus. *Vide*, Georgius.
Conſtantinus de la Fuente Hiſpanus.
Conſtantinus Magnus. *Vide*, Franciſci Balduini.
Conſtantinus Phrigius. *Vide*, Paulus.
Conſtitutio Sacri Concilij Baſileenſis. *Vide*, Libellus Apoſtolorum.
Conſultatio de Principatu inter Provincias Europæ. *Vide*, Friderici Achillis.
De Continentia. *Vide*, Claudij Eſpencei.
Continuatio hiſtoricæ narrationis. *Vide*, Mercurij Gallo-Belgici.
Continuatio Temporum Germani cuiuſdam ab anno ſalutis 1513. vſque ad annum 1549. *quæ ſolet addi Chronico Euſebij ab eo loco, vbi incipit*, Nova Temporum continuatio; *niſi emendetur.*
Continuatione del Commentario delle Guerre ſucceſſe in Alemagna; del Conte Maiolino Biſaccione.
De Contrabannis Clericorum. *Vide*, Caroli Cala.
Controverſia de Auxilio, & libero Arbitrio, qua ratione, &c. *Vide*, Pauli Benij.
Controverſia de Maieſtate Corporis Chriſti. *Vide*, Synodus Sanctorum Patrum.
Controverſia de vera & non interrupta ſucceſſione filiorum S. Franciſci. *vide*, Libriomnes impreſſi.
Controverſiarum Forenſium Collectio. *vide*, Gerardi de Meinard.
Controverſiarum Logicæ. *Vide*, Rodulphi Goclenij.

Catholicos & Hæreticos. *vide*, libri vulgari idiomate.
De Controverſijs relatore Philetimo. *vide*, Somnium Hipponenſe.
De Conventionali, Succeſſione. *Vide*, Concluſionum Civilium.
Conventualium Novatienſium Cauſa contra Officiatos, &c. *vide*. Reſponſorium Iuris.
Conventus Africanus, *ſiue* Diſceptatio Iudicialis apud Tribunal Præſulis Auguſtini, &c. *Enarratore* Artemidoro Oneirocritico. A Rouën.
Conventus Auguſtenſis.
Conventus Eccleſiæ, quo Auctore, &c. *vide*, Quę Regia poteſtas.
Conventus Genevenſis, *ſive* Conſilium Miniſtrorum Genevenſium in Diverſorio quodam iuxta Genevam habitum, *&c.*
De Conventu Haganonen.
Converdalius. *vide*, Milo.
De Convertendis Libris Sacris, &c. *vide*, Bononia.
Sopra il Convito di Platone Commento. *vide*, Lucabelli.
Convivalium Sermonum. *vide*, Ioannis Peregrini.
Convivia, *ſeu* Colloquia Tyronum.
Cooke. *vide*, Antonius.
Copernicanæ Aſtrologiæ Epitome. *vide*, Ioannis Kepleri.
Copernicus. *vide*, Nicolaus.
Copia d'vna Lettera ſcritta da vn Padre Chierico Regolare ad vna Signora ſua penitente, devota del Santiſſimo Sacramento dell' Altare; ove ſi moſtra quanto ſia vtile, *&c.* donec corrigatur.
Copia d'vna Lettera ſcritta allo 4. di Gennaro M,D,L.
Copius Balthaſſar.
Copperus, *vide*, Thomas.
coppola. *vide*, Maria Concepta.
coptis Chriſtianus.
corallus. *vide*, Abydenus.
coranus Antonius.
coraſij Opera. *Vide*, Ioannis Coraſij.
corbachienſis Valdeſij, *Vide*, Ioſiæ Nolden.

corbeau



Spiegelij.
Friderici II. &c. *vide*, Illuſtriſſimi Principis. Quærimonia Friderici II.
Friderici Fregoſij tractatus de Oratione, Iuſtificatione, Fide, & Operibus. & Præfatio in Epiſtolam Sancti Pauli ad Rom. *quæ tamen falsò illi creduntur adſcripta.*
Friderici Imperatoris Vita. *Vide*, Nicolai Ciſnerij.
Fridericus Beuthuſius.
Fridericus Celeſtinus. *vide*, Ioannes Fridericus.
Fridericus Dedekindus.
Fridericus à Dinheim.
Fridericus Furius Ceriolanus. *vide*, Bononia.
Fridericus Iacob.
Fridericus Mynius.
Fridericus Petri.
Fridericus à Than.
Fridericus Wendelinus. *vide*, Marci Friderici.
Friderus Mindanus. *vide*, Petri Frideri.
Fridelinus Brombach.
Fridolinus Lindoverus.
Frindangus. *Vide*, Iacobus.
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Friſius Tigurinus. *Vide*, Ioannes.
Frith Londin. *Vide*, Ioannes.
Frocedorfius. *Vide*, Valentinus.
Froſchelius. *vide*, Sebaſtianus.
Froſchoverus. *Vide*, Chriſtophorus.
Fuchs. *Vide*, Ioannes Chriſtophorus.
Fuchſius. *Vide*, Leonardus.
De la Fuente. *vide*, Conſtantinus.
Il Fuggi l'otio di Tomaſo Coſto, *donec corrigatur.*
Fugiendarum rerum Faſcieulus. *vide*, Faſciculus.
De Fugitivis, & Apoſtatis. *vide*, Iulij Clementis Scotti.
Fulcus. *vide*, Gulielmus.
Fulda. *vide*, Andreas.
F. Fulgentio Seruita. *vide*, Trattato dell' Interdetto.
Fulmen Papæ Sixti V. *vide*, Brutum Fulmen.

Fuquereius, vel Feuguereius. *vide*, Gulielmus.
Furius Ceriolanus. *vide*, Bononia.
Fuſterus. *vide*, Ioannes.

G

GAbriel Eccleſiæ Illantinæ Miniſter. *vide*, Storgæ Salicęæ.
Gabriel Pereira. *vide*, De Manu Regia.
Gabrielle Anguiſciola, *vide*, Medaglia.
Galaſius Zuinglij defenſor, *vel* Nicolaus Galaſius Calvini defenſor.
Galatheus. *vide*, Hieronymus.
Galecus. *vide*, Nicolaus.
In Galenum Commentaria. *vide*, Gaſparis Hofmanni.
Galerana Baratotti. *Vide*, Simplicità ingannata.
Galileo Galilei. *Vide*, Dialogo di Galileo.
Gallaſius. *Vide*, Nicolaus.
Gallemart. *Vide*, Declarationes eorumdem Cardinalium. Concilij Tridentini deciſiones.
Galliæ Hiſtoriæ Epitome. *Vide*, Epitome.
De Galliæ Regis pace cum Rege Hiſpaniæ: *Vide*, Chronologia ſeptenaria.
Gallicanæ Eccleſiæ Decreta. *Vide*, Laurentij Bochelli.
De Gallicanæ Eccleſiæ Libertate. *vide*, Duareni. De Concordia Sacerdotij, & Imperij. Preuves des Libertez. Traictez des Droits, Opuſcula duo.
Gallicanæ Nationis Apoſtolorum libellus. *Vide*, Libellus Apoſtolorum.
Gallicanus. *Vide*, Mariale.
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De Gallorum veteri Religione. *Vide*, Heliæ Schedij.
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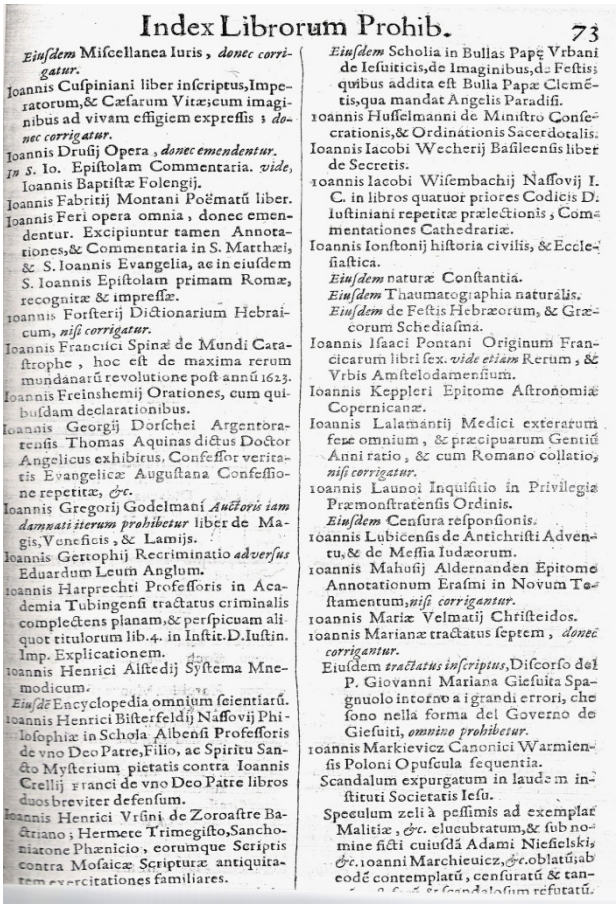
Gambacurta, *vide*, Petri Gambacurtæ.
Garcæus. *Vide*, Ioannes.
Garnier. *vide*, Dialogues en cinq Langues.

Garnerus.



Index Librorum Prohib. 73

Eiuſdem Miſcellanea Iuris, *donec corrigatur.*
Ioannis Cuſpiniani liber inſcriptus, Imperatorum, & Cæſarum Vitæ; cum imaginibus ad vivam effigiem expreſſis; *donec corrigatur.*
Ioannis Druſij Opera, *donec emendentur.*
In S. Io. Epiſtolam Commentaria. *vide*, Ioannis Baptiſtæ Folengij.
Ioannis Fabritij Montani Poëmatũ liber.
Ioannis Feri opera omnia, donec emendentur. Excipiuntur tamen Annotationes, & Commentaria in S. Matthæi, & S. Ioannis Evangelia, ac in eiuſdem S. Ioannis Epiſtolam primam Romæ, recognitæ & impreſſæ.
Ioannis Forſterij Dictionarium Hebraicum, *niſi corrigatur.*
Ioannis Franciſci Spinæ de Mundi Cataſtrophe, hoc eſt de maxima rerum mundanarũ revolutione poſt annũ 1623.
Ioannis Freinshemij Orationes, cum quibuſdam declarationibus.
Ioannis Georgij Dorſchei Argentoratenſis Thomas Aquinas dictus Doctor Angelicus exhibitus, Confeſſor veritatis Evangelicæ Auguſtana Confeſſione repetitæ, *&c.*
Ioannis Gregorij Godelmani *Auctoris iam damnati iterum prohibetur* liber de Magis, Veneficis, & Lamijs.
Ioannis Gertophij Recriminatio *adverſus* Eduardum Leum Anglum.
Ioannis Harprechti Profeſſoris in Academia Tubingenſi tractatus criminalis complectens planam, & perſpicuam aliquot titulorum lib. 4. in Inſtit. D. Iuſtin. Imp. Explicationem.
Ioannis Henrici Alſtedij Syſtema Mnemodicum.
Eiuſdẽ Encyclopedia omnium ſcientiarũ.
Ioannis Henrici Biſterfeldij Naſſovij Philoſophiæ in Schola Albenſi Profeſſoris de vno Deo Patre, Filio, ac Spiritu Sancto Myſterium pietatis contra Ioannis Crellij Franci de vno Deo Patre libros duos breviter defenſum.
Ioannis Henrici Vrſini de Zoroaſtre Bactriano; Hermete Trimegiſto, Sanchoniatone Phœnicio, eorumque Scriptis contra Moſaicæ Scripturæ antiquitatem exercitationes familiares.

Eiuſdem Scholia in Bullas Papę Vrbani de Ieſuiticis, de Imaginibus, de Feſtis; quibus addita eſt Bulla Papæ Clementis, qua mandat Angelis Paradiſi.
Ioannis Huſſelmanni de Miniſtro Conſecrationis, & Ordinationis Sacerdotalis.
Ioannis Iacobi Wecherij Baſileenſis liber de Secretis.
Ioannis Iacobi Wiſembachij Naſſovij I. C. in libros quatuor priores Codicis D. Iuſtiniani repetitæ prælectionis, Commentationes Cathedrariæ.
Ioannis Ionſtonij hiſtoria civilis, & Eccleſiaſtica.
Eiuſdem naturæ Conſtantia.
Eiuſdem Thaumatographia naturalis.
Eiuſdem de Feſtis Hebræorum, & Græcorum Schediaſma.
Ioannis Iſaaci Pontani Originum Francicarum libri ſex. *vide etiam* Rerum, & Vrbis Amſtelodamenſium.
Ioannis Keppleri Epitome Aſtronomiæ Copernicanæ.
Ioannis Lalamantij Medici exterarum ferè omnium, & præcipuarum Gentiũ Anni ratio, & cum Romano collatio, *niſi corrigatur.*
Ioannis Launoi Inquiſitio in Privilegia Præmonſtratenſis Ordinis.
Eiuſdem Cenſura reſponſionis.
Ioannis Lubicenſis de Antichriſti Adventu, & de Meſſia Iudæorum.
Ioannis Mahuſij Aldernanden Epitome Annotationum Eraſmi in Novum Teſtamentum, *niſi corrigantur.*
Ioannis Mariæ Velmatij Chriſteidos.
Ioannis Marianæ tractatus ſeptem, *donec corrigantur.*
Eiuſdem *tractatus inſcriptus*, Diſcorſo del P. Giovanni Mariana Gieſuita Spagnuolo intorno a i grandi errori, che ſono nella forma del Governo de Gieſuiti, *omnino prohibetur.*
Ioannis Markievicz Canonici Warmienſis Poloni Opuſcula ſequentia.
Scandalum expurgatum in laudem inſtituti Societatis Ieſu.
Speculum zeli à peſſimis ad exemplar Malitiæ, *&c.* elucubratum, & ſub nomine ficti cuiuſdã Adami Nieſielski, *&c.* Ioanni Marchieuicz, *&c.* oblatũ; ab eodẽ contemplatũ, cenſuratũ & tan-

Their absolute resolve on both issues is a fact of history that no one can change, be it pope, priest or parishioner. The question remaining for the modern Church is: will we be forced to succumb to the world's pressure to regard these successors of Peter as making an erroneous judgment on one doctrine but making a correct judgment on another, or will we be honest and admit that they were guided by the same Holy Spirit to affirm both doctrines as true?

The First Index of Benedict XIV

After the 1664 papal bull of Alexander VII, the next official declarations concerning the aftermath of the Galileo affair occurred in 1741 and 1758 when under the reign of **Pope Benedict XIV** (1740-1758) the Holy Office granted an imprimatur to the first edition of the complete works of Galileo in addition to omitting the general prohibition of Copernican books for the new *Index*.

As we noted earlier, however, the imprimatur was granted under the condition that the stipulations of the Padua Inquisitor, Paolo A. Ambrogi, be observed. The result was that the publication in 1744 had to exclude Galileo's *Letter to Christina* and the *Letter to Castelli*, which were two of Galileo's most formidable defenses of Copernicanism. Furthermore, Galileo's *Dialogue of the Two Great World Systems* had to be printed in Volume IV and accompanied by the 1633 sentence against Galileo (*i.e.*, "vehemently suspected" of "formal heresy"), as well as the text of Galileo's abjuration. The most important feature of the re-publication was that it was required to contain a preface emphasizing the "hypothetical" character of the book's contents. This requirement shows the consistency of the Church's position, for the same permission was granted to the works of Copernicus in 1620.

The road to the imprimatur was long and arduous, however. Rome was very cautious about what would be allowed and disallowed in the text. The events unfolded as follows. On September 29, 1741, Ambrogi wrote to the Inquisition in Rome seeking for permission for the Padua seminary to publish Galileo's complete works, with the promise to make the *Dialogo* hypothetical and to include Galileo's abjuration. On October 9, the Inquisition approved the project. Ambrogi wrote a second letter to the Inquisition on February 10, 1742 requesting permission to keep the *Dialogo* intact as it was written by Galileo but to include a preface that stipulated the Church's 1633 condemnation of both Galileo and the *Dialogo*. The seminary also wanted to include Galileo's *Letter to Christina*. Excerpts from the book's preface that Ambrogi submitted to the Inquisition are as follows:

> O learned Christan reader, here is a beautiful example of humility and submission to the decisions of the Holy Roman Church. What I present to you is Galileo Galilei's famous *Dialogue on the Two Chief Systems, Ptolemaic and Copernican*. In this *Dialogue*, he [Galileo] showed too much fondness for the second [Copernicanism], which is not compatible with Holy Writ; thus, he later repented and performed a solemn abjuration and retraction….Indeed, I have wanted the remedy to precede the disease in print, by prefacing to the dialogue itself the sentence pronounced against him and the ready mortification he showed toward the venerable decisions of the Holy Office; for he declared that what he had written on the subject, impulsively and out of intellectual vanity, was not only false but also improbable, because it was contrary to the divine scriptures. Given, then, that the Copernican hypothesis is false and untenable, and that I also condemn and detest it in the clearest manner and for the same reason, you can make use of the other admirable doctrines that are coincidentally found scattered on almost every page.[772]

[772] Translated from the anonymous Italian text transcribed and published by Mayaud, Rome: Editrice Pontifica

On March 17, 1742 Rome replied and stated that as long as the stipulated guidelines were followed, the imprimatur could be granted. Excerpts from the reply are recorded below. We notice the extreme care the Sacred Congregation took to abide by the decrees of 1616 and 1633 when granting the imprimatur.

> Last September the Father Inquisitor informed this Supreme Congregation of the petition made to him for permission to reprint all of Galilei's works. To obtain it, the printer obliged himself to print all declarations that might be prescribed by this Supreme Congregation; to include in the fourth volume the abjuration made by the author; to do everything possible to change the exposition to a hypothetical one, as it had been done there [in Padua] for the reprinting of Pourchot; and finally to have the correction done with the assistance of men who are learned and of proven Catholic religion….The committee of Consultants specially appointed by His Holiness decided that one should reply to the Father Inquisitor of Padua to permit the printing of the works in question, but only on the conditions described by the Father Inquisitor….Note that the needed searches have been made in the archives and the chancellery of this Supreme Tribunal in regard to Galileo's works.[773]

On May 20, 1742, Ambrogi again wrote to Rome on behalf of the editors and asked if, instead of changing the *Dialogo's* text they could make deletions and changes in the marginal postils of the book. They also stated that they would not be including Galileo's *Letter to Christina* but would like to include a published essay by biblical scholar Augustin Calmet, a French Benedictine friar who defended the geocentric worldview based on an exegesis from Scripture. Rome responded on June 6 stating that it wanted more information on how and why the Church had previously decided that the Copernican system could be permitted as a hypothesis. Friar Luigi Maria Giovasco was assigned to this task. On June 13, the Inquisition approved the book on the following recommendation by Giovasco. We notice in the Inquisition's approval that the heliocentric system is tied directly to Pythagoras, thus showing the 1742 Church's recognition that the battle over cosmology was a long-running one, which began when the Church Fathers held fast to the fixed Earth of Scripture against the moving Earth of the Greek philosophers:

> …*On the Revolutions of the Heavenly Spheres* by Nicolaus Copernicus…and a work by Diego de Zúñiga …supported the ancient opinion of Pythagoras, who taught that the Sun was the motionless center of the world and that the terraqueous globe of the Earth turned around it with perpetuated motion. The Carmelite Father Paolo Antonio Foscarini adopted such a system and defended it against the censure of theologians, who judged it false and contrary to Sacred Scripture. This system, which is commonly called Copernican for having been reawakened by Copernicus from the ashes of the ancient philosophy of Pythagoras, was denounced to the Sacred Congregation of the Index. On March 5, 1616, this Congregation published a decree prohibiting the system as a false Pythagorean doctrine contrary to Sacred Scripture and prejudicial to Catholic truth. But there was this difference: that Father Foscarini's *Letter* was prohibited absolutely, whereas Copernicus' book and Diego de Zúñiga *Commentaries on Job* were merely suspended, until corrected.

Rome then responds to the specific request of Ambrogi. We notice again how close the Inquisition follows the history so as to show the continuity of the thinking process from 1616 to 1742:

> Then some publishers approached the same Sacred Congregation of the Index to have the above corrections of the above-mentioned works and to be able to publish them, exempt from the announced suspension…So another decree appeared declaring that the system should be understood as condemned only when it was expounded as an absolute thesis, but not when it was expounded as a hypothesis to better know the revolutions of the

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Università Gregoriana, 1997, pp. 136-137, as cited in Finocchiaro's *Retrying Galileo*, pp. 127-128.

[773] Mayaud, pp. 137-138, *Retrying Galileo*, *op. cit*., p. 128.

> heavenly spheres. These corrections appeared in a decree of the Sacred Congregation of the Index of the year 1620. They emended the chapters of Copernicus' work in such a way that the printed text is left intact where it speaks problematically, and it is changed to mere hypothesis where it speaks in the manner of a doctrinal and absolute thesis. Corrected in this way, Copernicus' work is even today free of any condemnation. Indeed, all astronomers study the moon by following Copernicus and tell us that they follow such a system in the manner of a hypothesis and not in the manner of a thesis, for they think it is more useful for contemplating the oppositions and phenomena of the stars. In the year 1633, there appeared the *Dialogue* of Galileo Galilei…in which he established the Pythagorean system in the manner of a thesis. So it was prohibited…beause it defended and advocated such a system in the manner of a thesis and not in the manner of an imagined hypothesis.
>
> Thus it seems that by reprinting in Padua the works of Galileo Galilei, among which there is the prohibited *Dialogue*…by including the decrees and Galileo's retraction, as the printer promises; with the marginal notes referring to the prohibition to speak of the subject in the manner of a thesis and to the fact that one may discuss it only in the manner of a hypothesis; with the addition of Father Calmet's dissertation, which for its part confutes such a system if taken in the manner of a thesis; by all these means one remedies very well the damage of this printing, and one corrects the daring of the modern philosophers who accuse of injustice the Roman condemnation and censure of such a system.[774]

As the Inquisition is writing this letter in 1742, various astronomical phenomena had been and were being discovered, which some astronomers presumptuously interpreted as demonstrating the Earth was moving through space. Here we quote from *Galileo Was Wrong: The Church Was Right, Volume I*, to give the details of these events:

> As early as 1640 the astronomer Giovanni Pieroni observed that various stars shifted their position in the sky during the year. As we noted earlier, Francesco Rinuccini brought this evidence to Galileo's attention in 1641, but Galileo was unimpressed. Robert Hooke, three decades later, in 1669, noticed the same kind of shifting for one star in particular, named *Gamma Draconis*. Since everyone from the time of Copernicus had been looking for physical evidence of a moving Earth, Hooke actually thought he had discovered the first parallax as proof. Almost another thirty years later (1694), John Flamsteed observed the same kind of shifting in the star Polaris. Another thirty years later, James Bradley (d. 1762) set out to determine whether Hooke's observations were, indeed, a parallax of *Gamma Draconis*. During the years of 1725-1728 he noticed that during the course of a year the star inscribed a small ellipse in its path, almost the same as a parallax would make. In the heliocentric system, parallax is understood as a one-to-one correspondence between Earth's annual revolution and the star's annual ellipse, but Bradley noticed that the star's ellipse was not following this particular pattern.
>
> At this point, astronomical science was still waiting for a confirmed parallax of any star, since no one had ever measured one. A confirmed measurement of parallax would not be made until more than a century later by Friedrich Bessel in 1838. So Bradley, reasoning that *Gamma Draconis* was too far away to register a parallax, found another explanation, and it was rather an ingenious one. He theorized that the star's annual ellipse was being formed because the speed of light was finite. That is, the star wasn't actually moving in the sky; rather, its light, moving at a finite speed, was hitting a moving Earth, an Earth that for six months was moving toward the star, and in the next six months was moving away from the star.

[774] Mayaud, pp. 146-148, *Retrying Galileo*, *op. cit*., p. 130-131.

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> While the Earth moved toward the star, the star's light would hit the Earth sooner, but while the Earth moved away, the light would hit it later. Bradley reasoned that, if light's speed was infinite, there would be no such effect, but since it is finite, these back-and-forth movements of the Earth would translate into seeing the star move in an ellipse in the sky over the course of a year. This explanation was a welcome relief for the heliocentric view, since until Bradley, no one, including Galileo who died in 1642, had supplied any real evidence that the Earth could be revolving around the sun.[775]

As we proceed to show in the following paragraphs of Volume I, neither stellar aberration nor stellar parallax prove that the Earth is in motion; rather, a moving Earth is only one of at least two ways to explain these particular stellar phenomena. The geocentric solution, of course, is a rotating universe of fixed stars around a fixed Earth – the cosmology of Scripture and Catholic tradition. Nevertheless, the Catholic magisterium was willing to accommodate the aspirations of the then Copernican alternative by allowing various scientific treatises to at least regard a moving Earth as a hypothesis for the simple reason that modern astronomers "think it is more useful for contemplating the oppositions and phenomena of the stars,"[776] which is the Church's factual acknowledgment of stellar aberration and/or stellar parallax but without any commitment to the Copernican interpretation. One was permitted to "contemplate" the Copernican version of stellar aberration and stellar parallax if it made charting the heavens easier (just as naval navigators today use the geocentric system to chart positions at sea, even though they believe heliocentrism is the actual reality), but he could not declare it as the actual reality.[777]

The crucial point to be made here is this: although the Church of 1616 did not have the evidence of stellar aberration or parallax available to the Church of 1742, nevertheless, both ecclesiastical authorities allowed Copernicanism as a hypothesis, since both agreed that Scripture provided the only correct interpretation of celestial events – a fixed earth within a rotating universe, not vice-versa. This historical fact may be the watershed of the whole controversy, since at no time after the Church's 1616 decision to allow Copernicanism as a hypothesis did the Church ever rescind that allowance or permit more than that allowance. Today, as far as the Catholic Church is concerned, modern astronomers can speak and write about Copernicanism with relative freedom, provided they understand that, in the legal forum of the discussion, the Church still maintains that geocentrism is the only official interpretation the Church has ever, or will ever, accept as the correct one, and that all other models are mere hypotheses that can never be regarded as true. The simple reason is: several hypotheses can coexist in theory, but there can only be one true model in reality.

The Second Index of Pope Benedict XIV, 1758

Regarding the 1758 decision, we noted earlier that no *carte blanche* permission was given to Copernican cosmology; rather, the decree contained precautionary and limiting stipulations very similar to the 1741 decision. We can understand these stipulations if we reflect on the prohibitions in the 1619 edition of the *Index*. It, as well as subsequent editions, had two categories of prohibitions for Copernican works: specific works and general works. The edition of 1758 excluded only the general. Still included were Copernicus' *De Revolutionibus*, Galileo's *Dialogo* and Kepler's

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[775] *Galileo Was Wrong: The Church Was Right*, Vol. I, pp. 130-131.

[776] Stated by Friar Luigi Mario Govasco, assigned by the Inquisition to answer the inquiry of the Padua inquisitor, Paolo Ambrogi, Mayaud, p. 148.

[777] This rationale for allowing Copernicanism as a hypothesis answers Antonio Maria Grandi's objection, voiced by the Commissary General of the 1820 Index for support of Canon Settele's imprimatur, arguing that "If the system had been judged erroneous or heretical, the Church would never have allowed it to be maintained even as a hypothesis; the reason is that otherwise those who studied it would be placed at risk of sinning against the Faith, in case they judged the system to be manifestly demonstrated" (*Retrying Galileo*, pp. 206-207). As such, the hypothesis of Copernicanism would be no more dangerous than Jesus' use of hypothetical stories (e.g., parables) to express a given point, even at the risk of having the sinfully obstinate audience misinterpret the hypothesis (cf., Matt. 13:10-17). If the true interpretation is known and has been declared, it is the responsibility of the audience to adhere to that interpretation.

Epitome, obviously intending to give no endorsement to Copernican cosmology.

In light of its conclusion, the events that led to the 1758 decision are important to know. In July 1753, Pope Benedict XIV issued a bull titled *Sollicita ac Provida* directing reforms of the criteria for publications that would be prohibited by the *Index of Forbidden Books*. In January 1754, Agostino Ricchini, secretary to the Congregation of the Index, inquiring to the pope for additional reforms, desired to remove the ban on various books if proper corrections were made to them.[778] Among the examples he cited were works by Descartes, Copernicus and Galileo. Without much ado, Benedict XIV approved Ricchini's request on February 12, 1754. The important point that cannot be missed in this simple transaction is that the basis upon which any changes to the Index were approved, or any prohibitions of the heliocentric system were relaxed, centered consistently upon the stipulation that the proposed book must contain the "proper corrections," namely, that the use of the Copernican system not be promoted as a thesis, but as a hypothesis. Hence, on that specific basis, on April 1757, with the apparent approval of Benedict XIV, the Congregation of the Index eliminated the prohibition concerning "all books teaching the earth's motion and the sun's immobility,"[779] and thus the new *Index* was published in 1758, although it still included the prohibition against Copernicus, Foscarini, Zúñiga, Kepler and Galileo, perhaps because they stood "uncorrected" in their present form.

Not surprisingly, Galileo historians analyzing the situation from hindsight and predisposed to viewing heliocentrism as the correct model of cosmology, puzzle over what, in the words of Mayaud, seems to be an "illogical decision," or in the words of Finocchiaro, seems to be an "incomplete censure" by the *Index*. As they see it, a complete exoneration of Copernicus, Foscarini, Zúñiga, Kepler and Galileo was long overdue. What they fail to see, however, is that the Church was being entirely consistent to what its previous authorities had decreed. Copernicus, Foscarini, Zúñiga, Kepler and Galileo had already been condemned and there would be no lifting of their condemnations for the simple fact that heliocentrism was not suddenly proven correct in 1757. The Church maintained the decision made in 1620 to allow Copernicanism to be published as a hypothetical model and nothing more. Those that advocated it as more than a hypothesis (*e.g.*, Copernicus, Foscarini, Zúñiga, Kepler and Galileo) logically deserved to retain the status of being censured.

We must also conclude, then, that the removal of the all-inclusive sentence: "all books teaching the earth's motion and the sun's immobility" did not mean that other books could be published that taught heliocentrism as a fact. The 1758 Index laid the foundation for the meaning and intent of its decision to remove the all-inclusive sentence when it specified that Descartes, Copernicus and Galileo could be published if they contained the "proper corrections." Obviously, the Congregation of the Index would not require Descartes, Copernicus and Galileo to treat heliocentrism hypothetically yet allow "all [other] books teaching the earth's motion" to do so as a fact. Accordingly, the 1758 decision contains no specific stipulation that "all [other] books" could treat heliocentrism as a fact. Hence, the intended meaning must be that "all [other] books" teaching heliocentrism could do so only if they published it as a hypothesis, just as it was required of Descartes, Copernicus and Galileo. Since logic demands consistency, the burden of proof rests with any contrary assessment.

Nevertheless, the question may surface as to why the 1758 Index chose to remove the all-inclusive sentence at all if it remained firm in its intent to bar all books that taught heliocentrism as a fact. The probable reason is that the all-inclusive sentence might have been erroneously interpreted to mean that no other book could even teach heliocentrism as a hypothesis. But since the Church, even in 1616, never said heliocentrism was prohibited from being presented as a hypothesis, it was better, in light of Ricchini's specific request to publish heliocentric works with the "proper corrections," to delete the all-inclusive sentence so as to give no suggestion that hypothetical works on heliocentrism were barred from publication.

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[778] Finocchiaro notes: "…Agostino Ricchini, proposed to the pope…the possibility of lifting the prohibition of some books after proper correction" (*Retrying Galileo*, p. 138).

[779] Finocchiaro, *ibid*., p. 139, citing various sources, including *Le Opere di Galileo Galilei*, vol. 19, p. 419; Karl Gebler's *Galileo and the Roman Curia*, pp. 312-313; Pierre-Noël Mayaud, *La Condamnation des Livres Copernicians et sa Révocation à la Lumière de Documents Inédits des Congrégations de l'Index et de l'Inquisition*, 1997, p. 197.

This potential problem in the all-inclusive sentence stems from the paragraph in which it was originally drafted in 1616. The decree reads:

> And whereas it has also come to the knowledge of the said Congregation that the Pythagorean doctrine – which is false and altogether opposed to Holy Scripture – of the motion of the Earth and the immobility of the Sun, which is also taught by Nicolaus Copernicus in *De revolutionibus orbium coelestium*, and by Diego de Zúñiga [in his book] on Job…. Therefore, in order that this opinion may not insinuate itself any further to the prejudice of the Catholic truth, the Holy Congregation has decreed that the said Nicolaus Copernicus, *De revolutionibus orbium*, and Diego de Zúñiga, *On Job*, be suspended until they be corrected; but that the book of the Carmelite Father, Paolo Antonio Foscarini, be altogether prohibited and condemned, and that all other works likewise, in which the same is taught, be prohibited, as by this present decree, it prohibits, condemns, and suspends them all respectively.[780]

The phrase, "and that all other works likewise, in which the same is taught," is ambiguous with respect to whether the decree was referring only to books, like Foscarini's, that taught heliocentrism as a fact but had already been published and thus could not be corrected, or also included works that taught heliocentrism as a fact but had not yet been published and thus could still be corrected. That the latter condition may be included in the decree's intent is noted by the addition of "suspends" to the clause "it prohibits, condemns, and suspends them all respectively," since a single work within the class of "all other works" could not be "suspended" unless there was the intent to allow it to be corrected before being published, which also happened in the case of Copernicus' book. But since this latter possibility is not clearly stated in the decree, the decree could give the impression that even works that taught heliocentrism as a hypothesis would also be prohibited from being published. Since such was not the case due to the fact that the 1758 Index allowed Copernicus and Galileo's works to be published if "properly corrected," then it appears it was best to eliminate the general prohibition but keep the specific prohibition.

The Efforts of Pietro Lazzari

In any case, the decision to continue the censure of Copernicus, Foscarini, Zúñiga, Kepler and Galileo, became all the more significant in the face of the initial arguments put forth by the Jesuit consultant, Pietro Lazzari, professor of church history at the Roman College, to remove the general prohibition. Lazzari tries to convince the Congregation of the Index by first citing all the modern astronomers who hold to heliocentrism. The pressure his words put upon the Congregation were unprecedented. It seems his objective was to make them appear foolish if they did not accept the heliocentric system as a thesis. He writes:

> …I now come to the second point and reflection: that not one of these reasons, and still less the whole set, remains nowadays to retain the clause ["all books teaching the earth's motion and the sun's immobility"]. First, then, the opinion of the earth's motion is prevalent in the principal academies, even in Italy, and among them most celebrated and competent physicists and mathematicians. Second, they explain Scripture in the sense that is proper and most literal. Third, they

[780] Original Latin: "….Et quia etiam ad notitiam praefatae Sacrae Congregationis pervenit, falsam illam doctrinam Pithagoricam, divinaeque Scripturae omnino adversantem, de mobilitate terrae et immobilitate solis, quam Nicolaus Copernicus De revolutionibus orbium coelestium, et Didacus Astunica in Job, etiam docent…. ideo, ne ulterius huiusmodi opinion in perniciem Catholicae veritatis serpat, censuit, dictos Nicolaum Copernicum De revolutionibus orbium, et Didacum Astunica in Job, suspendendos esse, donec corrigantur; librum vero Patris Pauli Antonii Foscarini Carmelitae omnino prohibendum atque damnandum; aliosque omnes libros, partier idem docentes, prohibendos: prout praesenti Decreto omnes respective prohibit, damnat atque suspendit. In quorum fidem praesens Decretum manu et sigillo Illustrissimi et Reverendissimi D. Cardinalis S. Caeciliae, Episcopi Albanensis, signatum et munitum fuit, die 5 Martii 1616" (Antonio Favaro, *Galileo E L'Inquisizione*, p. 63; *Le Opere di Galileo Galilei*, vol. 19, p. 323). Part of above translation taken from de Santillana's *The Crime of Galileo*, as cited by Fantoli in *Galileo: For Copernicanism and For the Church*, pp. 223-4.

advance a kind of demonstration in their favor.

….Soon after our decree or thereabouts [1633], this opinion [of heliocentrism] began to get established, mostly through the work of Kepler…Bacon of Verulam also said…that in his time the opinion was beginning to spread and expand. In book 1 of *Kosmotheoros*, Christiaan Huygens asserted: "Nowadays all astronomers, except those who are of a retarded mind or whose beliefs are subject to the will of men, accept without doubt the motion of the earth and its location among the planets."[781] This is even more true today after the discoveries of Newton or those made with the benefit of his system. It is enough to read the proceedings and journals of academies, even Catholic ones, and the works of the most celebrated philosophers and mathematicians, or even dictionaries and similar books that report on the most widely accepted opinions. And indeed, in the article on Copernicus in the *Encyclopedia, or Reasoned Dictionary of the Sciences*, the famous mathematician D'Alembert writes: "Nowadays this system is generally followed in France and England, especially after Descartes and Newton each tried to confirm it by means of physical explanations….It would be desirable that a country as full of intelligence and learning as Italy recognize an error so harmful to scientific progress and that she think of this subject as we do in France! Such a change would be worthy of the enlightened pontiff who governs the Church nowadays. Friend of the sciences and himself a scholar, he ought to legislate to the inquisitors on this subject, as he has already done for more important subjects….In France one supports the Copernican system without fear…."[782]

To put as much pressure on the Congregation of the Index as he could muster, Lazzari adds an arsenal of heliocentric supporters, quoting from the 1749 *Chambers's Universal Dictionary*: "According to the Copernican hypothesis, which now seems generally accepted and even has a demonstration [Bradley's stellar aberration] the sun is at the center of the system of planets…and our earth among them revolve around it in different periods…" and the 1750 *Philosophical Grammar of the Sciences*, which, speaking of geocentrism, says: "We have not reason to believe it; instead we have some demonstrations to the contrary." He cites Fr. Paolo Frisi's *Dissertation on the Diurnal Motion of the Earth*, which was granted an "imprimatur of the general of his order; and it was signed 'Rome, at the ex college of Saints Blaise and Charles, 24 January 1756' and was based on the reports of two of his theologians." He continues:

> Here in Rome itself we can find that this is true. I have frequently had occasion to speak with the two celebrated mathematicians of the order of St. Francis of Paola, with Fathers Boscovich and Maire….I can attest that this is also their opinion. And the said Father Boscovich, who has tried to reconcile the modern discoveries with the earth's rest, has told me several times that he regards his reconciliation and the earth's rest most improbable from the point of view of pure natural reason, and that to believe this it is

[781] *Kosmotheoros, sive de Terris Coelestibus, Earumque Ornatu, Conjecturae*, 1698, Hagae Comitum, p. 14.

[782] Jean D'Alembert, *Copernic*, in Diderot and D'Alembert 1751-1780, 4, pp. 173-174, as cited in *Retrying Galileo*, pp. 142-143. We note here that Lazzari's quote of D'Alembert is only a few years prior to the French Revolution of 1789, which precipitated an almost total rejection of Church authority in France. As Finocchiaro describes it: "The French Revolution affected the Galileo affair not only in the general and indirect ways…but also in a very specific and concrete way….In 1798 a French army occupied Rome, abolished the papal government, and established a Roman Republic. Pope Pius VI was deported to Florence, and the Inquisition palace in Rome was 'plundered to some extent by a French military rabble, and a part of the archives burned.' In 1800 a new pope, Pius VII, was elected in Venice, and in 1806 he was allowed to return to Rome with limited powers of government….In 1809, Napoleon again abolished papal government in Rome; the pope responded by excommunicating him. As a result, the pope was arrested and deported to France, and on 2 February 1810 everything in Rome pertaining to papal government was ordered moved to France. This situation did not change until 1814, when Napoleon freed the pope, restored the papal state, and began returning Church records and archives to Rome" (*Retrying Galileo*, pp. 175-176).

necessary to bind the intellect in deference to Faith.

Lazzari adds the 1743 *Institutions of Physics*, wherein the famous Madame du Châtelet says: "The insuperable difficulties of the consequences drawn from it induced Copernicus to abandon it entirely and adopt the contrary hypothesis, which corresponds so well to the phenomena that now its certainty is not far from demonstration," and Keill's *Introduction to True Physics and Astronomy*, stating: "Induced by these indubitable reasons, we brought the earth into heaven, placed it among the planets, and thrust the sun down to the center." Lazzari adds "Bradley's letter to Halley on the aberration of fixed stars and chapter 3 of book 3 of MacLaurin's *Account of Sir Isaac Newton's Philosophical Discoveries*. And there is a great multitude of others who speak in a similar or more striking vein." Lazzari, hoping to persuade the Congregation of the Index by subtle suggestions of its ineptitude if it doesn't accept heliocentrism, then says:

> …it is expedient in the present situation for the Index to remove that clause….To retain it does no good….Who among young people studying mathematics does not read Wolff's *Elements*? Varenius's *Geography*? The *Introduction* of Keill, of Musschenbroek, and of Madame du Châtelet? Who does not consult Chambers's *Dictionary*? All these books mentioned so far have been republished in Italy; all are found in every bookshop of average stock; all are sold, bought, and lent. Who does not want to be informed about Newton's system or does not have available the book of some Newtonian?....Shall we ensure that some qualification be inserted every few pages, using that single word 'hypothesis' as a panacea?....Protestants are very deeply convinced of the falsity of the system of the motionless earth and of the existence to demonstrations to the contrary…with the intention of showing that in Rome there is the greatest ignorance of the most well known things or the blindest obstinacy. And so they exploit it…in connection with other points regarding either the interpretation of Scripture, or the definition of dogmas, or the understanding of Church Fathers….Thus, why should we not prevent them from doing so, and take away from them such a powerful weapon?

Lazzari also marginalizes geocentrists as those who "now deny the system of the moving earth with the most fervor and commitment are either strange in their other opinions, or barely educated in their basic elements of geometry and mechanics," while citing what he believes are the various proofs of heliocentrism: "To name a few items, such are the laws of the aberrations of the moon…the motion of fixed stars, called aberration of starlight; the nutation of the equatorial axis; the laws of the tides; the motions of comets; *etc.*," all of which, we might add, have been shown by modern science to be totally inept at proving heliocentrism.

Lazzari also tried his hand at convincing the Congregation of the Index by an appeal to the proper interpretation of Scripture based on two ways of viewing motion, claiming that "the defenders of the Copernican system…believe that while defending such a system they can keep a sense that is more proper and natural than any other." His argument is as follows:

> We must distinguish two kinds of motion and rest. The first is absolute; involves what is called imaginary space; and is not subject to any sensation. The other is relative to the bodies that are involved and that determine location, which is also called relative. Thus, when a ship is in motion, whoever is sitting astern moves with absolute motion and stands still at rest relative to the ship. Now, absolute motion is the one that is the subject of the reflection of philosophers since it is not possible to apprehend it with any sensation; relative motion is the only one that is the subject of common sense. Thus, civil society has coined the words "motion" and "rest" to express, in accordance with the common usage of words, relative motion and relative rest. And in accordance with this common manner of speaking, this meaning is not improper but really most proper….Thus, if Sacred Scripture is construed in this manner when it speaks of the motion of the sun and the rest of the earth, namely as meaning relative motion and rest, in relation to us and the place where we are, exactly as in that ship, then I am

> construing it in a sense that is proper, obvious, natural, and in harmony with the common definition of words.

Quite ingeniously, Lazzari then refers to the same argument to which many appeal today – the concept of the "center of mass" discovered by Newton. He writes:

> For in truth modern philosophers and astronomers do not regard it [the sun] as immobile at all, as they did; that is, they supposed its center to be immobile, and at most supposed it only moving around its own axis. After Newton, the moderns generally regard as immobile only the common center of gravity of the sun and all planets and comets; and they think that the sun as well as the earth and the planets turn around this center, although the sun has such a greater mass and is so much closer to the said center that it moves much less than all the other planets. But there is no need to linger on this….That is, nowadays the principle foundation of the prohibition ["all books teaching the earth's motion and the sun's immobility"] no longer subsists…"

As we know today, Lazzari's arguments advocating Newton's "common center of gravity" cannot be used to support heliocentrism. As noted in Volume I of *Galileo Was Wrong: The Church Was Right*, modern astronomy now holds that the sun and Earth are not isolated bodies in the universe; rather, at the least, the sun is pulled by the gravity of the Milky Way and thus revolves around the galaxy's center in order to escape its gravity. Since these stars, which are thousands of light-years away, duly affect our solar system with such strong force, it has become naive and specious for anyone nowadays to insist that we are required to limit ourselves to the two-body system of the sun and the Earth in order to determine what revolves around what. In short, it can no longer be claimed that heliocentrism is proven by Newton's laws of motion. From the perspective of the entire universe, the center of mass depends on far more than the sun and the Earth. According to Newton himself, if the universe's masses are properly distributed, the Earth itself could serve as the center of mass.[783] Indeed, for the Earth to be the center of mass, it alone would be stationary among all the celestial bodies, for according to Newton, the center of mass for the universe must be motionless.[784] Unfortunately, scientists of Lazzari's time were adept at playing the 'Newton card' to silence geocentrists, but as it turns out, it is not a trump card but only a joker that deceived many into thinking that Galileo was right. Indeed, if there ever existed a scientific discovery that backfired on its proponents, this was it. As modern cosmologist Fred Hoyle admits:

> Although in the nineteenth century this argument was believed to be a satisfactory justification of the heliocentric theory, one found causes for disquiet if one looked into it a little more carefully. When we seek to improve on the accuracy of calculation by including mutual gravitational interactions between planets, we find – again in order to calculate correctly – that the center of the solar system must be placed at an abstract point known as the "center of mass," which is displaced quite appreciably from the center of the Sun. And if we imagine a star to pass moderately close to the solar system, in order to calculate the perturbing effect correctly, again using the inverse-square

[783] "That the center of the system of the world is immovable. This is acknowledged by all, although some contend that the Earth, others that the sun, is fixed in that center" (*Philosophiae Naturalis Principia Mathematica*, Book 3: The System of the World, Proposition X, Hypothesis I). The Latin original is: Centrum systematis mundane quiescere. Hoc ab omnibus consessum est, dum aliqui terram, alii solem in centro systematis quiescere contendant. Videamus quid inde sequatur."

[784] In Proposition XI, Theorema XI, Newton adds: "That the common center of gravity of the Earth, the sun, and all the planets, is immovable. For that center either is at rest or moves uniformly forwards in a right line; but if that center moved, the center of the world would move also, against the Hypothesis." Original Latin is: Commune centrum gravitates terræ, solis & planetarum omnium quiescere. Nam centrum illud (per legum corol. iv) vel quiescent vel progredietur uniformiter in directum. Sed centro illo semper progrediente centrum mundi quoque movebitur contra hypothesin. See Chapters 3, 6, 9 in Volume I of *Galileo Was Wrong: The Church Was Right* for further study on Newton's laws and their relation to geocentrism.

> rule, it could be essential to use a "center of mass" which included the star. The "center" in this case would lie even farther away from the center of the Sun. It appears, then, that the "center" to be used for any set of bodies depends on the way in which the local system is considered to be isolated from the universe as a whole. If a new body is added to the set from outside, or if a body is taken away, the "center" changes.[785]

Lazzari's argument, namely, that we are to understand Scripture's description of the sun's motion and the Earth's rest as "relative motion" and "relative rest," respectively, is also specious. It is the classic error of begging-the-question, for it believes, based presumptuously upon Newton's laws, that heliocentrism is correct, and thus feels justified in making relative all motion or rest recorded in the narratives of Holy Scripture. Galileo did the same. He started with his presumptuous premise, namely, 'the Earth moves,' which then led him to the false conclusion that Scripture's language had to be modified to fit the premise. Thus the syllogism:

- Premise A: The Earth moves.
- Premise B: Scripture says the Earth does not move.
- Conclusion: Scripture is speaking in relative or metaphorical terms.

Of course, no one had proven that Premise A was correct, thus the Conclusion of Lazzari's syllogism was invalid. Conversely, basing one's syllogism on the inerrancy of Scripture and the missing proofs of modern science, the proper format would be:

- Premise A: Scripture says the Earth is not in motion.
- Premise B: Modern science has not proven that the Earth moves.
- Conclusion: The Earth does not move.

In retrospect, Scripture and the common man of biblical times were certainly aware of the difference between relative motion and absolute motion. It is not a hard concept to understand or an experience that is remote from every day living. Geometrically speaking, if there is no fixed center among things that move, then everything, to some degree, is in motion. But this is precisely why the Fathers fought for a fixed Earth. It gave a stable and dependable reference point for everything in the universe, both spiritual and physical. Once man knows he is in the very center of things, everything is within his grasp. As physicist Amitabha Ghosh admits: "As long as terre firma had its immobile status…there was no problem. All motions were with respect to the Earth, just as we observe. The difficulty started once the firm ground was lost."[786]

Lazzari also appeals to various and sundry beliefs in Catholic history that were later discovered to be in error:

> Nor is it relevant to say that here one is dealing with the interpretation of Scripture and an opinion considered to be against the Faith. It would be unfortunate if, whenever there has been a consensus in the past, we try now to maintain the old shared opinions. Once it was a common opinion, which was supported by citing Scripture, that the heavens were moved by intelligent beings. Thus at about the same time, in paragraph 4 of book 2 of his *Philosophical Course*, Cardinal Sfondrati said: "It was and is the opinion of almost all philosophers and theologians that the heavens are moved by intelligent beings." In question 6 of article 3 of *De Potentia*, St. Thomas says that it belongs to the Faith.[787]

Lazzari's desperate attempt to cast a cloud over the Church's geocentric tradition is fatuous. Although the idea that angels moved the heavenly bodies was discussed in and out of the patristic and medieval eras, there was no consensus among either group that it was a reality. In fact, in *De Potentia* 6, 3, Aquinas quotes Augustine from *De Trinitatae* 2, 10, saying: "How angels do these things, or rather

[785] Fred Hoyle, *Nicolaus Copernicus*, 1973, p. 85.

[786] Amitabha Ghosh, *Origin of Inertia: Extended Mach's Principle and Cosmological Consequences*, Montreal, Apeiron, 2000, p. 7.

[787] All quotes from Lazzari's letter taken from Ugo Baldini's *Saggi sulla cultura della Compagnia di Gesù*, Padua: Cooperativa Editrice Libraria Università di Padova, 2000, pp. 489v-491v, as cited in *Retrying Galileo*, pp. 139-151.

how God does them through his angels, my sight is not keen enough to see, my reason too diffident to unravel, my mind too slow to grasp; nor can I answer with assurance all the queries that could be made on this matter…" Aquinas himself makes no firm conclusion, but only says: "Although an angel *may cause* the movement of the heavens…"[788] In reality, the whole purpose of *De Potentia* 6, 3 was to refute the ideas that angels could perform miracles at will without limitation. In other sections of *De Potentia*, Aquinas shows us his understanding of movement by natural causes: "Although the local movements of the lower bodies as well as other movements are brought about by certain fixed natural causes…"[789] As for Scripture, there exists no passage which states that angels move the heavenly bodies. The most that could be gleaned from Scripture is that angels can exercise extraordinary powers in the temporal realm. Conversely, Scripture is replete with passages that specify the Earth is at rest and the sun moves. Secondly, the patristic and medieval eras give testimony of an absolute consensus to the doctrine of a fixed Earth and a moving sun, whereas no such consensus exists regarding angelic forces moving celestial bodies. Thirdly, geocentrism was confirmed by the magisteriums under several pontiffs, pontiffs that guided and approved the process of condemning Copernicanism from start to finish, whereas an angelic impetus for the heavenly bodies did not even come up for discussion within magisterial ranks.

Consequently, after all the pressure Lazzari brought to bear on the Congregation of the Index, in the final tally, although the 1758 decision excised the "all books" prohibition, none of Lazzari's arguments convinced the Congregation to lift the ban on Copernicus, Foscarini, Zúñiga, Kepler or Galileo, or to consider heliocentrism as more than a hypothesis. No permission was granted that Copernicus' model could be published without the previously required "proper corrections."

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The Rebuff to Astronomer Joseph Lalande and its Legal Implications

The solidity of Benedict XIV's 1758 approval of the acts of the Sacred Congregation in continuing the ban on Copernicanism was confirmed with legal overtones when French astronomer, Joseph Lalande, while visiting Rome in 1765, attempted to have Galileo's *Dialogo* taken off the Index by Lalande's citing the fact that the 1758 Index had withdrawn the general ban on books about Copernican cosmology. The head of the Congregation of the Index promptly told Lalande that since the prohibition against Galileo and his *Dialogo* was precipitated by a canonical trial, the sentence pronounced against Galileo would first have to be revoked in order for any lifting of the prohibition to occur.[790]

The importance of this canonical protocol cannot be underestimated. If the head of the Congregation of the Index indeed spoke truthfully for the Church on this matter, he informs us in no uncertain terms that for any rehabilitation of either Galileo or his heliocentric theory to occur, a formal and legal reversal of his sentence and condemnation would first have to take place, either by the then present magisterium or any future magisterium. If there is no subsequent formal and legal exoneration of Galileo, then, according to the canonical protocol of the Catholic Church, Galileo and his heliocentric theory remain condemned to this very day. Since the Church has not initiated any official, formal or legal rescission of Galileo's condemnation, it remains legally in force.

The Disclaimer on Isaac Newton's *Principia Mathematica*

Lalande and Lazzari represented a contingent of scholars who were advancing the theories of Isaac Newton to support heliocentrism. But there was an equally strong force against succumbing to the Newton factor. Isaac Newton, who, coincidentally was born in the same year Galileo died, 1642, published his famous work titled *Principia Mathematica* forty-five years later in 1687. It was, and is now, the most famous book ever written on

[788] "Ad quintum dicendum, quod Angelus etsi caelum moveat…" (*De potentia*, q. 6 a. 3 ad 5).

[789] "Ad undecimum dicendum, quod licet motus locales inferiorum corporum sint a determinatis motoribus naturalibus…" (*De potentia*, q. 6 a. 3 ad 11)

[790] As stated verbatim by Finocchiaro in *Retrying Galileo*, p. 154, with citation to Lalande's 1764 work, *Astronomie*, second edition, vol. 1, pp. 536-41, ¶¶ 1103-4. Also cited in Karl Gebler's *Galileo and the Roman Curia*, 1879, p. 313, and Walter Brandmüller's *Galilei e la Chiesa, ossia il diritto di errare*, 1992, p. 162.

physics and mathematics. It was the *Principia* that single-handedly gave geocentrism its most difficult challenge, since, apparently, Newton's laws of motion: (a) required the sun to be larger than the Earth, and (b) required the smaller body to revolve around the larger body. As we noted previously, Newton's laws actually stated that both the smaller and the larger body revolved around the center of mass that was located somewhere between the two bodies, but since the distance of the center of mass between the Earth and the sun was near the center of the sun, in all practicality, Newton's book was well on its way to convincing the world that heliocentrism could be the only possible answer to the question of celestial revolutions.

But Newton's *Principia* had formidable competition from the Catholic Church. In 1739-1742, when the three-volume edition of the *Principia* was published in Geneva, the Catholic Church apparently had enough power to assign two Minim friars from the Franciscan order, Thomas Le Seur and François Jacquier as editors (although they are commonly mistaken for Jesuits). Their editing of the *Principia* was for the purpose of introducing Newton's work to the educated class of the Roman papal court. As one author judged their edition:

> With its rich editorial content, extensive summaries and detailed index, the Jesuit edition remains the most ambitious and perhaps the most useful edition ever published. It was reissued in Geneva in 1760, Prague in 1780-85, and finally in Glasgow in 1822 and 1833, with further changes by J. M. F. Wright.[791]

The most significant feature of the above editions of the *Principia* in light of the heliocentric/geocentric debate was that the Preface contained a disclaimer, or what was then known as a "Declaratio," stating that although Newton assumed the heliocentric system to be true, this was not the belief of the editors, Le Seur and Jacquier, who represented the Catholic Church. Hence, each reader of the *Principia* would understand that although the editors wrote as if they accepted Newton's heliocentrism, they did not, in fact, agree with it at all. All the editions carried this wording:

> Newton in his third book assumes the hypothesis of the earth's movement. The author's [Newton's] propositions could not be explained except on the same hypothesis. Hence we have been obliged to put on a character not our own. <u>But we profess obedience to the decrees made by the Supreme Pontiffs against the movement of the earth</u>.[792]

This is quite a statement. The Pontiff reigning at the time was Benedict XIV, the same pontiff that eventually gave approval to remove the prohibitory sentence ["all books teaching the earth's motion and the sun's immobility"] from the *Index*. Hence, whatever allowance he had given to science in 1742 and 1758 it certainly was not to be interpreted as supporting the heliocentric system. In fact, we take strict notice that Le Seur and Jacquier did not attribute the "decrees…against the movement of the earth" as coming merely from "theologians" or even cardinals in high places, but from the "Supreme Pontiffs" up to their own day. Their specific use of the plural "Pontiffs" recognizes all the previous popes whom they understood as holding the same truth as Benedict XIV. All of them, without exception, had condemned the notion of a moving Earth. As editors commissioned by the Church and under her authority as Minim friars, Le Seur and Jacquier would never have been able to attribute the rejection of heliocentrism to all the "Supreme Pontiffs" unless they were permitted to do so by those very popes; and unless the consensus of allegiance to the pope on this matter was pervasive throughout the continents under her control.

Interestingly enough, Pietro Lazzari, noted earlier for his long letter seeking to convince the Inquisition in favor of Copernicanism in 1741, mentions Le Seur and Jacquier in his letter as "two celebrated mathematicians of the order of St. Francis

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[791] *Isaac Newton and the Scientific Revolution*, an exhibition of books from Dr. and Mrs. R. Ted Steinbock, Moutain Goat Press, Louisville KT, 2006.

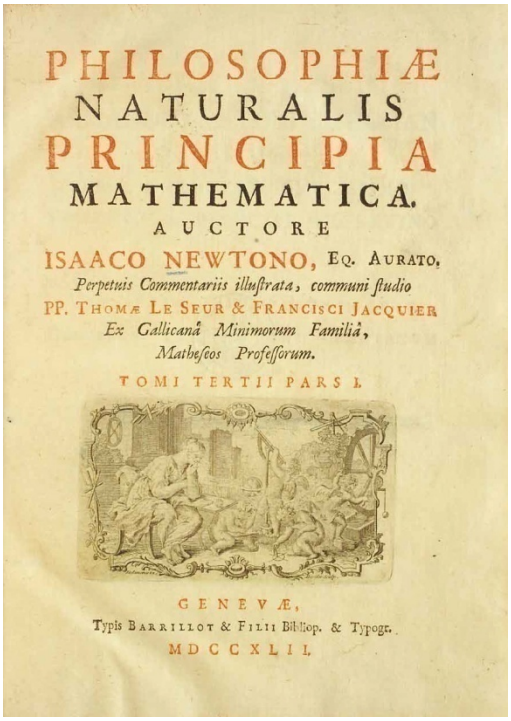
[792] *Philosophiæ Naturalis Principia Mathematica*, Isacco Newtono, PP. Thomæ Le Seur & Francisci Jacquier, Genevæ, MDCCXXXIX [1739]. Original Latin: "DECLARATIO: Newtonus in hoc tertio Libro Telluris motæ hypothesim assumit. Autoris Propositiones aliter explicari non poterant, nisi eâdem quoquè factâ hypothesi. Hinc alienam coacti sumus gerere personam. Cæterum latis a summis Pontificibus contra Telluris motum Decretis nos obsequi profitemur." Above translation taken from Rev. William W. Roberts in *The Pontifical Decrees Against the Doctrine of the Earth's Movement*, p. 53.

of Paola"[793] and he attempts to use them as corroborating testimony of the position that "nowadays the prevalent opinion among the most competent astronomers and physicists is that the earth moves around the sun." Hence, either Lazzari did not know of Le Seur and Jacquier's devotion to geocentrism, or he was purposely distorting the truth.

The relevant pages of the 1739-1742 editions of Newton's *Principia* are on display below:

(See next page)

[793] As cited in Finocchiaro's *Retrying Galileo*, p. 143, with an endnote identifying them as: "The Minim Fathers François Jacquier (professor of experimental physics at the University of Rome from 1746) and Thomas Le Seur (professor of applied mathematics from 1749)…They were the coeditors of the famous edition of and commentary to Newton's *Principia* in 1739-1742" (*ibid*., p. 394), yet neither Finocchiaro nor his alternate source, Baldini, mention that Jacquier and Le Seur disavowed themselves from Newton's heliocentrism and gave their full allegiance to the pontiffs who condemned Copernicanism.



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA.
AUCTORE
ISAACO NEWTONO, Eq. Aurato,
Perpetuis Commentariis illustrata, communi studio
PP. Thomæ Le Seur & Francisci Jacquier
Ex Gallicanâ Minimorum Familiâ,
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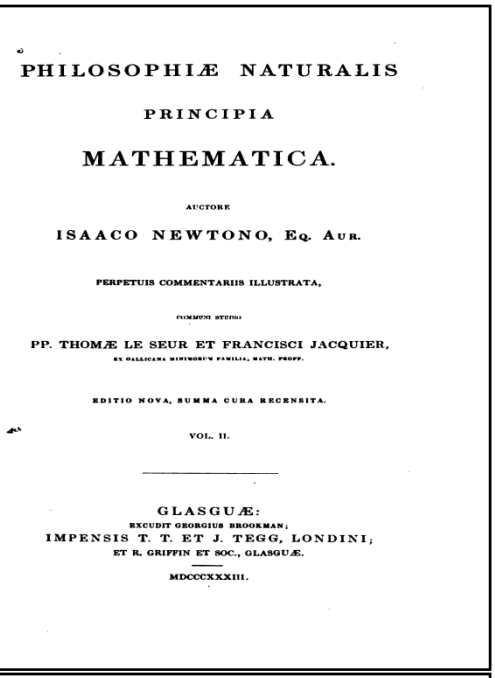

PHILOSOPHIÆ NATURALIS
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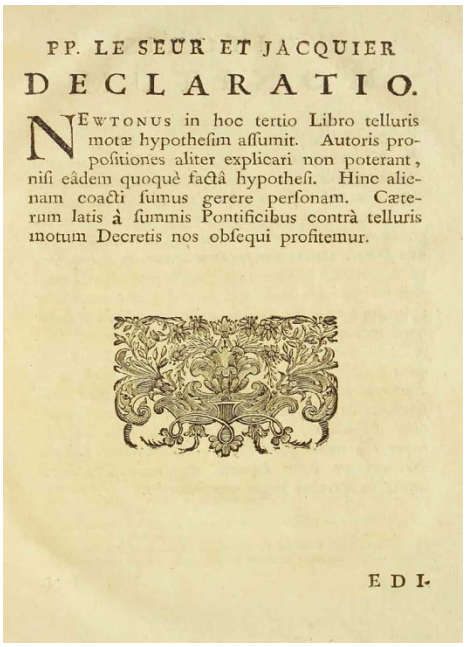
PERPETUIS COMMENTARIIS ILLUSTRATA,
COMMUNI STUDIO
PP. THOMÆ LE SEUR ET FRANCISCI JACQUIER,
EX GALLICANA MINIMORUM FAMILIA, MATH. PROFF.
EDITIO NOVA, SUMMA CURA RECENSITA.
VOL. II.

GLASGUÆ:
EXCUDIT GEORGIUS BROOKMAN;
IMPENSIS T. T. ET J. TEGG, LONDINI;
ET R. GRIFFIN ET SOC., GLASGUÆ.
MDCCCXXXIII.



PP. LE SEUR ET JACQUIER
DECLARATIO.

Newtonus in hoc tertio Libro telluris motæ hypothesim assumit. Autoris propositiones aliter explicari non poterant, nisi eâdem quoquè factâ hypothesi. Hinc alienam coacti sumus gerere personam. Cæterum latis à summis Pontificibus contrà telluris motum Decretis nos obsequi profitemur.

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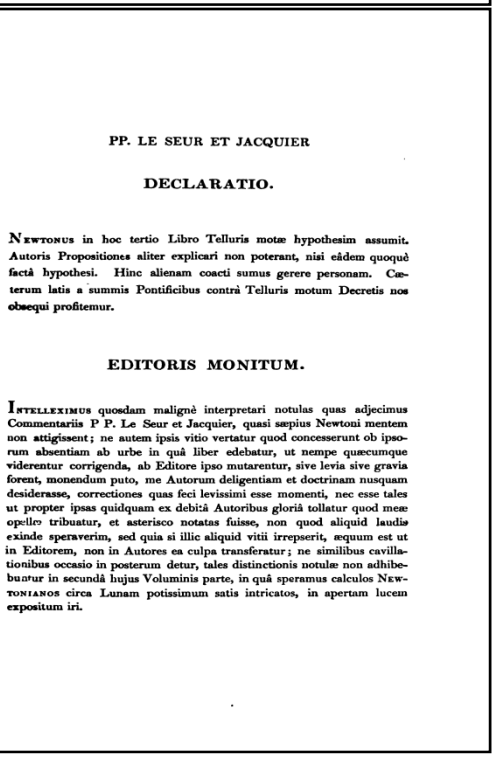

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EDITORIS MONITUM.

Intelleximus quosdam malignè interpretari notulas quas adjecimus Commentariis P P. Le Seur et Jacquier, quasi sæpius Newtoni mentem non attigissent; ne autem ipsis vitio vertatur quod concesserunt ob ipsorum absentiam ab urbe in quâ liber edebatur, ut nempe quæcumque viderentur corrigenda, ab Editore ipso mutarentur, sive levia sive gravia forent, monendum puto, me Autorum deligentiam et doctrinam nusquam desiderasse, correctiones quas feci levissimi esse momenti, nec esse tales ut propter ipsas quidquam ex debitâ Autoribus gloriâ tollatur quod meæ opellæ tribuatur, et asterisco notatas fuisse, non quod aliquid laudis exinde speraverim, sed quia si illic aliquid vitii irrepserit, æquum est ut in Editorem, non in Autores ea culpa transferatur; ne similibus cavillationibus occasio in posterum detur, tales distinctionis notulæ non adhibebuntur in secundâ hujus Voluminis parte, in quâ speramus calculos Newtonianos circa Lunam potissimum satis intricatos, in apertam lucem expositum iri.

The most significant aspect of the *Declaratio* was that it persisted in all Latin volumes of the *Principia* for the next hundred years. The last volume on record to contain Le Seur and Jacquier's disclaimer was the 1833 Glasgow (or Glasguæ) edition, two years before the Index of Gregory XVI (see facsimiles above). This late date (1833) proves once again that the Pontiffs of the Catholic Church were the main authorities against the censoring of the heliocentric system. By 1833, Newton was a household word and anyone worth his scientific salt had read his book and most likely agreed with it, at least in principle. That his book still contained the *Declaratio* in 1833 meant that the Catholic Church still believed in geocentrism and, consequently, the imprimatur granted to Settele in 1822 really had no effect on that consensus. Unfortunately, these facts were not added to the 1992 speech of John Paul II.

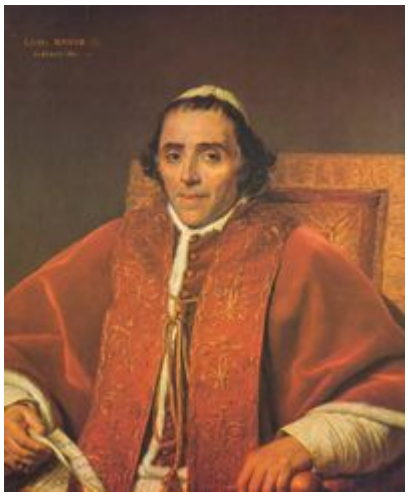
These matters are quite sobering. If we consider that in the present day we are less than 175 years from the publication of the last *Declaratio* on Newton's *Principia* (the most formidable defense of heliocentrism up to that time) it means that any belief in heliocentrism in Catholic society today is virtually in its infancy. As we noted in Volume I of *Galileo Was Wrong: The Church Was Right*, during this 175-year period (1833-2008) some of the most sophisticated scientific experiments ever performed demonstrated that the Earth was standing still in space. Already in 1818 the stage was being prepared. Dominique Arago tested the refraction of starlight and found that regardless how he adjusted his apparatus the results always showed the Earth was at rest. Augustin Fresnel and Armand Fizeau tried in vain to upset his results since they knew of and rejected its geocentric implications. The same results were again confirmed by an even more sophisticated experiment performed by George Airy in 1871. The final nail in the coffin came from the Michelson-Morley experiment of 1887, and all similar interferometer experiments performed through 1932. They all gave the same results – the Earth was standing still in space. After 1932, equipment with even more precision, masers and lasers, were employed, but the same results persisted.

The upshot of the foregoing history is, while the Catholic Church was maintaining its belief in geocentrism by the unwavering edicts of its "Supreme Pontiffs" through 1833, whatever winds of change Newton and his followers were brewing toward heliocentrism by their new theories of gravity and motion were just as quickly being corralled into support for geocentrism by the hands-on experimental evidence of Arago, Airy, and Michelson. It was as if God was giving the Church and the world all the evidence they needed against Newton in the 175-year interim after the 1833 *Declaratio* to maintain the course in geocentric cosmology. The only way the powers-that-be could fool the world into thinking that they could escape this glaring evidence was to reinvent physical science, which is precisely what occurred in the theories of Albert Einstein in 1905, a scientist, we might add, that had a deep antipathy for the Catholic Church and anything religious (see Chapter 11). This is precisely why Einstein is considered one of the greatest scientists ever known. He saved the world from having to turn the clock back and submit itself to the medieval Catholic Church in all its power and glory. If Einstein failed, which would mean that the Catholic Church had been right all along about Galileo, we can imagine what a different world this would be. Einstein knew what he was up against for it is more or less admitted in the way he chose to esteem Galileo, as a man who, in his own words, led "the passionate fight against any kind of dogma based on authority." According to Einstein, Galileo's *Dialogo*, the very book that was condemned by the Catholic Church, had "revolutionary factual content." He applauds Galileo for standing up against "the host of those" who relied "on the ignorance of the people and the indolence of teachers in priest's and scholar's garb" in order to "maintain and defend their positions of authority," namely, the Catholic Church.[794] Actually, as we have seen, Galileo did no such thing. Einstein and the rest of modern science have merely created a convenient myth about Galileo. Galileo did not rebel against the authority of the Catholic Church. When he was convicted of being suspect of heresy, he abjured, and eight years later, one year before his death, he totally rejected Einstein's universe.

Pius VII and Canon Settele's Imprimatur

As the 1833 *Declaratio* on Newton's *Principia* shows that the history of papal decisions from 1616 onward had a significant effect on what faithful Catholics believed, conversely, the 1822 imprimatur given to Canon Giuseppe Settele was a classic case of hierarchial subterfuge. It was initiated by Maurizio Benedetto Olivieri who, in 1820, had

[794] All quotes taken from I. Bernard Cohen's *Revolution in Science*, p. 439.



advanced to the position of Commissary General of the Index. From Settele's diary dates of 1810 through 1836,[795] we understand that, after his second volume of *Elements of Astronomy* was disapproved by the Master of the Sacred Palace, Filippo Anfossi, on January 3, 1820 because it held the thesis that the Earth moved, Settele sent a formal appeal to **Pope Pius VII**. The context of Pius' receiving of the appeal is important, since it may have had a bearing on the issuance of Settele's imprimatur. By 1820, Pius VII had only been restored to his Vatican home for a mere seven years, after having been incarcerated in Florence from 1809 to 1814 by Napoleon's armies. The Vatican had been turned into little more than a Napoleonic police-state during that time. In his siege of Vatican property, Napoleon had confiscated all the documents dealing with Galileo's trial and had them put in a library in France. They were not returned until 1843, by happenstance. Hence, in the period between 1820-1835 when the Vatican was making crucial decisions regarding the matter of Galileo and heliocentric cosmology, it had no access to the very documents the Church had published between 1616 and 1633. It is in the context of such governmental upheaval and a vacuum of documentation that Settele's imprimatur is issued in 1822 and Galileo's name is removed from the Index in 1835.

The missing historical records become a very significant factor in light of the fact that the Congregation of the Index had already gone on record in 1765 in the case of Joseph Lalande by stating that Galileo's *Dialogo* could not be approved unless the condemnation issued at his trial in 1633 was rescinded.[796] Faced with no direct documentation of Galileo's trial, the Inquisitors of the Settele affair could only consult the 1758 decision under Benedict XIV. As Finocchiaro puts it:

> The Inquisition, unable to consult the file of Galilean trial documents that had gone missing after the Napoleonic transfer, did the next best thing; it requested the Congregation of the Index to provide the file on the 1758 edition of the Index, which contained the partial and silent retraction of the anti-Copernican ban of 1616. The Index delivered the file to the Inquisition on March 28 [1820]. In the meantime, newspapers in Germany, France, and Holland were publishing articles about this ecclesiastical censorship.[797]

Without the historical records of 1616 and 1633, we might say that the 1820 Inquisition was hobbling on one leg and perhaps should have postponed their decision until the records could be retrieved. But, as the quote above reveals, the European newspapers were creating undue pressure on the Vatican, complaining of censorship against Settele and clamoring for a favorable decision toward Copernican cosmology.

Although Finocchiaro refers to the 1758 decision as a "partial and silent retraction of the anti-Copernican ban of 1616," this assessment is misleading, for we noted previously that not only were the names of Copernicus, Foscarini, Zúñiga, Kepler and Galileo kept on the Index precisely because they were condemned for teaching heliocentrism, more importantly, there was no specific provision made in 1758 (and Finocchiaro does not cite one in his book) which stated that "all books teaching the earth's motion and the sun's immobility" could now present heliocentrism *as a thesis rather than a hypothesis*, a fact not readily

[795] Collected and published by Paolo Maffei in 1987 as *Giuseppe Settele, il suo Diario e la questione galileiana*, Foligno: Edizioni dell'Arquata.

[796] As Finocchiaro puts it: "But he [Lalande] was told by the head of the Congregation of the Index that Galileo's case was different because it involved a trial, and so one would first have to revoke the sentence pronounced against him…" (*Retrying Galileo*, p. 154).

[797] *Retrying Galileo*, p. 195.

admitted by Galileo historians. Logically, it would be self-contradictory for the 1758 Index to continue the ban on Copernicus, *et al*., for teaching, as a thesis, that the Earth moves, but then allow "all [other] books" the privilege to do the exact opposite with impunity. Moreover, if the Index, both in 1758 and on through to 1820, approved of no treatise that regarded Copernicanism as a thesis, on what precedent could the 1820-1822 Inquisition approve Settele's book which treated heliocentrism as a thesis? The wording of the 1822 decision indicates that it was bound by what was decreed in 1758. It states:

> Their Eminences have decreed that, for the time being, now and in future, a license is not to be refused to the Masters of the Sacred Apostolic Palace for the printing and publication of works dealing with the mobility of the earth and the immobility of the sun according to the common opinion of modern astronomers, as long as there are no other contrary indications, on the basis of the decrees of the Sacred Congregation of the Index of 1757 and of this Supreme Holy Office of 1820.[798]

As such, since the 1758 decision did not make any provision to treat Copernicanism as a thesis, it should have served as a "contrary indication" to the Inquisitors of 1820-22, warning them against approving thesis-laden Copernican treatises. Somehow, however, the "contrary indications" were side-stepped between the years of 1820 and 1835. Interestingly enough, in Olivieri's lengthy Summation to the Inquisition in 1820 for the purpose of persuading it to approve Settele's *Elements of Astronomy*, he faults Anfossi, claiming that Anfossi "cannot be excused for ignoring the Index that has been in force since 1758 and declaring prohibited books that certainly are no longer such."[799] But since in 1758 neither the books that already presented heliocentrism as a thesis were excused (*viz*., Copernicus, Foscarini, Zúñiga, Kepler and Galileo), nor was there any specific provision to allow "all [other] books" to treat heliocentrism as a thesis, it seems that Olivieri is the one "ignoring" the 1758 decision, or at least reading into it more than what is there.

Olivieri, who by this time was enjoying his post as the Commissary General of the Inquisition, had already demonstrated he was capable of twisting the truth to win the day for Copernicanism when he advanced the absurd position that the popes and the Sacred Congregations of 1616 and 1633 had condemned Copernicanism because it was flawed for not including elliptical orbits of the planets. Olivieri posed this dubious analysis in the face of the fact that the 17th century magisterium never once mentioned anything about elliptical orbits, or any such technical defect, as being a criterion for its judgment against either Copernicus or Galileo. The magisterium's condemnation was based on only two criteria: (1) that the sun revolved around the Earth, and (2) that the Earth was motionless in space, both of which Copernicus, Foscarini, Zúñiga, Kepler and Galileo had denied. In his clever and manipulative ways, Olivieri takes the focus off these two criteria and instead argues that the condemnations of the 1616-1633 magisteriums are presently inconsequential because Copernicus and Galileo believed that the sun was motionless in the center of the world; and since modern astronomy, courtesy of Kepler, no longer believes that to be the case, then, according to Olivieri, the basis for the 1616-1633 condemnation of Copernicanism and Galileo is far removed from the beliefs of astronomy in 1820 and therefore does not directly apply. In other words, because of the new cosmological revelations of elliptical orbits bequeathed to mankind from Kepler and Newton, Olivieri and his colleagues claimed to have the real truth of how the celestial bodies moved in space, and thus the 1616-1633 decisions against Galileo and Copernicanism were considered obsolete. Olivieri argues this position in his Summation to the 1820 Inquisition as follows:

> Along with modern astronomers, Settele does not teach that the sun is at the center of the world: for it is not the center of the

[798] "E.mi DD. Decreverunt, non esse a praesenti et futuris pro tempore Magistris Sacri Palatii Apostolici recusandam licentiam pro impressione et publicatione operum tractantium de mobilitate terrae et immobilitate solis iuxta communem modernorum astronomorum opinionem, dummodo nihil aliud obstet, ad formam Decretorum Sacrae Congregationis Indicis anni 1757, et huius Supremae anni 1820" (Antonio Favaro, *Galileo e l'Inquisizione,* pp. 30-31).

[799] From Olivieri's November 1820 Summation, titled, "Ristretto di Ragione, e di Fatto," ¶29, as cited by Finocchiaro in *Retrying Galileo*, p. 205.

> fixed stars; it is not the center of heavy bodies, which fall toward the center of our world, namely of the earth; nor is it the center of the planetary system because it does not lie in the middle, or center, but to one side at one of the foci of the elliptical orbits that all planets trace. Still less does he teach that the sun is motionless; on the contrary, it has a rotational motion around itself and also a translational motion which it performs while carrying along the outfit of all its planets.[800]

As we noted in volume I of *Galileo Was Wrong: The Church Was Right*, based on what we now know from modern mathematics, geometry and cosmology, Olivieri's attempt to justify heliocentric cosmology using Kepler's ellipses is specious. As stated in the subtitle section, "The Real Truth about Kepler's Solar System," we write:

> Contrary to popular opinion, Kepler's geometrical modification didn't prove Copernicus' sun-centered system was right. It merely revealed Kepler's preferences, since he knew that, if the same elliptical modifications were made to the reigning geocentric model of Tycho Brahe, or even to Ptolemy's model, they would have shown heliocentrism to be merely an alternative system, not a superior one. As one physics course put it: "However, one could also construct a 'Tychonean' model with elliptical orbits."[801] In fact, it is well known among historians that although Kepler claimed the discovery of elliptical orbits was supported by independent computations of planetary positions, in actuality, he employed the elliptical theory in order to derive his "observations."[802] Be that as it may, the ellipses merely helped both the heliocentric and geocentric models to resolve that planetary orbits were not necessarily perfect circles, although some are very close to perfect circles.[803] The only other difference in the two main theses of Copernicus and Kepler was that Kepler, since he believed the sun pushed the planets in their orbits by a magnetic sweeping motion, sought to make the sun the actual center of the solar system to replace Copernicus' 'mean sun' – the common point of intersection for all the orbits of the planets.[804]

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[800] *Ibid*., ¶30.

[801] University of Illinois, Physics 319, Spring 2004, Lecture 03, p. 11.

[802] Knowing this fact, historian Owen Gingerich says that Kepler's ploy "may simply have been a legitimate flourish meant to persuade recalcitrant colleagues of the correctness of his insight" (As cited in the *Bulletin of the Tychonian Society*, No. 53, 1990, p. 32). Gingerich also suggests that elliptical orbits may not have been the brainchild of Kepler, but of Jerome Schreiber. He writes: "On folio 143 [of Kepler's copy of *De revolutionibus*] there appears the single Greek word ελλειψις – that is, ellipse – together with the same sort of emphasis marks that Schreiber used to highlight the passage on folio 96. When I first saw that book in Leipzig, I assumed that it was Kepler who had written ελλειψσις in the margin, and I hadn't made a color slide of it. Later, when I had discovered more information about the double layer of annotations and the evidence that it was likely Schreiber's handiwork, I had to worry about which one wrote it….Eventually I obtained excellent transparencies, which left no doubt that it was indeed Schreiber's ink in the book Kepler had inherited" (*The Book that Nobody Read*, p. 165).

[803] Not only may Schreiber have pre-dated Kepler in regards to inventing elliptical orbits, it seems that neither Schreiber nor Kepler were the first to introduce the phenomenon. That honor apparently belongs to the Greeks. As Koestler notes: "There exist some fragmentary remains, dating from the first century AD, of a small-sized Greek planetarium – a mechanical model designed to reproduce the motions of sun, moon, and perhaps also of the planets. But its wheels, or at least some of them, are not circular – they are egg-shaped [footnote: Ernst Zinner, Entstehung und Ausbreitung der Copernicanischen Lehre (Erlangen, 1943), p. 48]. Gingerich adds: "The equant got Ptolemy into a lot of trouble as far as many of his successors were concerned. It wasn't that his model didn't predict the angular positions satisfactorily. Rather, the equant forced the epicycle to move nonuniformly around the deferent circle, and that was somehow seen as a deviation from the pure principle of uniform circular motion. Ptolemy himself was apologetic about it, but he used it because it generated the motion that was observed in the heavens. Altogether his system was admirably simple considering the apparent complexity and variety of the retrograde loops" (*The Book that Nobody Read*, p. 53).

[804] Kepler, following the lead of William Gilbert who proposed that the Earth is a giant magnet, enhanced the

Even after Kepler's modifications, anomalies regarding the motions of the heavenly bodies remained, and stubbornly so. Although geometrically speaking the orbits are not perfect circles, they are not perfect ellipses either, but precess at different rates and contain various eccentricities. Quoting Hoyle again:

> The planetary orbits are not strictly ellipses, as we have so far taken them to be, because one planet disturbs the order of another through the gravitational force that it exerts….In all cases the orbits are nearly circles….It is curious that although the actual orbits do not differ in shape much from circles the errors of a circular model can nevertheless be quite large. Indeed, errors as large as this were quite unacceptable to Greek astronomers of the stature of Hipparchus and Ptolemy. It was this, rather than prejudice, which caused them to reject the simply heliocentric theory of Aristarchus….The Hipparchus theory grapples with the facts whereas the circular picture of Aristarchus fails to do so….The theory of Ptolemy, a few minor imperfections apart, worked correctly to the first order in explaining the planetary eccentricities. Copernicus with his heliocentric theory had to do at least as well as this, which meant that he had to produce something much better than the simple heliocentric picture of Aristarchus….Kepler achieved improvements, but not complete success, and always at the expense of increasing complexity. Kepler and his successors might well have gone on in this style for generations without arriving at a satisfactory final solution, for a reason we now understand clearly. There is no simple mathematical expression for the way in which the direction of a planet – its heliocentric longitude – changes with time. Even today we must express the longitude as an infinite series of terms when we use time as the free variable. What Ptolemy, Copernicus, and Kepler, in his early long calculations, were trying to do was to discover by trial and error the terms of this series. Since the terms become more complicated as one goes to higher orders in the eccentricity, the task became successively harder and harder…[805]

Professor of celestial mechanics at Columbia University, Charles Lane Poor, says much the same:

> From the time of Newton, it has been known that Kepler's laws are mere approximations, computer's fictions, handy mathematical devices for finding the approximate place of a planet in the heavens. They apply with greater accuracy to some planets than to others. Jupiter and Saturn show the greatest deviations from strictly elliptical motion. The latter body is often nearly a degree away from the place it would have been had its motion about the sun been strictly in accord with Kepler's laws. This is such a large discrepancy that it can be detected by the unaided eye. The moon is approximately half a degree in diameter, so that the discrepancy in the motion of Saturn is about twice the apparent diameter of the moon. In a single year, during the course of one revolution about the sun, the Earth may depart from the theoretical ellipse by an amount sufficient to appreciably change the

idea and envisioned the sun and all the planets as being magnetically bound. The precise orientation of the polarities of the sun and the planets would then determine the ellipticity of the latter's orbits.

[805] Fred Hoyle, *Nicolaus Copernicus: An Essay on his Life and Work*, pp. 73, 8, 9, 53, 11-12, 13-14, in the order of ellipses.

> apparent place of the sun in the heavens.[806]

Olivieri's intent to promote the Keplerian system and to dismiss or severely minimize the magisterium's condemnations in 1616 and 1633 is even clearer in a subsequent paragraph:

> I hope the Most Rev. Father [Anfossi] can quietly accept that that system was not declared "heretical" or "erroneous in the Faith"; that due to their ignorance, Copernicus and Galileo were unable to remove the "serious difficulties" affecting our globe, and so their system was infected with a devastating motion; that therefore the condemnation was based on the philosophical absurdities on account of which the system had consequences implying that the doctrine (I mean *their* doctrine) could be called contrary to Sacred Scripture; and that all this does not harm in the least the respect due to the decrees of the Sacred Congregations.[807]

In a nutshell, Olivieri's argument is that it was not heliocentrism, *per se*, that was condemned by the Church, but only Copernicus' and Galileo's version of it. This, of course, was an outright falsehood. As far as the Church was concerned, there were two choices – either the Earth moved or it did not. It made no difference to Paul V, Urban VIII, or even Benedict XIV who kept Copernicus, *et al*., on the Index in 1758, whether it was Galileo's model, Kepler's model, Newton's model or anyone else's. All of them were rejected and/or condemned because they made the Earth move, contrary to the literal reading of Scripture and the interpretation of it according to the unanimous consensus of the Church Fathers.

Olivieri, of course, had his prepared explanation for why Copernicus, *et al*., were kept on the 1758 Index. As he sees it,

> It is true that it contains some books, namely the particular books by Copernicus, Zúñiga, Foscarini, Kepler, and Galileo, the last of which was inserted in 1634; but it is not true that it contains other books (at least as far as I have been able to determine) and still less books in general that teach it. And there is a reason for leaving those books there, for they belong to the age in which the earth's motion had not been free from its implication of devastating mobility.[808]

But the smoking gun that denies Olivieri his rationalization is that the "devastating mobility" (which he earlier defined as "the axial rotation and orbital revolution which [Copernicus and Galileo] ascribed to the earth"[809] because they did not base it on Kepler's concept that the sun lies "to one side at one of the foci of the elliptical orbits that all planets trace" and "has a rotational motion around itself and also a translational motion which it performs while carrying along the outfit of all its planets"[810]), which was supposedly solved by Kepler, is not regarded by the magisterium to be an exonerating distinction between Galileo's heliocentrism and Kepler's heliocentrism for the simple fact that Kepler's works were condemned and put on the Index just as Galileo's were, but apparently Olivieri succeeded in slipping this contradiction past the noses of his colleagues! We noted earlier that Kepler's *magnum opus* was published in 1630, the *Epitome*

[806] Charles Lane Poor, *Gravitation versus Relativity*, p. 129. Owen Gingerich adds: "Naturally astronomy textbooks don't show it this way, because they can't make the point about ellipses unless they enormously exaggerate the eccentricity of the ellipse. So for centuries, beginning with Kepler himself, a false impression has been created about the elliptical shape of planetary orbits. The eccentricity of planetary orbits (that is, their off-centeredness) is quite noticeable – even Ptolemy had to cope with that – but the ellipticity (the degree the figure bows in at the sides) is very subtle indeed. Observations of Mars must be accurate to a few minutes of arc for this tiny ellipticity to reveal itself" (*The Book that Nobody Read*, p. 166).

[807] Olivieri's November 1820 Summation, "Ristretto di Ragione, e di Fatto," ¶42, as cited by Finocchiaro in *Retrying Galileo*, p. 209. Olivieri does much the same in ¶46, accusing Anfossi of not knowing what the 1616-1633 Sacred Congregations meant by the Earth's mobility.

[808] *Ibid*., ¶58.

[809] *Ibid*., ¶41. Olivieri states: "Such was the case of the devastating motion from which Copernicus and Galileo had been unable to free the motions of axial rotation and orbital revolution which they ascribed to the earth; such devastating motion was certainly contrary to Sacred Scripture."

[810] *Ibid*., ¶30.

astronomiae Copernicanae, written for the express purpose of redoing Copernicus' spheres with elliptical orbits, was already condemned and placed on Pope Alexander's 1664 Index and continued on the Indices of 1741 and 1758. Although the 1616 and 1633 magisterium did not formally condemn Kepler, the fact is that Kepler was not under their canonical jurisdiction because Kepler was a Lutheran.[811] The four other heliocentrists that were formally condemned by the magisterium were all Catholics (Copernicus, Foscarini, Zúñiga and Galileo). But after the 1633 trial of Galileo, Protestants began touting Kepler's *Epitome* as a means of protesting the Catholic Church's "censorship of heliocentrism," and thus the Church decided to condemn Kepler's book in its next Index of 1664. Hence, in regards to Olivieri, the only "devastating" features of his Summation are the historical facts that expose his attempt to twist and distort the truth.

As regards the interpretation of Scripture, Olivieri did precisely what Galileo tried to do with Bellarmine, and what avowed heliocentrists have always attempted to do in order to justify changing Scripture's language into figures and metaphors when up against its literal truth that they do not wish to accept. They claim: (1) that Scripture was meant to be interpreted in less than literal fashion because either it did not intend to give any specific information on the particular subject at hand, or the people of ancient cultures were too inept to understand the actual workings of the subject, and (2) there is scientific proof of the Earth's movement, and thus Scripture's words cannot be interpreted literally. Below is Olivieri's rather unique explanation. It begins by making the preposterous claim that the order in which the 1616 and 1633 magisteriums listed their condemnations (i.e., first "philosophy," second "Scripture") meant that they were not really concerned about the second. (NB: "devastating mobility" refers to non-elliptical planetary revolutions):

> You will certainly find in Scripture and in the Church Fathers assertions of terrestrial immobility that is opposed to the devastating mobility; but to properly understand the latter with its problematic characteristics, you will have to focus on what you perceive in experience and apprehend by reason, for here one is not dealing with a supernatural mystery but with something accessible to experience and observation; that is, you will need philosophy to make you perceive the falsity and absurdity, so that based on these you can understand the language of Scripture and of the Church Fathers, which uses experimental notions. This is the way it must be; and this is in fact shown by those theologians and by the Sacred Congregation, both of whom pronounced the doctrine false before calling it contrary to Sacred Scripture; by doing so they warned us to fix our attention on the philosophical falsity, and thus to not go astray in thinking of contrariety to Sacred Scripture, for mobility and immobility are not things which God has chosen to reveal to us; rather he has inspired the Sacred Writers to express to us what our senses perceive in the way they perceive it. Recall the statement of our Holy Teacher [Aquinas]: "Moses describes what is obvious to sense, out of condescension to the ignorance of the people"[812]

It appears that Olivieri is the "ignorant" one in this case, for Aquinas was a devoted geocentrist who based his belief on the literal interpretation of Scripture's cosmological passages, in addition to his firm commitment to the interpretation of Scripture according to the consensus of the Church Fathers. Second, the sentence from Aquinas that Olivieri chooses to support his argument is not only taken out of context, it is in a passage where Aquinas confirms his belief in geocentrism! In the passage, Aquinas' only concern is whether the whole firmament itself revolves around the Earth or that only the stars revolve around the Earth, the same question that Chrysostom had at one time. Aquinas writes:

> Reply OBJ 3: According to Ptolemy the heavenly luminaries are not fixed in the spheres, but have their own movement

[811] In 1584, Kepler attended the Protestant seminary at Adelberg. In 1589 he began studies at the Protestant university of Tübingen. In 1594, he became professor of mathematics at the Protestant seminary in Graz, where he remained until 1600 until the Counter-Reformation forced all Protestants to leave the province.

[812] *Ibid*., ¶41, *Retrying Galileo*, p. 209.

> distinct from the movement of the spheres. Wherefore Chrysostom says (Hom. 6 in Genesi) that He is said to have set them in the firmament, not because He fixed them there immovably, but because He bade them to be there, even as He placed man in Paradise, to be there. In the opinion of Aristotle, however, the stars are fixed in their orbits, and in reality have no other movement but that of the spheres; and yet our senses perceive the movement of the luminaries and not that of the spheres (*De Coelo* ii, 43). But Moses describes what is obvious to sense, out of condescension to popular ignorance, as we have already said (Q67, A4; Q68, A3). The objection, however, falls to the ground if we regard the firmament made on the second day as having a natural distinction from that in which the stars are placed, even though the distinction is not apparent to the senses, the testimony of which Moses follows, as stated above (*De Coelo* ii, 43). For although to the senses there appears but one firmament; if we admit a higher and a lower firmament, the lower will be that which was made on the second day, and on the fourth the stars were fixed in the higher firmament.[813]

Olivieri then tries the same argument Galileo foisted on Bellarmine, stating:

> The "arm of God" is an expression that sounds absurd if understood literally; thus it is interpreted in a figurative sense, as a figure of speech….it is enough to reflect that Catholics learn from the Church and study in its theological schools when one should regard as absurd the meaning of scriptural words variously labeled literal, material, natural, *etc*. and adopt a meaning variously called translated, improper, and what not.[814]

What Olivieri does not admit, however, is that the Catholic "theological schools" for the 1800 years prior to Olivieri's ascendancy to his post had always taught that the "arm of God" was not to be interpreted literally, for in the hierarchy of exegetical truths, the fact that God was a spirit overrode any temptation to assign human body parts to Him. By the same token, however, the Church also taught that Scripture's cosmological passages were not prohibited by the hierarchy of biblical truths to be interpreted literally. Of course, Olivieri was probably aware of these historical principles in Catholic exegesis but he ignored them, believing he had a trump card, as it were, with his alleged scientific proofs for Kepler's elliptical system. So strong were these proofs, he believed, that science itself would now serve as the 'hierarchy of truth' to make exegesis bend away from a literal interpretation of scriptural cosmology. Thus, he boasts:

> But what difficulty is there if by subsequent discoveries men correct what they thought was contrary to the Sacred Scriptures? Of if those who are more knowledgeable in the sciences are in a better position to correctly understand what the Scriptures say about them?[815]

Obviously, Olivieri's next line of attack against Anfossi was to list the popular proofs for heliocentrism that were being popularized during this time, and he ridicules Anfossi for not succumbing to these alleged proofs. Similar to Lazzari's attempt to persuade the 1741 Inquisition, so Olivieri does the same:

> The Most Rev. Fr. [Anfossi] must be joking when he says that "these gentlemen…try to tell us that what is

[813] *Summa Theologica*, Part 1, Question 70, Article 1, Reply to Objection 3. The second reference to Moses' accommodation to the ignorance of the people noted above (Question 68, Article 3) shows us what Aquinas' intent really was. He writes: "Moses, then, while he expressly mentions water and earth, makes no express mention of air by name, to avoid setting before ignorant persons something beyond their knowledge. In order, however, to express the truth to those capable of understanding it, he implies in the words: 'Darkness was upon the face of the deep,' the existence of air as attendant, so to say, upon the water. For it may be understood from these words that over the face of the water a transparent body was extended, the subject of light and darkness, which, in fact, is the air."

[814] *Summation* ¶45.

[815] *Ibid*., ¶47.

> stated many times by the Holy Spirit is false, but that what their stellar parallax and aberration tell them is true." Then he calls as a witness Fr. Jamin, to persuade them of the incomprehensibility of God's works. He also dares say that "the best astronomers and philosophers do not agree among themselves in regard to these discoveries." But he does not mention anyone. However, the fact is, as I hear from those who are well informed, that although there is no universal consensus among the experts in the field about the annual parallax of fixed stars, the aberration of fixed stars and of the planets has been verified for at least a century and is regarded by all astronomers as a true physical demonstration of the earth's annual motion….Thus, it is not surprising that the Most Rev. Fr. [Anfossi] who has not had the patience of mastering these astronomical matters, should appear to be incredulous, and that so does the Monsignor Majordomo, who in his memorandum claims to be "convinced of the uncertainty and the great deceptiveness of astronomical science."[816]

Olivieri goes on for many more paragraphs saying much the same, at one point declaring:

> Does the Most Rev. Fr. [Anfossi] think that today Tycho [Brahe] would declare himself against the earth's motion, against the universal persuasion acquired by astronomers more than two centuries after him, now that they believe the system of the earth's motion has been "proved as much as anything physical can be," as Lalande says.[817]

Later he adds:

> Most Rev. Fr. [Anfossi]…let us note that some of the most cogent proofs, such as nutation and the annual aberration of heavenly bodies, had not been discovered at the time of Gassendi…whereas the discovery of aberration and nutation is assigned to 1727….Before stopping this modest writing of mine, I must not be silent about the Msgr. Majordomo's assertion that "one can maintain as a thesis only what is true or what is believed to be incontrovertibly true"….But the fact is that nowadays astronomers really seem to be so convinced of the earth's motion that they "believe it to be incontrovertibly true."….it is certain that nutation, annual aberration, and other data that require more subtlety to be detected are believed to provide a new irresistible argument.[818]

As the history shows, Olivieri is referring to the stellar aberration discoveries of James Bradley in 1727. A close examination of Bradley's and other astronomers' work on this phenomenon reveals that Fr. Anfossi was actually right in saying that Olivieri's alleged evidence was a scientific canard being used to "tell us that what is stated many times by the Holy Spirit is false, but that what their stellar parallax and aberration tell them is true" and that "the best astronomers…do not agree among themselves in regard to these discoveries."[819] Although Olivieri then accuses Fr. Anfossi of "not mentioning anyone" who disagrees with these findings, from our modern perspective the record exonerating Fr. Anfossi is very clear. In volume I of *Galileo Was Wrong: The Church Was Right*, we show the reasons Fr. Anfossi and the Vatican majordomo refused to put the Holy Spirit on trial. Below are the relevant paragraphs.

The Experiments of George Airy and James Bradley

> Twenty years after Fizeau's experiment, George Biddell Airy would perform his own water-tube experiment, which, to his utter surprise, would confirm Arago's results – that Earth was standing still in space. Although Fresnel temporarily saved the world from having to scuttle the Copernican theory, we will see that the nature of Airy's experiment left Einstein with no choice but the

[816] *Ibid*., ¶49.

[817] *Ibid*., ¶53.

[818] *Ibid*., ¶¶55, 66

[819] *Ibid*., ¶49.

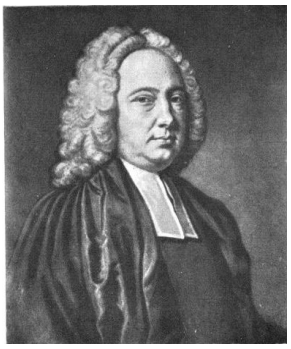
fantastic postulations of Relativity theory to answer Airy's results.

George Airy belonged to the exclusive Astronomer Royal of England. He was a well-respected scientist and had quite a reputation and audience for his endeavors. But Airy was an avowed heliocentrist just as Einstein, so it is not Airy's position as an esteemed scientist for which we make reference to his work, but precisely because of his failure to prove his cherished view of cosmology. Airy was quite certain, at least before he did his experiment, that his water-filled telescope would prove that the Earth revolved around the sun. Hence, he was quite surprised at his "failure."

Here's how "Airy's failure" transpired. Airy knew from Arago that: (1) light's speed was slower in a solid transparent medium than in air; (2) that any movement ascribed to the Earth did not affect the speed of light, and (3) that Fresnel's explanation of Arago's experiment was the glass plate "dragged" the ether and acted independently of ether in the air. Airy, by merely enhancing the procedures of those before him, had the idea of using a source of light outside Earth, namely starlight, and directing it through different mediums to see if the light was affected.

James Bradley and *Gamma Draconis*

Before we see what Airy's experiment did in the battle for whether the Earth was fixed in space, it would be beneficial to know a little of the history about the nature of starlight. As early as 1640 the astronomer Giovanni Pieroni observed that various stars shifted their position in the sky during the year. As we noted earlier, Francesco Rinuccini brought this evidence to Galileo's attention in 1641, but Galileo was unimpressed. Robert Hooke, three decades later, in 1669, noticed the same kind of shifting for one star in particular, named *Gamma Draconis*. Since everyone from the time of Copernicus had been looking for physical evidence of a moving Earth, Hooke actually thought he had discovered the first parallax as proof. Almost another thirty years later (1694), John Flamsteed observed the same kind of shifting in the star Polaris.



Another thirty years later, **James Bradley** (d. 1762) set out to determine whether Hooke's observations were, indeed, a parallax of *Gamma Draconis*. During the years of 1725-1728 he noticed that during the course of a year the star inscribed a small ellipse in its path, almost the same as a parallax would make. In the heliocentric system, parallax is understood as a one-to-one correspondence between Earth's annual revolution and the star's annual ellipse, but Bradley noticed that the star's ellipse was not following this particular pattern.[820]

[820] Parallax, as measured from Earth, is understood as the measure of the apparent movement of a star against more distant stars that do not move. There are about 700 stars in our sky that are close enough to Earth and far enough from background stars in order to form a parallax. In the heliocentric system, which Bradley was using, a star's parallax is measured by using the Earth's orbit. At each point on the Earth's path, a star with parallax will appear on the opposite side of the Earth's orbit in the star's ellipsis. For example, in the heliocentric system, if the Earth is at twelve o'clock in its orbit the star will be at six o'clock in its ellipsis; if Earth is at three o'clock, the star will be at nine o'clock. In stellar aberration, the Earth and the star will not be on opposite sides of their respective ellipses. So, if the Earth is at twelve o'clock in its orbit, the star will also be at twelve o'clock in its ellipsis. Bradley noticed that *Gamma Draconis* was following the stellar aberration pattern, not the parallax pattern, since it was behind the parallax pattern by at least three months. Bradley found a 20.47° angle of aberration. As we will see later, stellar aberration can also be explained by the geocentric model, since in that model the stars are centered on the sun and partake of the sun's annual movement around Earth, and thus stellar aberration will

At this point, astronomical science was still waiting for a confirmed parallax of any star, since no one had ever measured one. A confirmed measurement of parallax would not be made until more than a century later by Friedrich Bessel in 1838. So Bradley, reasoning that *Gamma Draconis* was too far away to register a parallax, found another explanation, and it was rather an ingenious one. He theorized that the star's annual ellipse was being formed because the speed of light was finite.[821] That is, the star wasn't actually moving in the sky; rather, its light, moving at a finite speed, was hitting a moving Earth, an Earth that for six months was moving toward the star, and in the next six months was moving away from the star. While the Earth moved toward the star, the star's light would hit the Earth sooner, but while the Earth moved away, the light would hit it later. Bradley reasoned that, if light's speed was infinite, there would be no such effect, but since it is finite, these back-and-forth movements of the Earth would translate into seeing the star move in an ellipse in the sky over the course of a year. This explanation was a welcome relief for the heliocentric view, since until Bradley, no one, including Galileo who died in 1642, had supplied any real evidence that the Earth could be revolving around the sun.[822] The only "evidence" Galileo's contemporaries provided was that of analogy, that is, because he saw moons revolving around Jupiter through his telescope he conjectured that smaller bodies (such as the Earth) had to revolve around larger bodies (such as the sun). As one author put it, in Galileo's day, "the telescope did not prove the validity of Copernicus' conceptual scheme. But it did provide an immensely effective weapon for the battle. It was not proof, but it was propaganda."[823] Thus, the Arago, Fresnel, Fizeau affair was more or less an interlude until someone would come along and either prove or disprove Bradley's hypothesis.

George Airy

Enter George Airy. As ingenious as Bradley's answer was to the ellipse formed by *Gamma Draconis*, so was Airy's experiment to prove it right or wrong.

occur in exactly the same proportions as in the heliocentric system. Incidentally, Bradley also discovered that *Gamma Draconis* traced out an additional smaller ellipse in the course of 18.6 years. The heliocentric explanation for this ellipse is that the moon, since its orbital precession rotates around Earth once every 18.6 years, is altering the Earth's axial spin (otherwise known as nutation). This explanation fails, however, since it would require each star to have the same 18.6 year ellipse as *Gamma Draconis*. The geocentric explanation for the 18.6 year ellipse is that, as the universe rotates around Earth, a slight uneven mass distribution causes a small precession of the universe of 18.6 years, which is part of a larger precession of 25,800 years (the heliocentric system has a 25,800-year precession of the Earth's axial rotation). These dual precessions, in conjunction with the stars that move within those precessions in a specified elliptical path depending on their distance from Earth, distance from the North Star (Polaris), and their mass, will create a specified ellipse for each star, as seen from Earth.

[821] Up until this time, the only one who had suggested that light had a finite speed was Ole Römer in 1670 as he was observing the variations between two successive eclipses of Io, one of Jupiter's moons. The eclipse is the shortest in duration when, in the heliocentric system, Earth is moving toward Jupiter, and longest in duration when Earth is moving away. As we will see later, this same phenomena can be explained by the geocentric model since in that model, Jupiter, revolving around the sun, is moving toward and away from a fixed Earth in the same proportions as in the heliocentric system.

[822] As one modern astronomer presumptuously concluded: "The discovery of this aberration was the first experimental proof that the earth has a yearly motion and that Copernicus was right" (A. Pannekoek, *A History of Astronomy*, 1961; originally published in 1951 under the Dutch title: *De Groei van ons Wereld*, cited in *The Biblical Astronomer*, Vol. 3, No. 64, 1993).

[823] Thomas Kuhn, *The Copernican Revolution*, 1959, p. 224. Kuhn adds: "The opposition took varied forms. A few of Galileo's more fanatical opponents refused even to look through the new instrument… Others…claimed…they were apparitions caused by the telescope itself. Most of Galileo's opponents behaved more rationally. Like Bellarmine, they agreed that the phenomena were in the sky but denied that they proved Galileo's contentions. In this, of course, they were quite right. Though the telescope argued much, it proved nothing" (*ibid*., p. 226).

Accepting that light's speed was finite, Airy had to figure out some way of determining whether the light from a star was affected by Earth's supposed motion. Whereas Bradley used only one kind of telescope, Airy had the ingenious idea of using a second telescope filled with water.

Since Arago/Fresnel/Fizeau had already shown that light's speed was slowed by glass or water, Airy assumed that if a telescope was filled with water then the starlight coming through the water should be slower than it would be in air, and thus bend the starlight outward toward the upper side of the telescope and away from the eyepiece (just as we see light bent when we put a pencil in water). In order to compensate for the outward bending of the starlight, Airy assumed he would have to tilt his water-filled telescope just a little more toward the lower end of the star so that its light would hit his eyepiece directly rather than hitting the side of the telescope.

We would do the same thing, for example, if we were carrying a drinking glass while we were running through a rainstorm. In order to catch the raindrops so that they hit the bottom and not the side of the drinking glass, we must tilt the drinking glass forward a bit in order to compensate for our running speed. Another example that illustrates this principle rather well is the task of dropping a drop of water into a test tube from an eye-dropper. If the test tube is mounted so that it stands straight up on a rotating disc, and one tries to drop a drop of water into the test tube as it comes around, the drop will invariably hit the inside of the test tube. One must tilt the test tube slightly in the direction of the rotation in order to allow the drop to hit the bottom of the test tube. Light, because it reacts as if it were a substance, moves in a similar fashion to the drop of water (only it moves much faster than rain and eye droppers, and thus the effects are much more subtle).

Although Airy had suspected the outcome prior to the actual experiment, indeed, he soon discovered that he was not required to tilt his water-filled telescope toward the star to any greater degree than his air-filled telescope. These results indicated that Earth wasn't moving, since if there is no additional adjustment necessary for a water-filled telescope toward the direction of the starlight, it means the starlight is coming into both telescopes at the same angle and speed, that is, directly overhead. If Earth were moving, then a water-filled telescope would have to be titled toward the starlight a little more acutely than an air-filled telescope. This is so for two related reasons: (1) in the heliocentric model, the Earth is moving sufficiently against the incidence of distant starlight upon it, and thus the water-filled telescope would not be able to catch all of the starlight in the slower medium of water. It would have to be titled slightly ahead of the air-filled telescope to make up for light's slower speed in water; and (2) since the starlight is coming from outside Earth's ether environment, then one cannot readily explain Airy's failure by saying that the denser medium (*i.e.*, water as opposed to air) carried a higher or lower amount of ether, as Fresnel had claimed. Starlight seemed to be unaffected by the ether, or any medium, since Airy proved that its light was coming to Earth at one specified angle and speed.[824]

[824] George B. Airy, "On a supposed alteration in the amount of astronomical aberration of light produced by

At this juncture we should also mention the fact that Bradley's appeal to a 20.5" arc in the star's movement as being due to a 30 km/sec revolution of the Earth around the sun assumes that the sun is a fixed object. Without taking the sun as fixed, Bradley would not be able to detect any aberration in *Gamma Draconis*. But according to modern cosmology, no object in the sky is fixed, and thus Bradley's theory is nullified on that count alone. Otherwise, the sun is at rest or Relativity is wrong.

As we noted earlier, Arago had already postulated in theory what Airy found by experiment, and he wrote a paper about it in 1839, and thus the science establishment should have anticipated Airy's results.[825] Moreover, Giuseppe Boscovich (1766) and Augustin Fresnel (1818) had already suggested testing Arago's hypothesis by a water-filled telescope. In Airy's experiment, the water-filled telescope would be analogous to Arago's glass plate (or the glass-filled telescope example we offered earlier), since both would make light travel at a slower speed than in air. Fresnel, being a firm believer that the Earth revolved around the sun in an ether medium, explained Arago's results by claiming that the glass plate trapped the ether and thus dragged it and the light, giving the appearance of the bending of light in the glass plate. In fact, it could be said that the plate dragged the ether equal to the Earth's supposed movement around the sun.[826] But it was not easy for Fresnel to explain Airy's failure, because Airy found that, with respect to two different telescopic mediums, there is no additional drag of starlight by the ether surrounding Earth. In other words, if Earth were moving, it would be moving against the ether, and thus the ether wind, as it were, would be expected to push the starlight past the telescope. Airy showed that the ether was not pushing the starlight faster through one medium than the other since both of his telescopes could view the star from the same angle. Fresnel would also not be able to explain Airy's failure if he claimed that the ether is moving with the Earth instead of against the Earth, otherwise he would have no more explanation why, in Arago's case, light is diffracted more in a glass plate than in air. Science was in a bind once again. Unless Airy's experiment could be answered, the world was about to stand still in space, both literally and figuratively.[827]

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the passage of light through a considerable thickness of refracting medium" (Proceedings of the Royal Society, London, 1871, pp. 35-39). As Arthur Miller describes it by means of a diagram: "Consider, in the geocentric system, a water-filled telescope whose line of sight to a star is normal to the direction of the star's velocity relative to the Earth which is $-v/N^2$ (according to Fresnel's hypothesis). The law of sines yields $\sin \delta' = v/cN$). Since the starlight is refracted on entering the water then δ' is not the aberration angle. Using Snel's law to relate v and δ', *i.e.*, $\sin \delta = N \sin \delta'$, we obtain $\sin \delta = v/c$. This derivation is based on the ones of Veltmann (1873), Lorentz (1886) and Drude (1900). The notion of seeking deviations from stellar aberration in air by using a water-filled telescope had been suggested by Boscovich in 1766, and was mentioned by Fresnel (1818), who predicted no change because this experiment was equivalent to Arago's. Airy (1871) carried out the experiment and found no change in the aberration angle" (*Albert Einstein's Special Theory of Relativity*, p. 19).

[825] *Comptes Rendus de l' Académie des Sciences*, 8, 326, 1839.

[826] In other words, the angle of refraction in the glass plate will equal the arc seconds Earth moves in its angular journey around the sun, since both are formed by Earth's movement through the ether. Incidentally, although we emphasize that Fresnel was a "heliocentrist," Arago and Airy were also heliocentrists, and thus "Airy's failure" is a failure for heliocentrism.

[827] *Galileo Was Wrong: The Church Was Right*, vol. I, pp. 129-133. Aware of the acute dilemma for heliocentrism that Airy's experiment presents, an example of how modern science seeks to rationalize its results is noted in the explanation of S. Tolansky on the art of telescope viewing: "If the Fresnel drag coefficient be introduced into the calculation of the aberration, there emerges the fact that the aberration is the same with or without water in the telescope. Thus, conversely, Airy's negative result confirms the validity of the Fresnel coefficient" (*An Introduction to Interferometry*, 1973, p. 98, cited in *De Labore Solis*, p. 35). What Tolansky didn't tell his students is that if the Fresnel coefficient is NOT used for both telescopes, they would both still produce the same aberration, and thus the Fresnel drag becomes superfluous, except for those trying to save the

In Volume I, we then proceed to discuss the Michelson-Morley experiment of 1887, which demonstrated that the Earth was not moving in space, and the subsequent efforts of Albert Einstein to suppress that conclusion by inventing an entirely new physics, Special Relativity. We also discuss stellar parallax and the efforts of various scientists to use it as proof for heliocentrism, the same that Lazzari and Olivieri attempted to do with their respective popes and Sacred Congregations. Hence, as we did against the claims of stellar aberration, we will now quote from Volume I to demonstrate that stellar parallax also provides no proof for heliocentrism.

The Use & Abuse of Stellar Parallax

> Regarding the size and limits of the universe, if there is one cosmological phenomenon that has been consistently advocated as the vindicator of heliocentrism, it is stellar parallax. Science books by the hundreds have declared that Frederich Bessel finally discovered heliocentrism's long-awaited proof when, in 1838, he observed a slight shift in the position of a nearby star (Cygnus 61) against the background of a more distant star. Copernican astronomers continue to praise Bessel, but invariably they do so without either the slightest indication that parallax does not prove heliocentrism or any admission that there is a perfectly good alternative which allows one to interpret parallax from a geocentric perspective. For example, Alan Hirshfeld, writing one of the more recent books on parallax, attempts to convince his reader that parallax is last word of the heliocentric/geocentric debate:
>
> > In Newton's day, the Ptolemaic system and the Keplerian version of the Copernican system were taught side by side in the universities of the world. But the pendulum of belief had swung irreversibly to the Copernican side. In the minds of most scientists, the heliocentric universe had become fact…Yet there remained a crucial missing element in what was otherwise a complete and compelling picture of the universe: *Not one shred of indisputable observational proof existed that the Earth moved through space*. Here then was the holy grail of many an astronomer. To prove that the Earth in fact revolved in a wide orbit around the Sun, the parallax of just one star – any star – had to be detected. The hunt for stellar parallax was on.[828]

Before we get into Hirshfeld's analysis of parallax, we pause to note his revelation concerning how heliocentrism was accepted. Hirshfeld admits that even prior to the discovery of what he deems as "indisputable observational proof," modern science had already accepted heliocentrism as a "fact." One wonders why this glaring anachronism that puts "fact" before "indisputable observational proof" doesn't cause Hirshfeld any concern, but there it is nonetheless. Of course, Hirshfeld's attempt to put fact

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appearances for heliocentrism. As van der Kamp notes, "…the drag coefficient cannot be dragged into court to vindicate Copernicus" (*ibid*., p. 36). Another objection comes from Wolfgang Pauli. With his typical pungency, Pauli wrote in 1958: "The Airy experiment, as seen from the rest system of the observer (Earth), therefore only demonstrates the (relativistically) trivial fact that for a zero angle of incidence (normal incidence) the angle of refraction is zero, too" (Wolfgang Pauli, *Theory of Relativity*, translated by G. Field, 1958, p. 114). Apparently, Einstein did not share the same casualness about Airy that Pauli did. Pauli seems to have both forgotten that neither the "observer" nor the "Earth" are "at rest" in the Copernican system, and that a "zero" value to both incidence and refraction is precisely the reason Airy's experiment is so important, since, given the same incidence of starlight in both telescopes, only the velocity of the Earth would have made the starlight hit the side of the telescope. Moreover, it would be rather difficult for Relativity to explain stellar aberration on the basis of the limited speed of light, since without ether, Relativity must understand light as a scalar phenomenon (*i.e.*, it has a speed but no definite direction, and thus the speed is everywhere the same), not a vector (*i.e.*, a definite speed in a definite direction). As such, Relativity will see the star rotate rather then exhibit an aberration.

[828] Alan Hirshfeld, *The Race to Measure the Cosmos*, 2001, p. 47, emphasis added.

before proof will become even more egregious when we show that not even parallax offers the "indisputable observational proof" that he is seeking. If Hirshfeld is ignorant of the inability of parallax to prove heliocentrism, then it shows how badly he and the modern scientific community he represents are out of touch with reality. In effect, Hirshfeld's anachronism gives us a clear example of the underlying bias in the Copernican establishment, for it demonstrates quite handily that it was not by any fact of science that heliocentrism reached acceptance, but only because "most scientists" had already made up their minds based on little more than their philosophical preferences.

How Parallax Measures Distance

First, we will investigate a little history about parallax measurements. Parallaxes have been measured for thousands of stars. For only about 700 stars, however, are the parallaxes large enough to be measured with a precision of 10 percent or better. Of those 700 stars, most of the ones within 20 parsecs from Earth are invisible to the unaided eye and are intrinsically less luminous than our sun. The vast majority of all known stars are too distant for their parallaxes to be measured, so that scientists must resort to non-empirical methods. Most of these methods are either statistical or indirect.[829]

With the advent of the Hipparcos satellite launched in 1989 by the European Space Agency, its telescopes gathered 3.5 years worth of data on stellar positions and magnitudes, which were eventually published in 1997. Viewing the stars through two telescopes 58 degrees apart, Hipparcos measured the parallax of 118,000 selected stars within an accuracy of 0.001 seconds of arc. This accuracy is comparable to viewing a baseball in Los Angeles from a telescope in New York. Another mission, named Tycho (after Tycho de Brahe) measured the parallax of a million stars, but only to an accuracy of 0.01 seconds of arc.

As accurate as these measurements appear to be, the reality is, beyond 100 light years, it is hardly possible to measure an accurate parallax. Even within 20 light-years, parallax measurements are accurate only to within one light-year. At 50 light-years from Earth the error could be as high as 5-10 light-years in distance. All in all, within a 10% margin of error, Hipparcos measured the parallaxes of about 28,000 stars of up to 300 light-years from Earth. For any star beyond 300 light years, scientists are forced to estimate its distance from Earth by other means, none of which are proven methods of measurement (*e.g.*, redshift).[830]

[829] George Abell, *Exploration of the Universe*, 1969, pp. 377-378.

[830] Other methods of determining parallax include: Photometric parallaxes, which are found by estimating a star's absolute magnitude (M) based on a spectral classification, and comparing that with its apparent magnitude (m). Statistical parallaxes could perhaps extend to 500 parsecs, but this only applies to groups of stars, not individual stars. Overall, of the half dozen or so methods employed today to measure astral distances, none of them are indisputable (including distances measured by redshift, Cepheid variables, luminosity, color of stars, etc.). There is only one purely empirical method, parallax (and its attendant modifications such as Spectroscopic, Moving Cluster Method, and Statistical Method), but it is quite limited in its applicability, since it can accurately measure only a thousand or so stars. In effect, modern science is left without an irrefutable means to measure cosmological distances, and thus all the literature espousing that stars, galaxies or quasars are billions of light years away from Earth is an unproven scientific assertion. Using Cepheid variables, for example, is certainly a question-begging venture, since Cepheids are too far away to be measured by parallax and, thus, depends on an unproven statistical method to measure distance. Other methods such as Secular Parallax, Expansion Parallax, Kinematic Distance, Light Echo Distance, Baade-Wesselink Method, Expanding Photosphere Method, Main Sequence Fitting, RR Lyrae Distance and about a dozen or so other methods have been proposed for measuring star distances, each with their own problems and uncertainties, and all of which makes one reflect on the veracity of Jeremiah 31:37: "Thus says the Lord: "If the heavens above can be measured, and the foundations of the earth below can be explored, then I will cast off all the descendants of Israel for all that they have done, says the Lord."

To understand how parallax is formed, in front of your face, place your finger from your right hand at arms length and align it with a finger from your left hand at half an arm's length. Observe your fingers first with your right eye open and then with your left eye open. As you switch your vision from one eye to the other, the nearer finger will appear to shift to the right.

In the heliocentric system, parallax is said to occur when, on one side of the Earth's orbit, say January 1, two stars are viewed at the same time in a telescope, one star near us and the other star far away (at least by conventional means to measure star distances). Let's say that the two stars we view on January 1 are aligned vertically in the same plane, that is, one star is at a higher position in our telescope lens than the other but both are on the same vertical line. Six months pass and we look at the same two stars on July 1. If parallax is demonstrated, we will see that the stars are not in a vertical alignment any longer. Assuming the Earth has orbited in a counterclockwise direction, the nearer star appears to have shifted to the right. This is due to the fact that, in the interval of six months, one has looked at the two stars from two separate locations that are 185 million miles apart (the diameter of the Earth's orbit). Since astronomers can now detect stellar parallax among a select few stars, they are predisposed to allowing the Copernican worldview to interpret the phenomenon as proof for the Earth's movement around the sun.

What most people do not know (and what most scientists keep from them) is that in the geocentric system the same optical phenomenon can be demonstrated. In the geocentric system, the stars are centered on the sun, (which is also true in the heliocentric system). The only difference, of course, is that in the geocentric system the Earth is fixed in space while the sun and stars revolve counterclockwise around the Earth. On January 1 we will notice that the two stars from our above example are in vertical alignment. When we look at these same two stars again on July 1 as the sun and stars have traveled halfway across the sky, the nearer star will appear to have shifted to the right of the farther star, at the same precise angle as in the heliocentric model. (To see animation of parallax from both a heliocentric and geocentric system, go to the menu button on the compact disc).

This equivalence of the geocentric parallax to the heliocentric parallax is nothing out of the ordinary. Based on geometrical reciprocity, the two systems must be equal on all counts. The only difference is that in the heliocentric model the Earth is moving and the stars are fixed, while in the geocentric model the Earth is fixed and the stars are moving. What is out of the ordinary, however, is that the natural equivalence between the two systems has been systematically suppressed out of almost every science book written since the days of Newton, yet it is as simple and natural as the symmetry between one's right hand and left hand. By the mere fact of the equivalence, parallax does not prove heliocentrism. It only proves that there is an annual shift between the Earth and the stars. Rather, history shows that the phenomenon of parallax only proves there has been a rush to judgment in favor of heliocentrism that was based on nothing more than preference, not scientific fact.

More Detail on the 1820-1822 Decisions

In light of these scientific facts, and the overriding concern expressed by Fr. Anfossi that "these gentlemen…try to tell us that what is stated many times by the Holy Spirit is false, but that what their stellar parallax and aberration tell them is true," we need to examine more closely the precise wording that was employed by the 1820 and 1822 decisions. There were two decisions because Fr. Anfossi protested the first issued on August 16, 1820, and thus a second one was issued in 1822 to which Fr. Anfossi acceded. The first states:

> Concerning the request of the Professor Giacomo Settele…for permission to print his work on the doctrine of the mobility of the earth, denied to him by the Master of the Sacred Apostolic Palace…it is ordered

> that someone of the consultors write on the posture to be taken in this matter so as to safeguard the good name of the Holy See decreed according to the opinion of the Father Consultor [Antonio Maria Grandi] who had written: "There is nothing contrary to the fact that one might defend the opinion of Copernicus on the motion of the earth in the manner in which today it is usually defended by Catholic authors; and as to the meaning [of this decision]: it means that it be suggested to the Most Reverend Master of the Sacred Apostolic Palace [Fr. Anfossi] that he not prevent the printing of the *Elements* [*of Astronomy*] of the canon Giuseppe Settele; and then that it be suggested to Settele to insert in the said work some things whereby he shows that the Copernican opinion, as it is presently defended, is no longer subject to those difficulties to which it was liable in times gone by, before the observations which were subsequently completed.[831]

The second, issued on September 11, 1822, states:

> The most excellent [cardinals] have decreed that there must be no denial, by the present or by future Masters of the Sacred Apostolic Palace, of permission to print and to publish works which treat of the mobility of the earth and of the immobility of the sun, according to the common opinion of modern astronomers, as long as there are no other contrary indications, on the basis of the decrees of the Sacred Congregation of the Index of 1757 and of this Supreme [Holy Office] of 1820; and that those who would show themselves to be reluctant or would disobey, should be forced under punishments at the choice of [this] Sacred Congregation, with derogation of [their] claimed privileges, where necessary.[832]

In analyzing the 1820 and 1822 decrees more closely, we will see many interesting twists and turns. Note the following:

1) Although the Settele affair began with the assertion from Settele that his book spoke of heliocentrism as a thesis and not as a hypothesis, there is no specific recognition of that fact from the Congregation of the Index. The Congregation refers only to "his work on the doctrine of the mobility of the earth." Neither is there a statement from the Congregation that future books which present heliocentrism as a thesis or fact can be published. The first decree refers only to "the manner in which today it is usually defended by Catholic authors," but does not specify that these authors were treating heliocentrism as a thesis or fact. Since, as we have noted previously by the disclaimer of Le Seur and Jacquier against Newton's heliocentrism as late

[831] *Le Opere di Galileo Galilei*, vol. 19, p. 420, as translated by Fantoli's *Galileo: For Copernicanism and for the Church*, pp. 520, 498. Latin is: "Feria IV. Die 16 Augusti 1820. Circa petitionem Professoris Iacobi Settele, a SS.mo remissam huic S. Congregationi, pro permissione impressionis sui operis super doctrina mobilitatis terrae, sibi denegata a P. M. S. Palatii Apostolici…rescriptum fuit quod scribat aliquis ex DD. Consultoribus circa temperamentum hac in re sumendum ad tuendam decentiam S. Sedis, lecto voto R. P. M. Antonii Mariae Grandi, E.mi DD. Decreverunt iuxta votum P. Consultoris qui scripsit, nempe: « Nihil obstare, quominus defendi posit sentential Copernici de motu telluris eo modo quo nun cab auctoribus Catholicis defendi solet; et ad mentem: Et mens est, ut insinuetur R.mo P. Magistro Sacri Palatii Apostolici ne impediat editionem Elementorum Canonici Iosephi Settele; Canonico autem Settele insinuetur ut ipso in opere nonnulla inserat, quibus ostendat, sententiam Copernicanam, ut modo defenditur, non amplius iis difficultatibus esse obnoxiam, quibus, ante posteriora observata, antiquis temporibus implicabatur »" (*Galileo E L'Inquisizione*, pp. 30-31).

[832] *Le Opere di Galileo Galilei*, vol. 19, p. 421, as translated by Fantoli's *Galileo: For Copernicanism and for the Church*, p. 498. Latin is: "Feria IV. Die 11 Septembris 1822. E.mi DD. Decreverunt, non esse a praesenti et futuris pro tempore Magistris Sacri Palatii Apostolici recusandam licentiam pro impression et publication operum tractantium de mobilitate terrae et immobilitate solis iuxta communem modernorum astronomorum opinionem, dummodo nihil aliud obstet, ad formam Decretorum Sacrae Congregationis Indicis anni 1757, et huius Supremae anni 1820; reluctantes et inobedientes, praevia, quatenus opus sit, derogatione praetensorum privilegiorum, coercendos esse poenis arbitrio S. Contregationis. Et Praesens Decretum communicetur tum E.mo Urbis Vicario, tum E.mo Praefecto S. Congregationis Indicis, tum P. M.ro Sacri Palatii Apostolici. F. Turriozzi Ass." (*Galileo E L'Inquisizione*, p. 31).

as 1833, at this time in history there obviously existed official defenders of the Earth's immobility. The second decree refers to future publications as "works which treat[833] of the mobility of the earth," not those which will regard the mobility of the Earth as a thesis or fact.

2) Copernicanism is never referred to as a fact or thesis but only as an "opinion" (*e.g*., "the opinion of Copernicus," and "the Copernican opinion," cited in the first decree). Additionally, in the second decree, the heliocentric cosmology then advocated by various scientists is never referred to as a fact or thesis, but only as an "opinion" (*e.g*., "the common opinion of modern astronomers"). An opinion is not a fact or thesis. It is closer to a hypothesis or a theory. As such, the Congregation of the Index seems to be saying that, as an official institution of the Catholic Church, it is not, and will not, advocate heliocentrism as a scientific fact, but if a Catholic author desires to formulate arguments to the contrary he may do so, and, of course, he does so at his own risk. As such, the permission to print Settele's book is never said to be granted on the basis that the Index recognizes it as a fact or thesis, but only as the "Copernican opinion, as it is presently defended…" Since both Copernicus' and "modern astronomers'" treatment of heliocentrism is nothing more than their respective opinions, then obviously Settele's advocacy of heliocentrism cannot be considered any more than an opinion, regardless of whether he, himself, believes it to be a thesis or fact.

3) Amazingly enough, the first decree relies on Olivieri's dubious argument that the 1616-1633 decrees against heliocentrism are now obsolete because Copernicus and Galileo claimed the sun was motionless and did not use elliptical orbits for the planets. Yet the second decree fails to recognize that very distinction since it mistakenly refers to the "common opinion of modern astronomers" as holding to the "immobility of the sun." It appears in this case that the left hand does not know what the right hand is doing. Be that as it may, we noted earlier that neither a moving sun nor elliptical orbits prove heliocentrism. Hence, the fact that the Congregation of the Index, being led by Olivieri as its Commissary General, was persuaded to base its decision on Olivieri's concocted analysis of the 1616 and 1633 decrees, exposes the dubious nature of the whole proceeding.

4) From the first decree it is apparent that one of the primary concerns of the "Holy See" is that its "good name" is "safeguarded." Although it is admirable for the accused to preserve its good reputation in the face of unproven allegations, it seems that the pressure from the world to accept heliocentrism may have unduly forced the Congregation of the Index to accept Olivieri's specious argumentation in order to dismiss the 1616-1633 decrees. To borrow a contemporary phrase, it was the 'politically correct' way of dealing with the problem.[834]

5) The first decree excuses Settele based on the assumption that science has demonstrated heliocentrism by "observations which were subsequently completed" (*e.g*., the observations of stellar aberration and stellar parallax). As we noted, however, modern astronomy, long after the limited knowledge of Settele, Olivieri, Newton and Kepler, reveals that neither stellar aberration nor stellar parallax proves heliocentric cosmology, since both phenomena can be explained quite adequately from the geocentric system. Fortunately, the conditional basis for providing imprimaturs to books which advocate the heliocentric system was added to the Congregation's Index when it said in the 1822 decree that it recognized the possibility that among "modern astronomers" there may be

[833] Latin: *tractantium*, meaning treat, discuss, handle, or manage.

[834] Some Galileo historians, who are themselves heliocentrists, applaud Olivieri's invented arguments as "the definitive solution to the Galileo case," as is advanced by Walter Brandmüller in *Galileo e la Chiesa ossia il diritto ad errare*, 1992, p. 184. Fantoli disagrees, saying, "I am not able to share in any way his [Brandmüller's] final judgment…." (*Galileo: For Copernicanism and for the Church*, p. 521). Finocchiaro makes a noteworthy point that Olivieri was forced to this *ad hoc* solution because both he and Anfossi understood the 1616 and 1633 "decrees were unrevisable, since the earth's motion had been condemned once, there could not be another decree withdrawing or revising the first" (*Retyring Galileo*, p. 220).

"contrary indications" which would forestall the permission to publish heliocentric works. Since modern science has since shown that the cosmological presumptions of Olivieri were wrong, the Church possesses the "contrary indications" upon which to rescind any imprimatur previously given to a book advocating heliocentrsim.

Conclusion from the Settele Affair

All in all, we can posit that, with the fallacious arguments that Olivieri submitted in his Summation, the Congregation of the Index was grossly ill-advised when it came time to deciding whether to grant an imprimatur to Canon Settele. Under such duress and false information, the whole affair is tainted from start to finish. Olivieri may have been successful in obtaining an imprimatur for Settele, still, this did not mean that the Church's condemnation of heliocentrism had been rescinded. Imprimaturs given to private books have no authority in overturning Congregational decrees approved by supreme pontiffs and/or facilitated by a canonical trial, as was the case in 1633. In face of the fact that the permission initially given to Galileo's *Dialogo* was later rescinded by the 1633 magisterium because it found the imprimatur was issued under false pretenses, makes the Settele imprimatur more an anomaly than a precedent. In addition, Copernicus, Zúñiga, Foscarini, Kepler, and Galileo remained on the Index and not even a motion was entertained in 1820-22 to remove them. Hence, the Settele affair proved only one thing, namely, that a high-placed cleric could convince his peers with pretentious scientific claims that neither he nor they could prove since the science of cosmology was still in its infancy. As we noted in the case of Bradley versus Airy, science would not mature nearly enough to shed sufficient light on Olivieri's claims until long after he and his contemporaries had died. And when it shed its light, it would show that Olivieri's claims were fallacious.

As for Pius VII's role in the Settele affair, although there are various accounts that, after receiving Olivieri's report, he helped smooth the pathway for Settele to obtain the imprimatur, there is no document existing containing a quote directly from Pius VII endorsing either Settele or heliocentrism.[835]

The 1835 Index of Pope Gregory XVI

The next significant event occurred in 1835 when, under the reign of Pope Gregory XVI, Copernicus, Galileo, *et al*. were removed from the *Index*. In this case also there is much suspect activity. We noted earlier that the decision to remove their names was made under false pretenses. Two bogus scientific claims were used to influence Catholic authorities. The first was the fallacious claim that stellar parallax had proven heliocentrism; and the second was that science had discovered a case of stellar parallax one hundred years earlier. In reality, stellar parallax had not been truly discovered until three years after the Index under Gregory XVI removed Copernicus and Galileo's names.[836]

[835] After giving the history of the evidence submitted by both Settele and Olivieri to Pius VII in favor of Settele; and the evidence against Settele submitted by Anfossi and the Vatican majordomo, the best Finocchiaro can conclude is: "On December 14 [1820], the Inquisition cardinals agreed that the imprimatur would be given by the vicar apostolic, and the pope approved the decision" (*Retrying Galileo*, p. 197, citing "Brandmüller and Greipl 1992, pp. 93-93, 396" as his source but without a direct quote from them), and "On September 25 [1822], Pope Pius VII ratified the Inquisition's decision to permit works teaching the earth's motion" (*Retrying Galileo*, pp. 197-198, citing Favaro's, *Le Opere di Galileo Galilei*, vol. 19, p. 421 and Brandmüller and Greipl 1992, p. 429, but again without a direct quote from Pius VII from either source). Fantoli states: "This decree [of Sept. 11, 1822] was approved two weeks later by Pope Pius VII" (*Galileo: For Copernicanism and for the Church*, p. 499). Favaro's citation of the "approval" has one short sentence signed not by Pius VII but by the Assessor, monsignor F. Turriozzi: "SS.mus D. N. D. Pius divina providential PP. Septimus, in solita audientia mihi infrascripto Assessori S. Officii impertita, supradictum Decretum approbavit, et exequi mandavit. F. Turriozzi Ass.," which translates: "During the accustomed audience granted to me [F. Turriozzi], the undersigned Assessor of the Holy Office, Our Most Holy Lord Pius the Seventh, by divine Providence pope, approved the above decree and ordered it to be executed" (*Galileo E L'Inquisizione*, p. 31). There is no document, however, that contains an exact quote of Pius VII's approval, nor has a signature of Pius VII been produced for decisions that are said to be "ratified" by him.

[836] See the earlier analysis in Volume 2 of *Galileo Was Wrong: The Church Was Right* of the 1992 papal speech of John Paul II to the Pontifical Academy of Science for information on the influence of the claims of stellar parallax on the Index of Gregory XVI.

There is more detailed information regarding the 1835 Index that will help in understanding the subterfuge that was taking place. After Settele was granted his imprimatur, in October 1822 Olivieri published his reasons why Copernicus, Zúñiga, Foscarini, Kepler, and Galileo were kept on the Index. In November, the Inquisition asked him to answer various questions regarding his thesis. In December, the Inquisition discussed Olivieri's answers with the help of two other experts, B. Garofalo and Bartolomeo Capellari. Although there are no historical records with the results of that discussion, we can assume that Capellari carried them in his mind when he became pope in 1831 as Gregory XVI.[837] Two years after he was elected, on May 20, 1833, apparently on little more than Olivieri's dubious argumentation presented at the December 1822 meeting,[838] **Gregory XVI** decided that the new Index would omit the books of Copernicus, Zúñiga, Foscarini, Kepler, and Galileo. This decision was made in the face of such incidents as astronomer Giuseppe Piazzi declaring in 1827 that "the Copernican system was not as certain and well demonstrated as commonly believed,"[839] and Le Seur and Jacquier's continuing *Declaratio* on Newton's *Principia* in the Glasgow edition of 1833, which read "…But we profess obedience to the decrees made by the Supreme Pontiffs against the movement of the earth."[840]

In analyzing more closely the situation under Gregory XVI, we discover that his permission to remove Copernicus, *et al*. from the Index was based on three irregular criteria: (a) unproven scientific claims; (b) an alteration of the historical record of 1616 and 1633; and (c) a removing of Galileo's name without first rescinding the sentence of his 1633 trial.

First, regarding the unproven scientific claims, we have presented detailed evidence demonstrating that, although in Gregory XVI's reign it was firmly believed that stellar aberration and stellar parallax proved the Earth was moving, it has since been discovered that neither phenomena present any proof at all. Both can be easily explained from a geocentric model. To put this in layman's terms, we quote from a popular book on modern cosmology:

> Schoolchildren learn that we live on a planet that revolves on its axis and orbits the Sun, that Nicolaus Copernicus introduced this controversial idea in the sixteenth century, and that some men were persecuted for believing it. But in the end…"all settled"…case closed….Yet our own contemporary science backs away and tells us that when it comes to proving what moves and what doesn't, and whether or not there is an unmoving "center," no one can make an airtight case that any answer is right or wrong. Pick what you will, the Moon, Mars, the Sun, the Earth, your great aunt's dining table – the options are infinite – and it's possible to come up with that as the unmoving center. In fact you are being parochial if you limit the exercise to our planetary system. It is

[837] Prior to Gregory XVI were Leo XII (1823-1829) and Pius VIII (1829-1830), but they did not address any of the cosmological issues.

[838] Finocchiaro notes that since Olivieri accepted the plea of Anfossi that the 1616 and 1633 decrees were "unrevisable" rather than "infallible," "it was dealing with a more manageable concept…it seemed to presuppose that there was a papal decree against the earth's motion, and so Olivieri's criterion for a papal decree seems less stringent than those prevailing today" (*Retrying Galileo*, p. 220).

[839] As noted by Finocchiaro in *Retrying Galileo*, p. 198, as cited from Settele's diary, op. cit., p. 421.

[840] Original Latin: "DECLARATIO....Cæterum latis a summis Pontificibus contra Telluris motum Decretis nos obsequi profitemur." Above translation taken from Rev. William W. Roberts in *The Pontifical Decrees Against the Doctrine of the Earth's Movement*, p. 53.

> possible to describe the entire universe using any chosen point as the unmoving center – the Earth will do very well – and no one can prove that choice is wrong….Scientists today [merely] prefer to picture everything in motion and nothing as being the center….[but] no one can prove that the Earth moves.[841]

As the scientific philosopher Paul Feyerabend puts it:

> …Galileo's utterances are indeed arguments in appearance only. For Galileo uses propaganda. He uses psychological tricks….This is the essence of Galileo's trickery! As a result, the clash between Copernicus and…ourselves…dissolves into thin air, and we finally realize "that all terrestrial events from which it is ordinarily held that the earth stands still and the sun and the fixed stars are moving would necessarily appear just the same to us if the earth moved and the other stood still."[842]

Second, regarding Olivieri's argument that Copernicus and Galileo were rejected merely because they presented flawed heliocentric models that did not include elliptical orbits of the planets, or that they understood the sun to be motionless, is simply a malicious distortion of the historical record. In no instance of the over 7000 documents of the Galileo affair from the seventeenth century is there any mention of such a criteria for condemning either Copernicus or Galileo. There existed only one basic issue in the trial of Galileo, namely, Galileo's insistence that the Earth revolved around the sun. The magaisterium answered this in two parts. It condemned the assertion that the sun did not revolve around the Earth as "formally heretical," and it condemned the assertion that the Earth was not motionless in space as "erroneous in faith." It would have made no difference if Galileo had believed the Earth moved in an ellipse or a circle. All such motion was condemned because the Congregation of the Index declared, of the two bodies, the sun moved and the Earth did not. Hence, Olivieri's deliberate attempt to confuse the issue by inserting the red herring of elliptical orbits is one of the most deceptive pieces of propaganda ever foisted on the Catholic Church.

Third, there exists, however, an even more egregious commission of fault on the part of Gregory XVI's Index. Earlier we learned of the incident that occurred in 1765 when French astronomer Joseph Lalande sought to have Galileo's name removed from the Index. He was told by the head of the Congregation of the Index that no such removal was possible until the sentence given to Galileo at the trial of 1633 was formally and officially rescinded.[843] The importance of this canonical protocol cannot be underestimated. If there is no legal exoneration of Galileo, then, according to canon law, Galileo and his heliocentric theory remain condemned to this very day, and thus, the removal of Galileo's name from the 1835 Index was both premature and inconsequential. Since the Church, to this very day, has not initiated any official, formal or legal rescission of either the condemnation against heliocentrism or against Galileo personally, both remain in force, regardless of whether his name was taken off the 1835 Index. An Index can revise an Index, but an Index cannot

[841] Kitty Ferguson, *Measuring the Universe*, pp. 34-35. Even as late as 1941, the president of the Pontifical Academy of Sciences, Agostino Gemelli, gave a speech to the members stating: "…although Galileo did not provide a decisive demonstration of Copernicanism, neither did Newton, Bradley, or Foucault" (cited by Finocchiaro in *Retrying Galileo*, p. 278).

[842] Paul Feyerabend, *Against Method*, pp. 65, 68, the quote coming from Galileo's *Dialogo*, p. 416. Later Feyerabend adds: "And [you] will perhaps see the merits of a different view which asserts that, while the pre-Copernican [Ptolemaic] astronomy was in trouble (was confronted by a series of refuting instances and implausibilities), the Copernican theory was in even greater trouble (was confronted by even more drastic refuting instances and implausibilities); but that being in harmony with still further inadequate theories it gained strength, and was retained, the refutations being made ineffective by *ad hoc* hypotheses and clever techniques of persuasion. This would seem to be a much more adequate description of the developments at the time of Galileo than is offered by almost all alternative accounts" (*Against Method*, p. 105).

[843] As stated verbatim by Finocchiaro in *Retrying Galileo*, p. 154, with citation to Lalande's 1764 work, *Astronomie*, second edition, vol. 1, pp. 536-41, ¶¶ 1103-4. Also cited in Karl Gebler's *Galileo and the Roman Curia*, 1879, p. 313, and Walter Brandmüller's *Galilei e la Chiesa, ossia il diritto di errare*, 1992, p. 162.

reverse or revise the results of a canonical trial. The only thing accomplished by removing Galileo's name from the Index while keeping the results of his trial in force is the creation of a glaring contradiction in the ecclesiastical record.

In the end, since the 1633 trial both condemned the heliocentric theory as "formally heretical" and Galileo as being "vehemently suspect" of that formal heresy, it is not only Galileo who was condemned, but the heliocentric theory itself, and it remains in force until legally abrogated by the Church. We can now understand why John Paul II's reinvestigation into the Galileo affair did not seek to overturn the decision of Galileo's trial or even rehabilitate Galileo, but to "rethink" what happened. Legally speaking, everything remains as it was in 1633.[844] As Cardinal Casaroli, the Vatican Secretary of State, said by orders of John Paul II to the Galileo commission on July 3, 1981:

> The aim of the various groups should be to rethink the whole Galileo question, with complete fidelity to historically documented facts and in conformity to the doctrine and culture of the time, and to recognize honestly, in the spirit of the Second Vatican Council and of the quoted speech of John Paul II, rights and wrongs from whatever side they come. This is not to be the review of a trial or a rehabilitation, but a serene and objectively founded reflection, in the context of today's historical-cultural epoch.[845]

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1850: The Vatican Supports the 1633 Condemnation of Galileo

In 1850, Marino Marini, Prefect of the Vatican Secret Archives, was commissioned by the Vatican to write an updated apologetic work on the Galileo affair. The book's title was *Galileo e l'Inquisizione* ("Galileo and the Inquisition") and was published by the press of the Sacred Congregation for the Propagation of the Faith in Rome. Marini's purpose was to demonstrate that the Catholic Church had saved Europe from heresy and that the Inquisition's punishment of Galileo, which most assuredly did not include torture, was mild compared to what Protestant churches and state courts were known to do against rebels. Marini concludes that the Inquisition handled the trial of Galileo in "justice, wisdom and moderation," and that "we must affirm that perhaps there has never been a judicial action as just and as wise as this one."[846] Marini paid special attention to the meetings that the Tuscan ambassador, Francesco Niccolini, had with Pope Urban VIII in 1632, in which the pope stressed the importance of silencing Galileo, and which papal resolve was reported to Duke Cosimo II, and from which Urban VIII implored Cosimo's help in curtailing Galileo's cosmological heresies.

The Encyclical of Pope Leo XIII

The encyclical of Pope Leo XIII, *Providentissimus Deus* ("The Providence of God"), contains a polite gesture toward the claims of science, yet without any official or formal concession to its specific propositions. The encyclical is subtitled: "On the Study of Sacred Scripture." Here Pope Leo reiterated the principles of Catholic hermeneutics that had been in practice for more than a millennia and a half, yet he did not mention anything about Galileo or any other related issue concerning the cosmological controversies of the 16th and 17th centuries. In fact, although Leo XIII's encyclical is often cited to support the heliocentric position, *Providentissimus Deus* is actually one of the Church's strongest statements on the literal interpretation of Scripture and the cautions that need to be exercised against the claims of modern science. We will quote and analyze these portions of his encyclical below. The more

[844] Recently, Pope Benedict XVI demonstrated the legal power that previous canonical decisions possess when he said this about the 1962 missal for the Mass: "As for the use of the 1962 missal as a forma extraordinaria of the liturgy of the Mass, I would like to draw attention to the fact that this missal was never juridically abrogated and, consequently, in principle, was always permitted. Article 1: …It is, therefore, permissible to celebrate the Sacrifice of the Mass following the typical edition of the Roman Missal promulgated by Bl. John XXIII in 1962 and never abrogated, as an extraordinary form of the Liturgy of the Church" (Motu Proprio: *Summorum pontificum*, July 7, 2007).

[845] Quoted from Casaroli, as translated by M. Segre in "Light on the Galileo Case?" in *Isis* 88, pp. 500-501, as cited in *Retrying Galileo*, p. 344.

[846] *Galileo e l'Inquisizione*, p. 141, as cited in *Retrying Galileo*, p. 230.

significant statements have been underlined for emphasis:

> 17. ….There has arisen, to the great detriment of religion, an inept method, dignified by the name of the "higher criticism," which pretends to judge of the origin, integrity and authority of each Book from internal indications alone. It is clear, on the other hand, that in historical questions, such as the origin and the handing down of writings, the witness of history is of primary importance, and that historical investigation should be made with the utmost care; and that in this matter internal evidence is seldom of great value, except as confirmation. To look upon it in any other light will be to open the door to many evil consequences. It will make the enemies of religion much more bold and confident in attacking and mangling the Sacred Books; and this vaunted "higher criticism" will resolve itself into the reflection of the bias and the prejudice of the critics. It will not throw on the Scripture the light which is sought, or prove of any advantage to doctrine; it will only give rise to disagreement and dissension, those sure notes of error, which the critics in question so plentifully exhibit in their own persons; and seeing that most of them are tainted with false philosophy and rationalism, it must lead to the elimination from the sacred writings of all prophecy and miracle, and of everything else that is outside the natural order.
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> 18. In the second place, we have to contend against those who, making an evil use of physical science, minutely scrutinize the Sacred Book in order to detect the writers in a mistake, and to take occasion to vilify its contents. Attacks of this kind, bearing as they do on matters of sensible experience, are peculiarly dangerous to the masses, and also to the young who are beginning their literary studies; for the young, if they lose their reverence for the Holy Scripture on one or more points, are easily led to give up believing in it altogether. It need not be pointed out how the nature of science, just as it is so admirably adapted to show forth the glory of the Great Creator, provided it be taught as it should be, so if it be perversely imparted to the youthful intelligence, it may prove most fatal in destroying the principles of true philosophy and in the corruption of morality. Hence to the Professor of Sacred Scripture a knowledge of natural science will be of very great assistance in detecting such attacks on the Sacred Books, and in refuting them. There can never, indeed, be any real discrepancy between the theologian and the physicist, as long as each confines himself within his own lines, and both are careful, as St. Augustine warns us, "not to make rash assertions, or to assert what is not known as known." If dissension should arise between them, here is the rule also laid down by St. Augustine, for the theologian: "Whatever they can really demonstrate to be true of physical nature, we must show to be capable of reconciliation with our Scriptures; and whatever they assert in their treatises which is contrary to these Scriptures of ours, that is to Catholic faith, we must either prove it as well as we can to be entirely false, or at all events we must, without the smallest hesitation, believe it to be so."

Analysis: In the next few sentences, Leo XIII speaks about the language of Scripture. This is the section to which those advocating a heliocentric model of the universe often appeal, but we will see that the pope says nothing about cosmology or the application of his hermeneutical principles to the specific question of how we are to understand the revolutions of the celestial bodies. As we noted earlier in our rebuttal of Galileo's claim for figurative interpretation, such instances are naturally applied to the anthropomorphic passages in Scripture (*i.e.*, those that give human body parts to God), or to various figures of speech that are commonly used in all cultures, both ancient and modern. The pope states:

> To understand how just is the rule here formulated we must remember, first, that the sacred writers, or to speak more accurately, the Holy Ghost "Who spoke by them, did not intend to teach men these things (that is to say, the essential nature of the things of the visible universe), things in no way profitable unto salvation." Hence

they did not seek to penetrate the secrets of nature, but rather described and dealt with things in more or less figurative language, or in terms which were commonly used at the time and which in many instances are in daily use at this day, even by the most eminent men of science. Ordinary speech primarily and properly describes what comes under the senses; and somewhat in the same way the sacred writers – as the Angelic Doctor also reminds us – "went by what sensibly appeared," or put down what God, speaking to men, signified, in the way men could understand and were accustomed to.

19. The unshrinking defense of the Holy Scripture, however, does not require that we should equally uphold all the opinions which each of the Fathers or the more recent interpreters have put forth in explaining it; for it may be that, in commenting on passages where physical matters occur, they have sometimes expressed the ideas of their own times, and thus made statements which in these days have been abandoned as incorrect. Hence, in their interpretations, we must carefully note what they lay down as belonging to faith, or as intimately connected with faith – what they are unanimous in. For "in those things which do not come under the obligation of faith, the Saints were at liberty to hold divergent opinions, just as we ourselves are," according to the saying of St. Thomas. And in another place he says most admirably: "When philosophers are agreed upon a point, and it is not contrary to our faith, it is safer, in my opinion, neither to lay down such a point as a dogma of faith, even though it is perhaps so presented by the philosophers, nor to reject it as against faith, lest we thus give to the wise of this world an occasion of despising our faith." The Catholic interpreter, although he should show that those facts of natural science which investigators affirm to be now quite certain are not contrary to the Scripture rightly explained, must nevertheless always bear in mind, that much which has been held and proved as certain has afterwards been called in question and rejected. And if writers on physics travel outside the boundaries of their own branch, and carry their erroneous teaching into the domain of philosophy, let them be handed over to philosophers for refutation.

Analysis: Although it is said that the Fathers sometimes expressed things in the ideas of their own times, Leo XIII does not give any specific examples, and thus there is no direct support for interpreting Earth-sun passages in a non-literal fashion. In fact, it goes without saying that the Fathers would speak from their own culture and use their idiomatic vocabulary since none of them would have known the culture or the idioms of the future. In addition, Leo's remarks about "things belonging to the faith…what they are unanimous in," would technically discount the heliocentric/geocentric debate from the discussion. First, we noted earlier, Cardinal Bellarmine argued that the Earth's centrality and immobility were a "matter of faith," if not so much in the explicit sense, then simply because of the fact that God is the author of Scripture, as even Leo states later in this encyclical (*e.g.*, ¶21: "and that God, speaking by the sacred writers, could not set down anything but what was true"). Second, it is a fact that the Fathers were unanimous in their belief in geocentrism. There was not one dissenting voice. It is perhaps the strongest unanimity the Fathers ever held on a particular topic. Hence, on both counts, faith and patristic unanimity, history shows that geocentrism is not to be included in Leo XIII's category of things to be "figuratively" interpreted or things that the Fathers expressed only "in the ideas of their times."

Also significant in the above paragraph is Leo XIII's comment about the mistakes in science and the overturning of scientific ideas, especially that of physics. He states:

> The Catholic interpreter… must nevertheless always bear in mind, that much which has been held and proved as certain has afterwards been called in question and rejected. And if writers on physics travel outside the boundaries of their own branch, and carry their erroneous teaching into the domain of philosophy, let them be handed over to philosophers for refutation.

This statement has, more or less, been the clarion call of our book, *Galileo Was Wrong: The*

Church Was Right. If there is anything of which Catholic theologians and scientists should avail themselves, it is the scientific evidence showing that heliocentrism is at best an unproven theory. These same theologians and scientists should avail themselves to an honest study into the history of science, which starkly reveals that almost every scientific theory proposed as true has been replaced by another theory that falsifies it; and that theory awaits to be replaced by yet another. In light of the new scientific evidence available, we can easily see that heliocentrism is one of those canons of physics that "has been held and proved as certain has afterwards been called in question and rejected."

In the next paragraphs, Leo XIII makes some of the Church's strongest statements upholding the full plenary inerrancy and inspiration of Holy Writ ever recorded. The words of Robert Bellarmine to Galileo meet their strongest echo in the solemn declarations of Leo XIII:

> 20. The principles here laid down will apply to cognate sciences, and especially to History. It is a lamentable fact that there are many who with great labor carry out and publish investigations on the monuments of antiquity, the manners and institutions of nations and other illustrative subjects, and whose chief purpose in all this is too often to find mistakes in the sacred writings and so to shake and weaken their authority. Some of these writers display not only extreme hostility, but the greatest unfairness; in their eyes a profane book or ancient document is accepted without hesitation, whilst the Scripture, if they only find in it a suspicion of error, is set down with the slightest possible discussion as quite untrustworthy. It is true, no doubt, that copyists have made mistakes in the text of the Bible; this question, when it arises, should be carefully considered on its merits, and the fact not too easily admitted, but only in those passages where the proof is clear. It may also happen that the sense of a passage remains ambiguous, and in this case good hermeneutical methods will greatly assist in clearing up the obscurity. But it is absolutely wrong and forbidden, either to narrow inspiration to certain parts only of Holy Scripture, or to admit that the sacred writer has erred. For the system of those who, in order to rid themselves of these difficulties, do not hesitate to concede that divine inspiration regards the things of faith and morals, and nothing beyond, because (as they wrongly think) in a question of the truth or falsehood of a passage, we should consider not so much what God has said as the reason and purpose which He had in mind in saying it – this system cannot be tolerated. For all the books which the Church receives as sacred and canonical, are written wholly and entirely, with all their parts, at the dictation of the Holy Ghost; and so far is it from being possible that any error can co-exist with inspiration, that inspiration not only is essentially incompatible with error, but excludes and rejects it as absolutely and necessarily as it is impossible that God Himself, the supreme Truth, can utter that which is not true. This is the ancient and unchanging faith of the Church, solemnly defined in the Councils of Florence and of Trent, and finally confirmed and more expressly formulated by the Council of the Vatican. These are the words of the last: "The Books of the Old and New Testament, whole and entire, with all their parts, as enumerated in the decree of the same Council (Trent) and in the ancient Latin Vulgate, are to be received as sacred and canonical. And the Church holds them as sacred and canonical, not because, having been composed by human industry, they were afterwards approved by her authority; nor only because they contain revelation without error; but because, having been written under the inspiration of the Holy Ghost, they have God for their author." Hence, because the Holy Ghost employed men as His instruments, we cannot therefore say that it was these inspired instruments who, perchance, have fallen into error, and not the primary author. For, by supernatural power, He so moved and impelled them to write – He was so present to them – that the things which He ordered, and those only, they, first, rightly understood, then willed faithfully to write down, and finally expressed in apt words and with infallible truth. Otherwise, it could not be said that He was the Author of the entire Scripture.

Such has always been the persuasion of the Fathers. "Therefore," says St. Augustine, "since they wrote the things which He showed and uttered to them, it cannot be pretended that He is not the writer; for His members executed what their Head dictated." And St. Gregory the Great thus pronounces: "Most superfluous it is to inquire who wrote these things – we loyally believe the Holy Ghost to be the Author of the book. He wrote it Who dictated it for writing; He wrote it Who inspired its execution."

21. It follows that those who maintain that an error is possible in any genuine passage of the sacred writings, either pervert the Catholic notion of inspiration, or make God the author of such error. And so emphatically were all the Fathers and Doctors agreed that the divine writings, as left by the hagiographers, are free from all error, that they labored earnestly, with no less skill than reverence, to reconcile with each other those numerous passages which seem at variance – the very passages which in great measure have been taken up by the "higher criticism;" for they were unanimous in laying it down, that those writings, in their entirety and in all their parts were equally from the afflatus of Almighty God, and that God, speaking by the sacred writers, could not set down anything but what was true. The words of St. Augustine to St. Jerome may sum up what they taught: "On my part I confess to your charity that it is only to those Books of Scripture which are now called canonical that I have learned to pay such honor and reverence as to believe most firmly that none of their writers has fallen into any error. And if in these Books I meet anything which seems contrary to truth, I shall not hesitate to conclude either that the text is faulty, or that the translator has not expressed the meaning of the passage, or that I myself do not understand."

22. But to undertake fully and perfectly, and with all the weapons of the best science, the defense of the Holy Bible is far more than can be looked for from the exertions of commentators and theologians alone. It is an enterprise in which we have a right to expect the co-operation of all those Catholics who have acquired reputation in any branch of learning whatever. As in the past, so at the present time, the Church is never without the graceful support of her accomplished children; may their services to the Faith grow and increase! For there is nothing which We believe to be more needful than that truth should find defenders more powerful and more numerous than the enemies it has to face; nor is there anything which is better calculated to impress the masses with respect for truth than to see it boldly proclaimed by learned and distinguished men. Moreover, the bitter tongues of objectors will be silenced, or at least they will not dare to insist so shamelessly that faith is the enemy of science, when they see that scientific men of eminence in their profession show towards faith the most marked honor and respect. Seeing, then, that those can do so much for the advantage of religion on whom the goodness of Almighty God has bestowed, together with the grace of the faith, great natural talent, let such men, in this bitter conflict of which the Holy Scripture is the object, select each of them the branch of study most suitable to his circumstances, and endeavor to excel therein, and thus be prepared to repulse with credit and distinction the assaults on the Word of God.

1921: Pope Benedict XV's Encyclical: *In Praeclara Summorum*

On April 30, 1921, Pope Benedict XV promulgated the encyclical titled: *In Praeclara Summorum*, commemorating the memory of the poet Dante (1265-1321). In it the pope makes mention of the various antiquated ideas held by Dante and his contemporaries, but through it all Dante was a faithful son of the Church and believed in the basic idea that God created the world and governs it. In the midst of this memorial, the pope says that the Earth "may not be the center of the universe." He writes:

> …It is thus that, according to the Divine Revelation, in this poem shines out the majesty of God One and Three, the Redemption of the human race operated by the Word of God made Man, the supreme loving-kindness and charity of Mary, Virgin and Mother, Queen of Heaven, and lastly the glory on high of Angels, Saints and men; then the terrible contrast to this, the pains of the impious in Hell; then the middle world, so to speak, between Heaven and Hell, Purgatory, the Ladder of souls destined after expiation to supreme beatitude. It is indeed marvelous how he was able to weave into all three poems these three dogmas with truly wrought design. If the progress of science showed later that that conception of the world rested on no sure foundation, that the spheres imagined by our ancestors did not exist, that nature, the number and course of the planets and stars, are not indeed as they were then thought to be, still the fundamental principle remained that the universe, whatever be the order that sustains it in its parts, is the work of the creating and preserving sign of Omnipotent God, who moves and governs all, and whose glory *risplende in una parte piu e meno altrove*; and though this earth on which we live may not be the center of the universe as at one time was thought, it was the scene of the original happiness of our first ancestors, witness of their unhappy fall, as too of the Redemption of mankind through the Passion and Death of Jesus Christ. Therefore the divine poet depicted the triple life of souls as he imagined it in a such way as to illuminate with the light of the true doctrine of the faith the condemnation of the impious, the purgation of the good spirits and the eternal happiness of the blessed before the final judgment.

Little if anything can be extracted from this encyclical for the cause of heliocentrism, however. First, the encyclical is not purporting to be a treatise on either cosmology or cosmogony, and it is the understanding of the Church that no dogmatic teachings are to be gleaned from an ecclesiastical document unless said document specifically addresses and defines the issue at hand. In this case, the encyclical is merely an exoneration of Dante and his works, not a teaching on whether the Earth is the center of the universe. Popes may often gather popular sentiments or ideas from the surrounding culture in order to enhance the basic message they wish to teach, but they have no dogmatic standing whatsoever.

Second, the pope himself is aware of the conditional and speculative nature of his reference to cosmology since he carefully couches his appeal with the subjective word "may" in the sentence: "and though this earth on which we live *may* not be the center of the universe as at one time was thought." To say that the Earth *may not* be the center is as equally indicative as saying that it *may* be the center. In actuality, the fact that the pope did not confirm the scientific consensus, which by this time (1921) firmly believed in heliocentrism, means that he was not allowing himself to be pressured by the scientific community into adopting a non-central Earth as an indisputable fact. Although the pope may have known about the decrees of 1616 through 1664, he was probably under the impression, as many are today, that those decrees had been relaxed somewhat in 1822 and 1835 (yet it is safe to say that he was not aware of the subterfuge behind those two latter events that we have documented above). Since he put no particular study into the question, it is only reasonable that he might have a hesitancy regarding the Church's official position on the matter. This is to be expected since it is common for most Catholics to have inadvertently but speciously relied on the 1822 and 1835 decisions to exonerate heliocentrism to a status of scientific fact that it should not have.

Technically speaking, discussions regarding whether the Earth is the center of the universe must take into account the difference between the geometric center and the center of mass. In the Aristotelian model from which Dante is working, little was known about the center of mass. Barring Ptolemy's use of the equant and deferent, which, giving the illusion of an off-center pivot point which, in turn, affected the speed of the revolving body in relation to the Earth, the Aristotelian universe comprehended the Earth as it would the center of a circle. Modern physics understands the center in two ways, however: one as the center of a circle, the other as the central point of all the mass in the system. The center of mass is what causes a tennis racket to wobble if it is thrown into the air. The reason for this erratic gyration is that the center of mass for the tennis racket is not in the geometric center but more toward the heavier end of the racket.

All the mass of the racket will rotate proportionately around the center of mass, not the geometric center, regardless of how the racket is shaped. In the same way, the Earth may be the center of mass of the universe but not the geometric center. Hence Benedict XV's reference to the Earth perhaps not being "the center of the universe" could possibly be true from the geometric perspective employed by Aristotle, Ptolemy, and even Tycho Brahe, but not true from a center of mass perspective. If that is the case, Benedict's statement makes perfect sense, even in its conditional form.

Lastly, we cannot leave the teachings of Benedict XV without remarking on his warning regarding the interpretation of Scripture. Whereas Galileo and his followers were wont to interject a figurative interpretation on any scriptural passage that did not fit their scientific views, Benedict XV decried such a methodology. He writes:

> By the doctrine of Jerome those statements are well confirmed and illustrated by which Our predecessor, Leo XIII, solemnly declared the ancient and constant faith of the Church in the absolute immunity of Scriptures from any errors… And, introducing the definitions of the Councils of Florence and Trent, confirmed in the Vatican Synod, he has the following: "Therefore, nothing at all matters... otherwise He Himself were not the Author of all Sacred Scripture."
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> Although these words of Our predecessors leave no place for ambiguity or evasion, We must grieve, Venerable Brothers, that not only were there not lacking some among those outside the Church, but even among the sons of the Catholic Church, moreover – which wounds Our soul more severely – among the clergy itself and the teachers of the sacred disciplines, who relying proudly on their own judgment, either openly reject the magisterium of the Church on this subject or secretly oppose it. Indeed, We approve the plan of those who, to extricate themselves and others from the difficulties of the Sacred Codex, in order to eliminate these difficulties, rely on all the aids of scholarship and literary criticism, and investigate new avenues and methods of research; but they will wander pitifully from their purpose, if they disregard the precepts of Our predecessor and pass beyond certain limits and bounds which the Fathers have set [Prov. 22:28]. Yet by these precepts and limits the opinion of the more recent critics is not restrained, who, after introducing a distinction between the primary or religious element of Scripture, and the secondary or profane, wish, indeed, that inspiration itself pertain to all the ideas, rather even to the individual words of the Bible, but that its effects and especially immunity from error and absolute truth be contracted and narrowed down to the primary or religious element. For their belief is that that only which concerns religion is intended and is taught by God in the Scriptures; but that the rest, which pertains to the profane disciplines and serves revealed doctrine as a kind of external cloak of divine truth, is only permitted and is left to the feebleness of the writer. It is not surprising, then, if in physical, historical, and other similar affairs a great many things occur in the Bible, which cannot at all be reconciled with the progress of the fine arts of this age. **There are those who contend that these fabrications of opinions are not in opposition to the prescriptions of Our predecessor, since he declared that the sacred writer in matters of nature speaks according to external appearance, surely fallacious. But how rashly, how falsely this is affirmed, is plainly evident from the very words of the Pontiff**.
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> And no less do they dissent from the doctrine of the Church who think that the historical parts of Scriptures depend not on the absolute truth of facts, but only on what they call the relative and harmonious opinion of the multitude; and they do not hesitate to infer this from the very words of Pope Leo, because he said that the principles established regarding the things of nature can be transferred to the historical disciplines. And so they contend that the sacred writers, just as in physical matters they spoke according to what was apparent, so they related events unwittingly, inasmuch as these seemed to

be established according to the common opinion of the multitude or the false testimonies of others; and that they did not indicate the sources of their knowledge, and did not make the narrations of others their own. Why shall we refute at length a matter plainly injurious to Our predecessor, and false and full of error? For what is the similarity of the things of nature and history, when the physical are concerned with what "appears to the senses," and so should agree with phenomena; while on the other hand the law of history is chiefly this, that what is written must be in agreement with the things accomplished, according as they were accomplished in fact? If the opinion of these men is once accepted, how will that truth of sacred story stand safe, immune from every falsehood, which Our predecessor declares must be retained in the entire text of its literature? But if he affirms that the same principles that have a place in physics can to advantage be transferred to history and related disciplines, he certainly does not establish this on a universal basis, but is only professing that we use the same methods to refute the fallacies of adversaries as we use to protect the historical faith of Sacred Scripture against their attacks....

Nor is Sacred Scripture lacking other detractors; We recognize those who, if they are restrained within certain limits, so abuse right principles indeed that they cause the foundations of the truth of the Bible to totter, and undermine the Catholic doctrine handed down by the Fathers in common. Among these Fathers Jerome, if he were still alive, would surely hurl the sharpest weapons of his speech, because, neglecting the sense and judgment of the Church, they very smoothly take refuge in citations which they call implicit, or in accounts historical in appearance; or, they contend that certain kinds of literature are found in the sacred books, with which the whole and perfect truth of the divine word cannot be reconciled; or, they have such an opinion on the origin of the Bible that its authority collapses and utterly perishes. Now, what must be thought of those who in expounding the Gospels themselves diminish the human faith due them and overturn divine faith? For what our Lord Jesus Christ said, and what He did they are of the opinion did not come down to us entire and unchanged, although they are witnesses of all those who wrote down religiously what they themselves had seen and heard; but that – especially with reference to the fourth Gospel – part came down from the evangelists who themselves planned and added much, and part was brought together from the account of the faithful of another age.

Now, Venerable Brethren, with the passing of the fifteenth generation after the death of the greatest Doctor, We have communicated with you not to delay to bring these words to the clergy and your people, that all, under the patronage and leadership of Jerome, may not only retain and guard the Catholic doctrine of the divine inspiration of the Scriptures, but may also cling most zealously to the principles which are prescribed in the Encyclical Letter, "Providentissimus Deus," and in this Our own....[847]

1941: Pio Paschini's Book on Galileo

The next ecclesiastical juncture dealing with the Galileo aftermath, and the last one before the convoking of the Galileo commission under John Paul II, was in 1941. Once again, however, we have evidence of how powerful and far-reaching were the 1616 and 1633 decrees against Galileo. The Pontifical Academy of Science commissioned Pio Paschini, a priest and professor of ecclesiastical history in Rome, to write a biography of Galileo for the third centenary of his death, 1942. After completing the work three years later, Paschini submitted it to the Pontifical Academy of Science but it was rejected by both the Academy and the Holy Office, mainly because it was judged to be too favorable to Galileo. The manuscript sat on the shelves of the Academy for the next twenty-two years until it was given to the Congregation for the Doctrine of the Faith under Paul VI. Paschini had

[847] *Spiritus Paraclitus*, September 15, 1920, Denzinger ¶ 2186-2188.

since died, but it was decided that as long as the manuscript was revised it could be published, which it eventually was.

One interesting statement from Paschini in his letter to Deputy Secretary Montini (who would later be elected Paul VI in 1963) reveals that his opponents at the Vatican were voicing with one accord the same historical facts that the president of the Pontifical Academy of Sciences, Agostino Gemelli, had stated in 1941, namely, "…although Galileo did not provide a decisive demonstration of Copernicanism, neither did Newton, Bradley, or Foucault."[848] Paschini concurred with: "They oppose me with the already superseded difficulty that Galileo had not advanced conclusive proof for his heliocentric system."[849]

1616-1664: Are the Papal Decrees Infallible?

Ultimately, the question of the canonical status of the decrees against heliocentrism rests solely with the magisterium of the Catholic Church, and heretofore she has not made any formal and official declaration that the 1616-1664 decrees were infallible. The closest the Church has come to remarking on the status of the decrees is the comment made by John Paul II in his 1992 speech stating: "Cardinal Poupard has also reminded us that the sentence of 1633 was not irreformable." The reference to "irreformable" is another way of saying that the decrees were not infallible, since doctrines that are infallible, even in the words chosen to declare the doctrine, cannot be reformed at any time by any person. They are sealed until the end of time. If by his repeating of Cardinal Poupard's opinion John Paul II was affirming that the 1633 decrees were, in fact, reformable, then this stands as the most public statement on their status. However, the fact that John Paul II's 1992 address to the Pontifical Academy of Science is not considered a formal declaration of Church doctrine, both the address and what it contains cannot be considered the official or definitive word on the issue.

Still, although it may be canonically proper to say that the 1633 decree against heliocentrism as being "formally heretical" was not technically infallible, it is quite a different matter to claim that the 1633 decree was, in actuality, erroneous, as many Catholics have done who have been influenced by the atheistic sectors of modern science. Fr. William Roberts, one of the leading critics of the Catholic Church's handling of the aftermath of the Galileo affair, has the following words to say about the faulty logic that is often employed by Catholic apologists who seek to exonerate the Church from any inconsistency. He writes:

> When the doctrine of the Immaculate Conception was defined, all the conditions of an *ex cathedra* Act were so abundantly and clearly fulfilled that no Roman Catholic theologian would be permitted to raise doubt on the subject. I do not for a moment pretend that heliocentricism was condemned by any judgment of which the same may be said; neither have I attempted to prove that it was. My contention was a very different one; and I will try to explain and vindicate it.
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> I have found it laid down by such distinguished representatives of the Ultramontane school as Cardenas, La Croix, Zaccaria, and Bouix, that Congregational decrees, confirmed by the Pope and published by his express order, emanate from the Pontiff in his capacity of Head of the Church, and are *ex cathedra* in such sense as to make it infallibly certain that doctrines so propounded as true, are true.
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> Moreover, it seemed to me…that this opinion was powerfully supported by certain utterances and Acts of the Holy See itself. Take for instance, the language I quoted in my pamphlet, used by Pius IX in the Brief *Eximiam tuam*, in reference to the original decree prohibiting Günther's works. That decree was a simple edict of the Index, having the usual notice that the Pope had ratified the decision and ordered its publication. Yet the Pope speaks of it as having been approved "by his supreme authority," and remarks that, "sanctioned by our authority and published by our order, it plainly ought to have sufficed that the whole question should be judged finally decided – *penitus dirempta*, and that all who boast of the Catholic

[848] The words of Finocchiaro in *Retrying Galileo*, p. 278.

[849] *Retrying Galileo*, p. 322.

> profession should clearly and distinctly understand…. that the doctrine contained in Günther's books could not be considered sound (sinceram haberi non posse doctrinam Güntherianis libris contentam)." [Roberts asks]: "How, in the name of common sense, could a decree possibly erroneous have made it clear to all Catholics that the doctrine of the books thereby prohibited could not be sound? And how could such a decree have plainly sufficed to determine the whole question at issue?"[850]

Roberts then adds many more examples of such instances in recent Catholic history. As his convincing repertoire of incidents closes, no Catholic apologist can remain cavalier about the decrees of 1616-1664. The solemnity of those decrees, Roberts reminds us, even if not technically infallible, are still an open wound on the veracity of the Catholic Church if, indeed, the Catholic apologist believes heliocentrism is a scientific fact and the popes who condemned it were wrong.

A word of caution is due at this point, however. Although Roberts, being an Anglican and an avowed heliocentrist,[851] has as his main purpose for pointing out these ecclesiastical anomalies the undermining of the Catholic Church, that is not our purpose here, of course. Roberts will go on to insist that since there is no real difference between "infallibility" and "not being in error," then the 1616-1664 decrees were, for all intents and purposes, "infallible," and thus the Catholic Church is exposed as a bogus institution for having deemed infallible a cosmological theory (geocentrism) that the world now regards as erroneous. On the one hand, our position, obviously, is that Roberts' view of cosmology is itself erroneous and therefore the Church did not err in condemning heliocentrism. On the other hand, Roberts' analysis of the situation should give pause to faithful Catholics to consider that, even though a particular doctrine may not be couched in the technical formula of infallible language, it is, for all intents and purposes, infallible in the practical sense, since such decrees were understood to be true and abiding statements, binding on the Christian faithful.[852] Papal decrees of this sort, especially when the action is not merely disciplinary but involves the determination on a matter of faith (stipulated in the 1633 decree against heliocentrism as: "that which has already been declared and defined to be contrary of the divine Scripture," or as Bellarmine called it: *ex parte dicentis*), can never be erroneous regarding the very issue it condemned. It is generally safe to posit that God will not permit the pope to use his supreme authority to impose on the mind of the Christian faithful doctrines that are false. Surely we would not want to say that God ignores the pope and allows him to require, under pain of excommunication, the Christian faithful to assent to heretical, erroneous, or rash propositions of the faith, even *ex parte dicentis*, whether we deem those doctrines infallible or merely authoritative.

Until the Catholic Church and her apologists come to the stark realization that their attempts to save the doctrine of infallibility has inadvertently put them in a position of sullying, perhaps beyond repair, the canonically lesser but still authoritative and binding decrees of the popes, they will continue to be the object of criticism from those outside the Church (like Roberts) who wonder if, indeed, this is the honest and forthright institution established by Jesus Christ that it claims to be. In the mid-1800s a publication from the *Dublin Review* raised this very question in the midst of the debates occurring just

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[850] *The Pontifical Decrees Against the Doctrine of the Earth's Movement and the Ultramontane Defence of Them*, Rev. William W. Roberts, London, Parker and Co., 1885, pp. 4-5.

[851] As noted on pages 34, 47, 48, 97, 106 of his book.

[852] Roberts argues that well known Catholic canonists, such as Bouix in his book *Tractatus de Curia Romana* (part 3, ch. 7, p. 471), teaches that congregational decrees may be infallible if they are specifically confirmed by the pope. Roberts writes: "On turning to M. Bouix's *Tractatus*…we learn that there are three kinds of Congregational decrees: 1. Those which the pope puts forth in his own name after consulting a Congregation. 2. Those which a Congregation puts forth in its own name with the pope's confirmation, or express order to publish… 3. Those which a Congregation with the pope's sanction puts forth in its own name, but without the pope's confirmation or express order to publish. Decrees of the first and second class, we are told, are certainly *ex cathedra*, and to be received with unqualified assent under pain of mortal sin. According to Zaccaia – a very great authority – even decrees of the last class are not fallible, in the sense that they can ever condemn as erroneous a doctrine which is not so" (*The Pontifical Decrees Against the Doctrine of the Earth's Movement*, p. 60.

prior to Pius IX's 1870 declaration on papal infallibility. The author writes:

> We are inclined, however, to think, that the Pope does give a general test, whereby we may certainly know that some letter, addressed to an individual bishop, is intended as an instruction to the whole Church *ex cathedra*. We speak here with diffidence, as we are not aware of any theologian who has treated the question; but we observe that in the recent Encyclical Pius IX unites all the apostolic letters from which the Syllabus is compiled, under the common category of "having been published by him."[853] If the Pope writes to a bishop for his individual instruction, of course there is no secret in the matter, and the letter becomes universally known; yet its publication takes place by the mere force of circumstances. But if the Pope himself *commands* its publication and promulgation, but this very fact he seems to indicate, that the letter is not intended for the bishop alone, but as a public act affecting the whole Church….
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> We have just seen that the Pope's letter to an individual bishop, is often, in fact, a doctrinal instruction addressed to the whole Church. May it not similarly happen, that what is in form the doctrinal decree of a Congregation, is in fact a doctrinal decree promulgated by the Pope as universal teacher? We must maintain that under particular conditions this is the fact.[854]

Along these lines of argumentation, it is a fact that Urban VIII promulgated: (a) the 1633 decision that heliocentrism was "formally heretical" and "erroneous in faith," and (b) Galileo's detailed abjuration admitting to the same, to all the Catholic leaders of Europe. Obviously, this was by no means a private affair. As Dorothy Stimson notes:

> Pope Urban had no intention of concealing Galileo's abjuration and sentence. Instead, he ordered copies of both to be sent to all inquisitors and papal nuncios that they might notify all their clergy and especially all the professors of mathematics and philosophy within their districts…[855]

Finocchiaro confirms this situation:

> In the summer of 1633 all papal nuncios in Europe and all local inquisitors in Italy received from the Roman Inquisition copies of the sentence against Galileo and his abjuration, together with orders to publicize them. Such publicity was unprecedented in the annals of the Inquisition and never repeated. As a result, many manuscript copies of Galileo's sentence and abjuration have survived in European archives. By contrast, no copies of the full text of the Inquisition's sentence against Giordano Bruno survive, even though his crime…and his penalty…were much more serious….From the replies of the nuncios and inquisitors, there is concrete evidence that the sentence circulated in the manner intended. Letters of reply have survived from the nuncios to Naples, Florence, Venice, Vienna, Paris, Brussels, Cologne, Vilnius, Lucerne and Madrid, and from the inquisitors of Florence, Padua, Bologna, Vicenza, Venice, Ceneda, Brescia, Ferrara, Aquileia, Perugia, Como, Pavia, Siena,

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[853] "Pluribus in vulgus editis Encyclicis…errors damnavimus."

[854] *Dublin Review*, Vol. V. New Series, July—October, MDCCCLXV, Dublin: James Duffy & W. B. Kelly, 1865, pp. 385-386. The author adds a quote from Catholic theologian Zaccaria, stating: "…it is Zaccaria's doctrine, that decrees of a Pontifical Congregation, which are published and promulgated by the Pope's express command, are, in fact, his instructions *ex cathedra* and infallible. This doctrine, it seems to us, has received very great support from Pius IX's language in speaking of Günther's condemnation. 'Which decree' (of the Index), he says, 'sanctioned by our authority, and published by our command, ought plainly to suffice, in order, that the whole question be judged as finally decided (penitùs dirempta); and that all who boast of the Catholic profession should clearly and distinctly understand that complete obedience must be paid to it, and that the doctrine contained in Günther's books may not be considered sound (sinceram haberi non posse)'" (*ibid*., p. 387).

[855] Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory of the Universe*, pp. 67-68.

> Faenza, Milan Crema, Cremona, Reggio Emilia, Mantua, Gubbio, Pisa, Novara, Piacenza, and Tortona. The most common reply was a brief acknowledgment of receipt and a promise that the orders would be carried out. However, in this case the standard response was not sufficient for the Inquisition. It expected to be notified that the orders had in fact been carried out. Those who did not send such a follow-up letter were soon reprimanded and had to write back to Cardinal Barberini to explain the oversight of the delay….The quickest promulgation occurred in university circles.[856]

Finocchiaro adds:

> We know today that such a promulgation of Galileo's condemnation had been decided at the Inquisition meeting of 16 June 1633, presided over by Pope Urban VIII; this was the same meeting at which Galileo's trial was discussed and the pope reached a decision on its conclusion, the verdict, and the penalty. Thus the promulgation was not an afterthought but part of a well-considered plan. In fact, the plan was reaffirmed at the meeting of June 30, when the pope was again presiding over the Inquisition meeting and was a little more explicit about its details. Cardinal [Antonio] Barberini's letter followed immediately thereafter.[857]

The letter from Antonio Barberini (brother to Pope Urban VIII) stated the following:

> The Congregation of the Index had suspended Nicolaus Copernicus's treatise *On the Revolutions of the Heavenly Spheres* because that book maintains that the earth moves, and not the sun, which is the center of the world, an opinion contrary to Sacred Scripture; and several years ago this Sacred Congregation of the Holy Office had prohibited Galileo Galilei of Florence from holding, defending, or teaching in any way whatever, orally or in writing, the said opinion. Nevertheless, the same Galileo has dared to write a book titled [*Dialogo di*] *Galileo Galilei Linceo*, without revealing the said prohibition, he has extorted the permission to print it and has had it printed; claiming at the beginning, within the body, and at the end of that book to want to treat hypothetically of the said opinion of Copernicus (although he could not treat of it in an manner), he has however treated of it in such a way that he became vehemently suspected of having held such an opinion. Thus, he was tried and detained in this Holy Office, and the sentence of these Most Eminent Lords condemned him to abjure the said opinion, to stay under formal arrest subject to the wishes of their Eminences, and to do other salutary penances. Your Reverence can see all that in the attached copy of the sentence and abjuration; this document is sent to you so that you can transmit it to your vicars and it can be known by them and by all professors of philosophy and of mathematics; for, knowing how the said Galileo has been treated, they can understand the seriousness of the error he committed and avoid it together with the punishment they would receive if they were to fall into it. By way of ending, may God the Lord preserve you.[858]

During this time, there were indications from popular philosophers and scientists that the Church had made its desired impression, which then prompted these academicians to seek some measure of safe haven by questioning the precise level of authority the magisterium's decree held. Immediately after Galileo's 1633 trial, René Descartes, who had already written the draft of a book which included his advocacy for heliocentrism, sent a letter to a friend in Paris, stating:

> ….But I will tell you that recently I made inquiries in Leiden and Amsterdam about whether Galileo's *System of the World* was

[856] *Retrying Galileo*, pp. 26-28.

[857] *Ibid*., p. 27.

[858] *Le Opere di Galileo Galilei*, Antonio Favaro, Vol. 15, p. 169, as translated by Finocchiaro, *Retrying Galileo*, p. 27.

> available…I was told that indeed it had been printed, but that all copies had been simultaneously burned in Rome and he had been condemned to some penalty. This has shocked me so much that I have almost decided to burn all my papers, or at least not to let anyone see them. For I surmise that he, who is Italian and as I understand well liked by the pope, was convicted for no other reason than that he undoubtedly wanted to establish the earth's motion…and I confess that if it [heliocentrism] is false, so are also all the foundations of my philosophy; it is easily demonstrated from them, and it is so connected with all parts of my treatise that I would not know how to detach it without rendering the rest flawed. However, just as I would not want for anything in the world to produce an essay containing the least word that was disapproved by the Church, so I would rather suppress it than publish it maimed.[859]

In a second letter in February 1634, Descartes reiterates his resolve but wonders whether the decree is a binding article of faith:

> ….I have decided to entirely suppress the treatise I had written and lose almost all my work of four years in order to render full obedience to the Church, insofar as it has prohibited the opinion of the earth's motion. However, because I have not yet seen that either the pope or a Council has ratified this prohibition that was issued by the Congregation of Cardinals in charge of book censorship, I would be very pleased to learn what one thinks about it in France nowadays, and if their authority is sufficient to make it an article of faith.[860]

In a third letter, the same thinking persists. Although Descartes, independently of Galileo, believes he has demonstrated the movement of the Earth, his only recourse is to create a gap between the Sacred Congregation and a dogmatic Council:

> Undoubtedly you know that a short time ago Galileo was reproved by the Inquisitors of the Faith and that his opinion on the earth's motion was condemned as heretical. Now, I will tell you that all things I explain in my treatise, including also this opinion of the earth's motion, depend so much on one another that it is sufficient to know that one of them is false to realize that all the reasons I employ have no force at all; and although I think they are based on demonstrations that are very certain and very evident, nevertheless I would not want for anything in the world to maintain them against the authority of the Church. I know well that one could say that nothing decided by the Inquisitors of Rome is thereby automatically rendered an article of faith, and that it is necessary that it first be approved by a Council.[861]

Hence, Descartes decides to forge a safe haven by recourse to an anachronistic lacuna between the Sacred Congregation and a hypothetical Council, leaving aside the fact that: (a) the pope was the supreme authority behind the condemnation of Galileo, and (b) that even if there were such a Council, its decision must be approved by the

[859] René Descartes, *Oeuvres*, 1897-1913, eds. C. Adam and P. Tannery, Paris, vol. 1, p 270. Also in Favaro's *Le Opere di Galileo Galilei*, vol. 15, p. 340, as cited by Finocchiaro in *Retrying Galileo*, pp. 43-44.

[860] Descartes, *ibid*., p. 280f, Favaro, *ibid*, vol. 16, p. 56.

[861] Descartes, *ibid*., p. 284f, Favaro, *ibid*, vol. 16, pp. 88-89. Descartes' "demonstrations" of the earth's movement could not have been much better, since he believed Galileo's "reasons proving the earth's motion are very good; but it seems to me that he does not present them as one must in order to be persuasive" (*Le Opere di Galileo Galilei*, vol. 15, p. 125). As most scientists have admitted, Galileo's proofs for a moving earth were entirely fallacious. Finocchiaro adds: "A few years after the *Discourse*, Descartes even felt comfortable enough to discuss the condemned geokinetic thesis. In 1644, he published in Latin the *Principles of Philosophy*….He devised his own system, which was a modification of the Copernican one….Of course, to comply with the ecclesiastical censures, Descartes wanted to engage merely in a hypothetical discussion and not appear to hold or defend the geokinetic thesis. He thought he could accomplish this aim in two ways. First, Descartes devised a version of the doctrine of the relativity of motion and applied it to the earth's motion in such a way as to be able to say that the earth is both stationary and in motion!" (*Retrying Galileo*, p. 50).

reigning pope, otherwise it is null and void, a situation that has occurred more than once in Catholic history. Since from Pius V in 1616, to Urban VIII in 1633, to Alexander VII in 1664 and beyond, the pontiffs were in one accord on condemning any cosmology that required the Earth to move, no Council that affirmed heliocentrism would have been approved by the pope. The pope would have had the final say on the outcome of a Council just as he had the final say on the outcome of his Sacred Congregation. As Catholic apologist, John Daly, notes:

> …no single act of the Sacred Congregations took place without the fullest authorization of the then reigning popes who, in fact, supervised and directed every step of the entire procedure; moreover the pope is himself the *ex officio* prefect of the Holy Office; so just as all of the Sacred Congregations are in fact no more than the instruments through which the pope governs the Church by delegating certain of his powers, the Holy Office is that which has the least possibility of acting independently of the pope. Moreover it is certain that it was the pope who ordered the sentence of the Holy Office condemning Galileo on the 22nd of June 1633 to be promulgated and circulated throughout the Church, and in 1664 and 1665 it was unquestionably the pope acting *motu proprio* who promulgated anew the decrees condemning all works in favor of heliocentrism in the two editions of the Alexandrine Index of Forbidden Books.
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> No single detail in any of the official acts of the Holy See…can be construed as showing the slightest hesitation in rejecting heliocentrism as absolutely and unconditionally false owing to its conflict with Divine revelation as contained in the Bible. Nor is there any basis for pretending that the prohibition to defend heliocentrism was limited exclusively to Galileo. Certainly on the 25th of February 1616 he was forbidden in a special way to treat the subject. But on the 5th of March 1616 *all* writings in favor of heliocentrism were condemned, no matter by whom they were written, and the minutes of the proceedings of the Holy Office in 1633 show that the reason why the pope ordered wide circulation to be given to the decree condemning Galileo was in order that it might serve as an indication to others of the position of the Holy See on the subject and thereby prevent other writers from falling into the same aberrations as Galileo himself. And in 1664 and 1665 the prohibition became even more general, if possible, when Pope Alexander VII extended it specifically so as to include not only books but even periodical articles, manuscripts and other writings – whatever could be used to promote heliocentrism.[862]

As we can see, the condemnation of Galileo was no private affair. Every person with authority (nuncios, inquisitors, bishops, priests) and academic influence (professors, mathematicians, scientists) knew of the decree and thus their unmitigated cooperation was demanded. As noted, there had never been such a thorough and systematic dissemination of a decision by a pope and his Sacred Congregation. The magisterium's actions were unprecedented. From this evidence one could argue that such pervasive and regimented procedures were at least reasonably close to the criteria required for a binding and irreformable teaching.

Unfortunately, the question concerning the infallibility of a given doctrine of the Catholic Church has always been a minefield of debate and dissent. Debates over everything from whether the decree was disseminated to the universal church or if an Index qualifies as universal, to whether it was said *in forma specifica*, to whether the decree was directly as opposed to indirectly pronounced, to altering the definitions of "declare and define," to whether the pope can use any medium he wishes as long as he makes clear his intentions, continue to rage today. As good as the doctrine of infallibility is, nevertheless, because of its self-imposed restricted domain as to when it is applicable, it invariably creates a whole new set of problems, one chief problem being how we determine whether a specific Church teaching is infallible. Often the Church does not explicitly and unequivocally state that a given doctrine is infallible. Odd as it may seem, the words

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[862] John S. Daly, "The Theological Status of Heliocentrism," October 1997, unpublished and privately circulated paper, p. 12.

"infallible" or "irreformable" are not used in dogmatic proclamations. Even the four criteria for papal infallibility established in the decree of Pius IX in 1870 do not make it foolproof for the cleric or the layman to determine when, precisely, a given papal teaching is infallible, since the doctrine in question, ironically, is never preceded by the explicit words: "This teaching is an infallible and irreformable declaration of the Catholic Church for it fulfills all four criteria of the doctrine of papal infallibility." Adding to the debate, the 1983 Code of Canon Law states that if the Church does not explicitly declare a doctrine infallible, then it is not to be considered infallible.[863] The whole process can easily become a quagmire of distinctions and counter-distinctions that turn that which was at first intended to be a simple help to the difficulties of life into tedious, hair-splitting legalese that often confuses more than it clarifies.

The four criteria for papal infallibility are delineated in prose form in the following paragraph of Vatican I (numerals in brackets are added): "…the Roman Pontiff, when he speaks *ex cathedra*, that is, [1] when carrying out the duty of the pastor and teacher of all Christians [2] in accord with his supreme apostolic authority [3] he explains a doctrine of faith or morals [4] to be held by the universal Church…".[864] As noted, questions of when and where these four criteria are applicable continue to raise problems. For example, the recent teaching against artificial contraception given by Pope Paul VI in 1969 in the encyclical *Humanae Vitae*, and the teaching against women's ordination given by John Paul II in 1994 in the letter *Ordinatio Sacerdotalis*, have raised continued questions whether those two teachings are formally infallible. If they are infallible, the documents themselves do not explicitly say so. Although at least the latter uses language that some may interpret as the formula of words often associated with an infallible declaration, still, there remain doubts due to the fact that the pope who issued them never declared them explicitly infallible (see Code of Canon Law, ¶ 749.3).[865] If they are not formally infallible, then they are technically "reformable," just as Cardinal Poupard said about the decrees against Galileo.

At this point, advocates for the infallibility of the above documents (*Humanae Vitae* and *Ordinatio Sacerdotalis*) will sometimes retreat from depending on *papal* infallibility and make an appeal to the *inherent* infallibility of the "ordinary magisterium" or the "constant teaching of the Church" as the authoritative basis for declaring these two doctrines infallible. Although legitimate, this appeal, however, has its own set of problems, since it is open to the subjective judgment of clerics or laymen on a much lower level of authority than the pope, and thus, it invariably creates diverse opinions as to which specific traditional Church teachings are infallible and which are not infallible. If it is not infallible, but merely authoritative, many feel that, although they could give "assent" to the teaching, they are not bound to obey it if, for the sake of conscience, they find it morally unacceptable.

At this point, their adversaries will appeal to other papal statements (Pius XII's *Humani Generis*),[866] the Code of Canon Law,[867] or conciliar

[863] 1983 Code of Canon Law states: "No doctrine is understood as defined infallibly unless this is manifestly evident" (Canon 749.3). The 1917 Code of Canon Law put it this way: "Nothing is understood to be dogmatically declared or defined unless this shall be manifestly certain" (Canon 1323).

[864] Denz. ¶ 1839.

[865] In fact, a few months after the issuance of *Ordinatio Sacerdotalis*, Cardinal Joseph Ratzinger was approached by various bishops questioning whether the document was infallible. Ratzinger affirmed that it *was* infallible. This, however, creates two problems: (1) it shows that the document did not contain explicit and unequivocal language declaring its infallibility, and (2) the affirmation of its infallibility came from the head of the Congregation for the Doctrine of the Faith, not the pope who wrote the document, thus making the affirmation of the document's status dependent on a fallible, although respected, opinion.

[866] *Humani Generis* states: "Nor must it be thought that the things contained in Encyclical Letters do not of themselves require assent on the plea that in them the Pontiffs do not exercise the supreme power of their Magisterium. For these things are taught with the ordinary Magisterium, about which it is also true to say, 'He who hears you, hears me.' [Lk 10. 16]...If the Supreme Pontiffs, in their acts expressly pass judgment on a matter debated until then, it is obvious to all that the matter, according to the mind and will of the same Pontiffs, cannot be considered any longer a question open for discussion among theologians."

[867] Canon 752: "Although not an assent of faith, a religious submission of the intellect and will must be given to a doctrine which the Supreme Pontiff or the college of bishops declares concerning faith or morals when they exercise the authentic magisterium, even if

statements (*e.g.*, Vatican II's *Lumen Gentium 25*) and insist that they are obligated to obey. For example, the latter document states:

> This loyal submission of the will and intellect must be given, in a special way, to the authentic teaching authority of the Roman Pontiff, even when he does not speak *ex cathedra* in such wise, indeed, that his supreme teaching authority be acknowledged with respect, and sincere assent be given to decisions made by him, conformably with his manifest mind and intention, which is made known principally either by the character of the documents in question, or by the frequency with which a certain doctrine is proposed, or by the manner in which the doctrine is formulated."

But in respect of the Church's geocentric teachings and its corollary condemnations of heliocentrism over the past two thousand years, *Lumen Gentium 25* brings us back to square one, as it were, in authenticating the authority of the 1616-1664 decrees and the level of commitment and obedience Catholics must give to them. In effect, Cardinal Poupard's and John Paul II's appeal to the decrees against heliocentrism as not being "irreformable" becomes moot or superfluous since, as is true with many teachings of the Catholic Church, the mere "ordinary" or "traditional" authority of the decrees plays a larger part, according to *Lumen Gentium 25*, in commanding submission from the Catholic parishioner. In fact, the Church's historic teaching on geocentrism and her condemnation of heliocentrism fulfills all the criteria of *Lumen Gentium 25*:

- "that his supreme teaching authority be acknowledged with respect":

It was certainly the case that popes Paul V, Urban VIII and Alexander VII understood themselves and their decrees against heliocentrism as coming from their "supreme teaching authority" and commanded that it be "acknowledged with respect." Urban VIII, for example, approved his Holy Office's conclusion that heliocentrism was "formally heretical" and "erroneous in faith," and demanded that Galileo sign an abjuration to that effect. Obviously, Pope Urban VIII also considered his predecessor's decree, Paul V's, as authoritative, binding, and demanding respect, since the 1633 decree was based on the condemnations of the 1616 decree.

- "and sincere assent be given to decisions made by him":

It was certainly the case that the decrees against Copernicanism required the "assent" of Galileo, Foscarini, and all the other theologians who were venturing into the area of biblical cosmology. Urban VIII sent letters of the decree against Copernicanism and Galileo's abjuration to all the papal nuncios and universities of Europe showing the seriousness of the issue and his desire to have it widely disseminated so that the Christian faithful would be obedient to it. Alexander VII devoted a signed papal bull to the subject of banning books that threaten the faith and welfare of the Christian faithful, stating: "We command each and every one of our venerable brethren, the patriarchs, archbishops, bishops and other Ordinaries of places, as well as those beloved sons who are their vicars and officials, the inquisitors of heretical depravity, the superiors of every kind of religious Order, congregation, society, or institute, and all others…" to obey his words.

- "conformably with his manifest mind and intention":

Few can read the documents surrounding the Galileo affair and come away without the conviction that the popes, cardinals and the Holy Offices were as resolute in their condemnation of Copernicanism as they have been about most major doctrines of the Church. The popes used and approved very solemn and foreboding language and made sure that the decrees were enforced throughout Europe.

- "which is made known principally either by the character of the documents in question"

The decrees against heliocentrism were put in place for the express purpose of protecting Scripture from false interpretations and protecting the Christian faithful from harmful teachings. Although the decrees may not reach the level of being declared formally infallible, they are, nevertheless, on the

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they do not intend to proclaim it by definitive act; therefore, the Christian faithful are to take care to avoid those things which do not agree with it."

same level of "ordinary" or "traditional" authority as most other doctrines that the Church has taught.

- "or by the frequency with which a certain doctrine is proposed"

The formal and official condemnations of Copernicanism spanned a period of fifty years (1615-1665) and were delineated by three different popes. The number of ecclesiastical documents and other personal correspondences written about the Galileo affair over the course of three decades (1615-1633) exceed 7,000. Obviously the Church considered this a grave matter. She incessantly appealed to the 1500 years of tradition on the teaching of geocentrism as her greatest bulwark against the new ideas of Copernicus and Galileo.

- "or by the manner in which the doctrine is formulated":

During the condemnations against heliocentrism the Church issued some of the most detailed and comprehensive decrees ever written. Every wrinkle of the issue was investigated, arguments were presented and rebutted, witnesses were put under oath, experts were called in for testimony, the most severe and condemnatory language was formulated in the final decree, that is, that heliocentrism was "formally heretical" and "erroneous in faith." If geocentric doctrine does not qualify under the rubrics of *Lumen Gentium 25*, what does?

1870: Vatican I, the Ordinary Magisterium and Modern Science

Vatican I also had some important things to say regarding the authority of the ordinary magisterium and the claims of modern science. They are as follows:

> **Vatican I**: Further, by divine and Catholic faith, all those things must be believed which are contained in the written word of God and in tradition, and those which are proposed by the Church, either in a solemn pronouncement or in her ordinary and universal teaching power, to be believed as divinely revealed.[868]

Analysis: In regard to "those things proposed by the Church," Vatican I makes no distinction between a "solemn pronouncement" (an infallible, *ex cathedra*, definition) and the ordinary magisterium, insofar as it concerns the truth of a doctrine. Both sources are to be considered as "divinely revealed." Hence, if the condemnations of heliocentrism, which were "declared and defined" as being "formally heretical" and "erroneous in faith" were not "solemn pronouncements," it follows that they were then authoritative decisions from the "ordinary magisterium," and are likewise to be understood as "divinely revealed." Vatican I adds:

> **Vatican I**: By enduring agreement the Catholic Church has held and holds that there is a twofold order of knowledge, distinct not only in principle but also in object: (1) in principle, indeed, because we know in one way by natural reason, in another by divine faith; (2) in object, however, because, in addition to things to which natural reason can attain, mysteries hidden in God are proposed to us for belief which, had they not been divinely revealed, could not become known.[869]

Analysis: In this case, the matter of geocentrism, which, on one level, the Church proposed as a "matter of faith," it is a fact that modern science, especially the relativistic forms, admits that it cannot determine whether the Earth moves or is stationary. In effect, the immobility of the Earth is something that can only be revealed by "divine faith."

> **Vatican I**: But, although faith is above reason, nevertheless, between faith and reason no true dissension can ever exist, since the same God, who reveals mysteries and infuses faith, has bestowed on the human soul the light of reason; moreover, God cannot deny Himself, nor ever contradict truth with truth. But, a vain appearance of such a contradiction arises chiefly from this, that either the dogmas of faith have not been understood and interpreted according to the mind of the Church, or deceitful opinions are considered as the determinations of reason. Therefore, "every assertion contrary to the

[868] Denzinger ¶1792.

[869] Denzinger ¶1795.

> truth illuminated by faith, we define to be altogether false."[870]

Analysis: In regards to the issue of geocentrism, both of the above warnings come into play: (a) Cardinal Bellarmine informed Galileo that geocentrism was a "matter of faith" and that the Church, based on the consensus of the Fathers, could not interpret Scripture in opposition to the same literal interpretation that had been passed down to it through the preceding centuries. In essence, Galileo was accused of not interpreting Scripture "according to the mind of the Church"; (b) since false claims of scientific proof for heliocentrism were consistently being advanced (*e.g.*, Foscarini, Galileo, Kepler, Bradley, Settele, Boscovich, Newton, Bessel), and from which many people became convinced that heliocentrism was correct, these would have to be classed as "deceitful opinions [that] are considered as the determinations of reason."

> **Vatican I**: Further, the Church which, together with the apostolic duty of teaching, has received the command to guard the deposit of faith, has also, from divine Providence, the right and duty of proscribing "knowledge falsely so called" [1Tm 6:20], "lest anyone be cheated by philosophy and vain deceit" [Cl 2:8]. Wherefore, all faithful Christians not only are forbidden to defend opinions of this sort, which are known to be contrary to the teaching of faith, especially if they have been condemned by the Church, as the legitimate conclusions of science, but they shall be altogether bound to hold them rather as errors, which present a false appearance of truth.[871]

Analysis: Obviously, Galileo was "forbidden to defend opinions" of "knowledge falsely so called," concerning the claims of science that asserted the Earth revolved around the sun.[872] Galileo was reminded in 1633 that heliocentrism, as early as 1616, had already been "declared and defined as opposed to Scripture," and was now declared to be "formally heretical" and "erroneous in faith" in 1633. Hence, the Church made it known that heliocentrism was, in the language of Vatican I, "known to be contrary to the teaching of faith," since it had clearly "been condemned by the Church," even though it was commonly believed to be a "legitimate conclusion of science." These "legitimate conclusions," the Church warned, could "present a false appearance of truth," which is certainly the case for heliocentrism since geocentrism can be demonstrated to work just as well on a geometric basis. It is quite clear that the ordinary magisterium can, without invoking infallibility, declare these theoretical beliefs of science as propping up a "false appearance," and are thus "formally heretical" and "erroneous." It is clear that this was done in 1616, 1633 and 1664, and these teachings against heliocentrism were never officially and formally rescinded or reformed.

> **Vatican I**: And, not only can faith and reason never be at variance with one another, but they also bring mutual help to each other, since right reasoning demonstrates the basis of faith and, illumined by its light, perfects the knowledge of divine things, while faith frees and protects reason from errors and provides it with manifold knowledge. Wherefore, the Church is so far from objecting to the culture of the human arts and sciences, that it aids and promotes this cultivation in many ways. For, it is not ignorant of, nor does it despise the advantages flowing therefrom into human life; nay, it confesses that, just as they have come forth from "God, the Lord of knowledge" [1 Samuel 2:3], so, if rightly handled, they lead to God by the aid of His grace. And it (the Church) does not forbid disciplines of this kind, each in its own sphere, to use its own principles and its own method; but, although recognizing this freedom, it continually warns them not to fall into errors by opposition to divine doctrine, nor, having transgressed their own proper limits, to be busy with and to

[870] Denzinger ¶1797.

[871] Denzinger ¶1798.

[872] Some Bibles during this precise time in history (1611-1633) translate 1 Timothy 6:20 as "science falsely so called" (KJV), which shows a common understanding in the early 1600s that "science" was often equated with "knowledge."

> disturb those matters which belong to faith.[873]

Analysis: If, for example, "right reasoning" was employed in 1887 when the Michelson-Morley experiment was preformed, it would have shown that a slight impedance of light's velocity would be due to the rotation of space around a stationary Earth and not because matter shrinked when it moved or that time slowed down. In that case "reason" would have worked very well with "faith." But Einstein, being an atheist, had no faith. He ridiculed Christianity. Therefore, he would consider the rotation of space around a stationary Earth as "unthinkable," and his colleague Edwin Hubble, a like-minded atheist, even though he saw through his telescope evidence that the Earth was in the center of the universe, rejected it as a "horrible" conclusion and something that must be "avoided at all costs." Faith in Scripture could have provided the necessary boundaries for the crucial interpretations of the scientific experiments of the late 1800s and 1900s. Science would have been spared the wild goose chase it was forced to run as it began inventing a world in which twins age at different rates, clocks slow down at will, matter shrinks upon movement, where one is forced to say that up may be down and left may be right in order to have at least some answer to the crucial experiments. As Thomas Aquinas put it:

> The knowledge proper to this science of theology comes through divine revelation and not through natural reason. Therefore, it has no concern to prove the principles of other sciences, but only to judge them. Whatever is found in other sciences contrary to any truth of this science of theology, must be condemned as false.[874]

John Daly adds:

> It is perfectly true that the Church's authority does not extend to the order of natural science and that therefore the Church cannot pronounce on whatever belongs exclusively to that order, or on anything insofar as it belongs to that order. The Church could not define the number of chemical elements, canonize the value of *pi* or forbid scientists to attempt to effect cold fusion, but she is entirely free to teach or legislate on any topic coming within her sacred field of competence even if that topic simultaneously belongs to the natural order.[875]

Vatican I concludes:

> For, the doctrine of faith which God revealed has not been handed down as a philosophic invention to the human mind to be perfected, but has been entrusted as a divine deposit to the Spouse of Christ, to be faithfully guarded and infallibly interpreted. Hence, also, that understanding of its sacred dogmas must be perpetually retained, which Holy Mother Church has once declared; and there must never be recession from that meaning under the specious name of a deeper understanding. "Therefore...let the understanding, the knowledge, and wisdom of individuals as of all, of one man as of the whole Church, grow and progress strongly with the passage of the ages and the centuries; but let it be solely in its own genus, namely in the same dogma, with the same sense and the same understanding."[876]

1965: Vatican Council II and Modern Science

As noted earlier, Vatican Council II did not address the Galileo issue directly; rather, it made some general comments about the relationship between science and religion, but with a slight twist. The comments were limited to one paragraph of *Gaudium et spes*, which is miniscule compared to the volume of documents produced at Vatican II, especially in light of the burgeoning claims of science that had been forthcoming for the prior fifty years. Paragraph 36 of *Gaudium et spes* states:

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[873] Denzinger ¶1799.

[874] *Summa Theologica*, I, Ques. 1, Art. 6, ad. 2.

[875] John S. Daly, "The Theological Status of Heliocentrism," October 1997, unpublished, privately circulated paper, p. 14.

[876] Denzinger ¶1800.

> Now many of our contemporaries seem to fear that a closer bond between human activity and religion will work against the independence of men, of societies, or of the sciences.
>
> If by the autonomy of earthly affairs we mean that created things and societies themselves enjoy their own laws and values which must be gradually deciphered, put to use, and regulated by men, then it is entirely right to demand that autonomy. Such is not merely required by modern man, but harmonizes also with the will of the Creator. For by the very circumstance of their having been created, all things are endowed with their own stability, truth, goodness, proper laws and order. Man must respect these as he isolates them by the appropriate methods of the individual sciences or arts. Therefore if methodical investigation within every branch of learning is carried out in a genuinely scientific manner and in accord with moral norms, it never truly conflicts with faith, for earthly matters and the concerns of faith derive from the same God.(6) Indeed whoever labors to penetrate the secrets of reality with a humble and steady mind, even though he is unaware of the fact, is nevertheless being led by the hand of God, who holds all things in existence, and gives them their identity. Consequently, we cannot but deplore certain habits of mind, which are sometimes found too among Christians, which do not sufficiently attend to the rightful independence of science and which, from the arguments and controversies they spark, lead many minds to conclude that faith and science are mutually opposed.(7)
>
> But if the expression, the independence of temporal affairs, is taken to mean that created things do not depend on God, and that man can use them without any reference to their Creator, anyone who acknowledges God will see how false such a meaning is. For without the Creator the creature would disappear. For their part, however, all believers of whatever religion always hear His revealing voice in the discourse of creatures. When God is forgotten, however, the creature itself grows unintelligible.

We can see from a fair reading of the two underlined paragraphs that no specific concessions are made to Galileo and no specific endorsements are given to heliocentrism. Although the "rightful independence of science" is acknowledged, this is not an independence that allows science to go outside the boundaries of the faith or say things that contradict the faith. In both of the above paragraphs the message that shines through is that science and faith must work together and must never oppose one another. The reason, of course, is that they have God as both their author and designer.

The resolve of Vatican II not to give any direct concessions to Galileo was made clear when, as Fantoli describes it,

> During the preparatory phase of the document the proposal was put forth for a frank recognition of the errors committed by the Church with respect to Galileo, and it became partially accepted by the "joint commission" which dedicated a new paragraph (No. 40) to the question of the autonomy of culture, where a brief mention was made of the error of the condemnation of Galileo."[877]

This event, of course, never happened, since the proposed paragraph #40 contains no mention of Galileo and no error made by the Church. Monsignor Pietro Parente, co-president of the commission, saw to it that the reference to Galileo was eliminated, stating: "[It is] not appropriate to speak of it in this document – so as not to ask the Church to say: I have been wrong."[878] Whatever Parente's motivations were, even if it were to save face for the Church that he personally thought had erred, is really of no consequence in the final tally, since, as those who understand Catholic protocol know, ecumenical councils are guided by the Holy Spirit. As such, it would have been erroneous to say that the Church made an error in her condemnation of Galileo and heliocentrism. If heliocentrism was

[877] Annibale Fantoli, *Galileo: For Copernicanism and for the Church*, p. 505.

[878] *Ibid*.

correct, this was the perfect opportunity for the Holy Spirit, through the Church, to clear the air, as it were. The fact that it never happened shows once again that the efforts of the three popes of the 17th century to eliminate the "formally heretical" view of heliocentrism from Catholic doctrine still reverberate today, although in much more subtle tones.

The only allusion to the Galileo affair that appeared in the Vatican II discourse is a footnote added to paragraph 36 citing Paschini's work.[879] But even then, as Fantoli admits, the citation of Paschini's work on Galileo

> had been made possible only by means of the changes already mentioned [to Paschini's original 1944 publication], especially those more important and drastic ones which concerned the original judgment of Paschini on the behavior of the Church in 1616 and 1633.[880]

Unfortunately, some of the more liberal sectors of Catholicism have been prone to eisegete these paragraphs from *Gaudium et spes* to reach the agenda-driven conclusion that the Church has given science full reign to propose any theory it desires, and that the Church has little or no say in what is distilled from those theories. In actuality, *Gaudium et spes* not only refuses to acknowledge any error on the part of the Church in the Galileo affair, it says nothing different than what was previously stated in the Church's tradition, for all the Church's authorities, from Bellarmine, the Council of Trent, Pius IX to Leo XIII, taught that faith and science can never conflict. Indeed, that has been the whole theme of our book, *Galileo Was Wrong: The Church Was Right*, since, if studied carefully and without the atheistic agenda common in the sciences today, modern science has demonstrated quite handily that the faith of our fathers who held fast to geocentrism was not in vain.

2003: Catholic Apologetics & Geocentrism

Obviously, questions concerning the infallibility of the 1616, 1633 and 1664 decrees against heliocentrism invariably surface because society has assumed that heliocentrism is a proven scientific fact, which then leads to the conclusion that the ecclesiastical decrees condemning it were in error. Additionally, since the Church has admitted that it is theoretically possible for her to make errors in her "non-infallible" teachings, Catholics of the past one hundred years have concluded that the proper apologetic concerning the Galileo affair is to communicate to the world that the popes and cardinals of the 17th century, although faithful to their calling as pastors, were, to put it politely, a little overbearing and misdirected in their dedication to Scripture and Catholic tradition. Added to this apologetic is the rationale that such errors are permissible within the confines of Catholic protocol because only when the pope speaks *ex cathedra* and fulfills the four criteria stipulated at Vatican Council I is his teaching infallible. Such is the tack taken, for example, by one of the more popular Catholic traditionalist magazines:

> Firstly, in terms of apologetics, if the Church indeed pronounced solemnly that the earth does not revolve around the sun, then she almost certainly would have erred. Naturally, this situation would have eliminated her claim of infallibility, which would in turn destroy her claim of Divine institution.[881]

Later Winschel writes: "And yet, the earth moves!" and "Galileo was right about heliocentrism," and "Galileo seems to have won out both on theological as well as scientific grounds."[882] Here we have the typical child of the Enlightenment; one who has accepted the *status quo* of modern science without reservation and is willing to put it all

[879] The *Guadium et spes* footnote at #7 above reads: "See Pio Paschini, Vita e Opere di Galileo Galilei, 2 vol., Pont. Academia Scientiarum, Vatican City State, 1964."

[880] *Galileo: For Copernicanism and for the Church*, p. 506.

[881] Jason Winschel, "Galileo, Victim or Villain," *The Angelus*, October 2003, p. 10. A few months after the article was published, we approached the editor of *The Angelus* and asked if he would allow us to write a rebuttal for the sake of fairness. He declined, even after an appeal. A milder treatment of the Galileo affair is written by Thomas E. Woods, Jr. in *How the Catholic Church Built Western Civilization* (2005), although Woods gives no consideration to the idea that Galileo could have been wrong. Fr. Victor P. Warkulwiz, in *The Doctrines of Genesis 1-11: A Compendium and Defense of Traditional Catholic Theology on Origins* (2007) is highly favorable to geocentrism.

[882] *Ibid*., pp. 36, 38.

on the line, as it were, believing that everything can be answered on that basis. The absolute fact he employs to make his conclusions is that science has proven the Earth revolves around the sun; yet, ironically, he provides no such proof in his article. Although it might appear that he gives himself at least some escape clause in the words: "then she *almost certainly would have* erred," he is not so equivocal toward the end of his article:

> Had the Inquisition made a mistake in declaring heliocentrism heretical? Yes. Did the Church err? Absolutely not. In fact, where the Holy Ghost played a role was in seeing to it precisely that the Church did not at this time make the error of stamping the decision of the Holy Office with her infallible approval.[883]

Here we see, perhaps, an additional apologetic. The goal is not merely to protect the doctrine of papal infallibility but to minimize the role of the popes and make it appear as if they had little to do with the whole affair. The same type of evasion was employed in the 1992 papal speech prepared mainly by Cardinal Poupard. It spoke of the "error of the theologians" but laid no blame on the popes and cardinals who, everyone knows, played a much larger role than what the speech admitted. We can understand the dilemma of these apologists. Since they are convinced that a gross "error" occurred in the years 1616 to 1664, there is little choice but to deflect as much blame from off the hierarchy as possible, for image is just as important as substance in such cases. Even though these authors know that the historical record shows quite clearly that over the course of fifty years Paul V, Urban VIII and Alexander VII facilitated, interrogated, presided, endorsed, commanded, demanded abjurations, sent signed notices to papal nuncios, and signed papal bulls endorsing the condemnation of heliocentrism, respectively, the whole burden of the supposed mishap is placed on the shoulders of the "Inquisition," perhaps because that infamous institution has always been the favorite boogeyman employed to epitomize the primitive and uneducated medievals of yesteryear who were just a bit too zealous for their Christian faith and who are thus caricatured as having not the slightest wit about things scientific. The title of the apologist's article could just as well be worded: *The Popes: Victims or Villains?* and probably get his point across much better. As such, it would be his contention that the popes involved in the Galileo affair are not to be considered "villains" who besmirched the Church's reputation by promoting error; rather, they are "victims" of an Inquisition gone awry, a runaway train that the pontiffs were helpless to stop. This is the type of murky quicksand that Catholic apologists are forced to adopt once they elevate the premise of heliocentrism to an established scientific fact. They find themselves inadvertently implying that the Church at large could be: (a) led wholesale down the primrose path of error; (b) be virtually ignored by the Holy Spirit because He apparently doesn't deal in things stated "non-infallibly"; (c) led to maintain a specious allegiance to the consensus of the Church Fathers; (d) led to erroneously uphold the traditional belief in inerrancy and literal interpretation of Scripture, and (e) be forever embarrassed in front of a gapping world of critics, all for the sole purpose of "saving the doctrine of papal infallibility" a doctrine which, ironically, was neither employed nor defined until the late nineteenth century.

On the other hand, this type of apologetic forces the bearer to speculate in the negative about the motivations of the popes. Toward the end of his article, Winschel, driven by his belief that "Galileo was right about heliocentrism," finally faces the pope and, as we would expect him to do, puts the blame on the pointiff instead of Galileo:

> In Galileo's defense, one could argue that certain Churchman acted disreputably during this affair. Motivated by wounded pride, Pope Urban VIII certainly exaggerated when he referred to the whole thing as the worst scandal in the History of the Church. This in the midst of the Thirty Years' War and hot on the heels of the Protestant Revolution, the Western Schism and the abuses of the Renaissance Era?![884]

The first thing Winschel's approach verifies for us is the very reason that *Galileo Was Wrong: The Church Was Right* was written as it is – with strong emphasis on the scientific side of the debate. Being a product of his intellectual culture (*e.g.*, the Enlightenment, modern science, historical criticism, *etc*.), a whole generation of Catholics have been

[883] *Ibid*., p. 36.

[884] *Ibid*., p 38.

reared and educated in the school of heliocentric hegemony. One such example is the school of Teilhardianism, the teachings of the wayward Catholic theologian from France, Pierre Teilhard de Chardin, whose corrupting influence began in the early 1900s and found its way into many of the minds of the prelates who sat at Vatican II. Earlier we cited his strange "omega-searching" evolutionary ideas, but Teilhard was also pushing for the connection between the demise of geocentrism and the rise of evolutionary thought, as well as his desire to rid the world of the traditional notion of Original Sin. In the book published in 1969 (fourteen years after his death), *Christianity and Evolution*, he writes:

> It is not only, in fact, a few palaeontological discoveries which are forcing the Church to lose no time in modifying her ideas about the historical evidence of human origins. The whole new physiognomy of the universe, as disclosed to us for some centuries now, is introducing an intrinsic imbalance into the very core of the dogma; and we cannot escape from this except through an extensive metamorphosis of the notion of original sin.

> As a result of the collapse of geocentrism, which she has come to accept, the Church is now caught between her historico-dogmatic representation of the world's origin, on the one hand, and the requirements of one of her most fundamental dogmas on the other – so that she cannot retain the former without to some degree sacrificing the latter.
>
> In earlier times, until Galileo, there was perfect compatibility between historical representations of the Fall and dogma of universal redemption – and all the more easily, too, in that each was modeled on the other. So long as people believed as St. Paul himself did, in one week of creation and a past of 4000 years – so long as people thought the stars were satellites of the earth, and that animals were there to serve man – there was no difficulty in believing that a single man could have ruined everything, and that another man had saved everything. Today we know, with absolute physical certainty, that the stellar universe is not centered on the earth, and that terrestrial life is not centered on mankind…. With the end of geocentrism, what was emerging was the evolutionist point of view. All that Galileo's judges could distinctly see as menaced was the miracle of Joshua. The fact was that in consequence the seeds of decomposition had been introduced into the whole of the Genesis theory of the fall: and we are only today beginning to appreciate the depth of the changes which at that time were already potentially completed [in Galileo's day].[885]

The "collapse of geocentrism" was leading many Catholics, who were already predisposed to liberal theology and liberal hermeneutics, down the primrose path of accepting evolution as a fact. Another example is George Mivart, a convert to Catholicism in the late 1800s. As Finocchiaro describes it:

> Mivart…argued for the compatibility of Christianity and evolution….that Galileo's trial showed that the Church was fallible in scientific matters, and so modern Catholics had complete freedom in scientific inquiry; but he argued that the Church's error on Copernicanism was a providential one…"[886]

[885] Teilhard de Chardin, "Fall, Redemption and Geocentrism," *Christianity and Evolution*, 1969, 1971, William Collins Co., Harcourt, pp. 37-38.

[886] *Retrying Galileo*, pp. 260-261.

Suffice it to say, there is no proof for Mivart's accusation that "the Church was fallible in scientific matters" or Teilhard's wish that we possess "absolute physical certainty that the stellar universe is not centered on the earth." Yet Winschel and many other 20th century Catholics grew up with Mivart's and Teilhard's self-satisfied assurance about science. Winschel is the typical example of the modern Catholic who comes to the theological debate having already been primed and molded by the biased scientific education he received from childhood. Having been reared with the idea in either public, private or parochial schools that the Earth revolves around the sun at such an impressionable age, it is unfathomable for most of them, now adults, to contemplate that the *status quo* of modern science could possibly have gotten it wrong. So ingrained has the notion of heliocentrism been wired into the consciousness of this generation that otherwise good Catholics think nothing of impugning ulterior motives onto the very popes that God gave to protect them from the false ideas and irreligious prejudices of the world. In short, once the true pontiffs are eliminated from the discussion because they didn't speak "infallibly," a new and different ecclesiastical leader arrives on the landscape, yet his fallibility is not even questioned. His name is Galileo, pope of the church of Scientism, who, being so powerful, even speaks from the grave, as his ideas on scriptural interpretation, Winschel pleads, are even enshrined in "several papal encyclicals":

> …Galileo was right about heliocentrism. Moreover, some of his theological wanderings eventually found themselves mirrored in several papal encyclicals of the last two centuries. *Providentissimus Deus* by Leo XIII and *Humani Generis* by Pius XII, for instance, both have pieces that could have been extracted from Galileo's *Letter to the Grand Duchess*.[887]

As much as he appeals to the encyclicals for support for heliocentrism, unfortunately Winschel has already demoted their authoritative value since his article inadvertently consigns all non-infallible papal statements to the ambiguous category of "it could be true, but then again, it could be false," due to his hasty and scientifically biased conclusion about Pope Urban VIII and his "wounded pride." As we saw in Pope Urban's dialogue with the ambassador to Archduke Cosimo Medici, Francesco Niccolini, the only "pride" Urban had was for the word of God, the very word he consistently accused Galileo of violating. Contrary to Winschel's claim, there is not a shred of evidence that Urban's personal pride was at stake. Moreover, as we have already noted, the encyclicals of Leo XIII and Pius XII say nothing supporting heliocentrism. They are merely exhortations on the proper interpretation of Scripture that the tradition of the Church had been preaching and practicing since the time of the Church Fathers, and which can be applied to a number of literary situations in Scripture (personifications, irony, metaphors, hyperbole, anthropomorphisms, *etc*.) without once involving the 17th century cosmological controversies. It is only modern Catholics who consistently eisegete these encyclicals into supporting their previously made-up minds about the merits of heliocentrism and the demerits of the 17th century Church.

As much as Winschel bases his apologetic on the "disreputable" acts, "wounded pride," and "exaggerations" of Urban VIII,[888] perhaps he did not investigate to any satisfactory depth the personal life of Galileo before he wrote his article. As we noted in Chapter 11, Galileo was the epitome of a selfish, immoral and prideful man who trampled over anyone and anything to get what he wanted. This was par for the course for the world's pioneering heliocentrists (*e.g*., Copernicus, Galileo, Kepler, Newton, Einstein). As we also noted in Chapter 11, their personal lives are a sordid tale of malfeasance and deception. But Urban VIII, Robert Bellarmine, and the whole employ under Paul V and Alexander VII led exemplary lives that were far and away superior to the scurrilous life of Galileo and his contemporaries. As it stands, Urban VIII was precisely on target in calling Galileo's onslaught "the worst scandal in the history of the Church." The troubles stemming from Winschel's "Western Schism," the "Protestant Revolution," the "Thirty Years War" and the "Renaissance Era" were based on one main issue: the Church's sole and lofty role as the final authority on the interpretation of Scripture, the authority contested by each of the aforementioned epochs of history. The "filioque" issue that divided East from West was based on the

[887] *Ibid*.

[888] An accusation against Urban VIII that, as we cited earlier in Finocchiaro's analysis, is most likely a myth since there is no credible documentation.

interpretation of Scripture.[889] The Protestant Revolution was based on the interpretation of Scripture.[890] The Thirty Years War was between Catholics and Protestants and stemmed directly from religious disputes about Scripture, even though later it digressed into the desire to wrest control from the Hapsburg dynasty. The Galileo affair is the key to understanding each of these historical controversies, since the main contention between the Church and Galileo was not whether there was proof of heliocentrism, for everyone knew that none existed, but over who had the final say on the interpretation of Holy Scripture.

It is obvious that Winschel's apologetic has a severe set of problems. Instead of viewing papal infallibility as merely the highest expression of a given truth, this Catholic apologist has created an unbridgeable chasm between doctrines that are infallible over against those that are authoritative, but which, as far as he sees it, contain the ticking time bomb of damnable error. As such, this defeatist apologetic invariably leads the Catholic faithful to doubt the truth and veracity of magisterial statements that are not disseminated infallibly. If the people are taught that previous popes were in error simply because they did not couch their teachings in infallible terminology, what would stop the Catholic faithful from becoming just as wary about the possibility of papal error coming from all other venues of Catholic teaching?

It is certainly true that these questions may be somewhat diffused by appeal to: (1) the tradition of the Church, (2) the analogy of faith, (3) the consensus of the Fathers, (4) previous magisterial statements that set an authoritative precedent, (5) the teachings of Scripture, and which often give the needed authoritative backing to non-infallible teachings. But the main problem for those seeking to eliminate the Church's condemnations of heliocentrism from the category of the infallible is that each of the five above authoritative sources unequivocally supports geocentric doctrine. It is an undeniable fact of Catholic history that Scripture, Tradition and the Magisterium have all given their undivided endorsement of geocentric cosmology. Hence, denials of the infallibility of geocentric teachings that then reduce those same teachings to the Church's non-infallible level of authority provide no escape for those advocating heliocentric cosmology. In fact, there is no Scripture, no Tradition and no Magisterial statement in all of the past two thousand years that either denies geocentric cosmology or promotes heliocentric cosmology.

As we have seen, at no time has the Church ever formally and officially reversed the 17th century decrees against heliocentrism. Although it is perhaps true from a procedural standpoint that the removal of Copernicus and Galileo from the 1835 *Index* of Gregory XIV may give a polite pass to the two scientists even though the removal was made under false pretenses, the fact remains that the 1633 *doctrinal decision* that heliocentrism was "formally heretical" and "erroneous in faith" has never been rescinded. It was under the aegis of a canonical trial, a trial that, according to the Congregation of the Index's answer to Joseph LaLande in 1765, must be officially rescinded before any lifting of the condemnation against either heliocentrism or Galileo could possibly occur. Moreover, since the doctrinal decision was determined and came *prior to* what actually appears in the *Index* itself, which is proven by the fact that Urban VIII had these words read to Galileo:

> Invoking, then, the most holy Name of our Lord Jesus Christ, and that of His most glorious Mother Mary ever Virgin, by this our definitive sentence we say, pronounce, judge, and declare, that you, the said Galileo…. having believed and held a doctrine which is false and contrary to the sacred and divine Scriptures – to wit, that the sun is in the center of the world, and that it does not move from east to west, and that the earth moves, and is not the center of the universe; and that an opinion can be held and defended as probable **after** it has been declared and defined to be contrary to Holy Scripture.[891]

[889] "Filioque" concerned whether the Holy Spirit proceeded from the Father only or from the Father and the Son. The East sided with the former, the West, under the Roman Pontiff, sided with the latter. The issue of contention was the interpretation of Jn 15:26: "But when the Paraclete cometh, whom I will send you from the Father, the Spirit of truth, who proceedeth from the Father, he shall give testimony of me," as opposed to Rm 8:4: "the Spirit of Christ."

[890] Romans 3:28, James 2:24; 5:14; Matthew 16:18-19; 19:9; John 3:5; John 20:23; 2 Timothy 3:16 and many more.

This means that the Catholic Church is left with official papal teachings and/or approvals classifying heliocentrism as "formally heretical" and "erroneous in faith" that cannot be dismissed by a mere maneuvering of the 1835 Index. Indices can revise Indices but they cannot reverse or revise canonical trials. Additionally, if it is claimed that the 1633 decision was erroneous, it can also be asserted that the 1835 Index was erroneous. There simply is no escape from this logic.

Much more favorable to geocentric cosmology among Catholic writers is Dr. Wolfgang Smith, Professor emeritus from the Massachusetts Institute of Technology (whom we have already cited at length), and Fr. Victor P. Warkulwiz, who has a Ph.D. in Physics, and writes:

> …We have that revelation in Genesis. To accept the big bang theory is to repudiate Genesis….Militant atheists espouse the cosmological principle because it removes earth from the center of creation. They see this as a step toward dethroning man as the masterpiece and master of creation, the standpoint of Genesis….The centrality of man was expressed geometrically in the Christian medieval cosmos by having the earth at rest, with the sun and the heavens moving around it….Einstein maintained that he succeeded in eliminating the notion of absolute motion in his theory of general relativity, making the notion "at rest in space" open to definition. But God had already made that definition. Scripture informs us that God established the earth as a standard of rest….The earth is at the center of the universe because it is a place in the universe with special properties, just as geometric centers and centers of mass are places with special properties. God created the earth first, built the rest of the universe around it, defined it as the standard of rest, and made it the home of man… [892]

[891] The sentence of 1633 against Galileo, approved by Pope Urban VIII, and sent out to all the papal nuncios and their underlings in Europe.

[892] Victor P. Warkulwiz, *The Doctrines of Genesis 1-11*, 2007, pp. 66-68.

Lumen Gentium 12: "The Whole Body…Cannot Err"

Perhaps the most significant reason why the doctrine of geocentrism should be considered infallible comes, quite surprisingly, from one of the more modern declarations concerning the teachings of the Church. Earlier we quoted from *Lumen Gentium 25* to show that Catholics are required to give obedience to both infallible and non-infallible teachings of the Church. Yet *Lumen Gentium* contains an even more significant requirement for obedience in regards to geocentric doctrine, and it certainly seems to make the doctrine infallible. It is stated in Paragraph 12:

> The holy People of God shares also in Christ's prophetic office: it spreads abroad a living witness to him, especially by a life of faith and love and by offering to God a sacrifice of praise, the fruit of lips praising his name (*cf.* Heb. 13:15).[893] The whole body of the faithful who have an anointing that comes from the holy one (*cf.* 1 Jn. 2:20 and 27)[894] cannot err in matters of belief. This characteristic is shown in the supernatural appreciation of the faith (*sensus fidei*)[895] of the whole people, when, "from the bishops to the last of the faithful"[896] they manifest a universal

[893] "Through him then let us continually offer up a sacrifice of praise to God, that is, the fruit of lips that acknowledge his name."

[894] "But you have been anointed by the Holy One, and you all know….but the anointing which you received from him abides in you, and you have no need that any one should teach you; as his anointing teaches you about everything, and is true, and is no lie, just as it has taught you, abide in him."

[895] *Lumen Gentium* 12 adds this footnote: "(The *sensus fidei* refers to the instinctive sensitivity and discrimination which the members of the Church possess in matters of faith. – Translator.)"

[896] *Lumen Gentium* 12 adds this footnote: "See St. Augustine, *De Praed. Sanct*. 14, 27: *PL* 44, 980." This refers to Augustine's work *Predestination of the Saints*, Book II, Chapter 14: This grace He placed "in Him in whom we have obtained a lot, being predestinated according to the purpose of Him who worketh all things." And thus as He worketh that we come to Him, so He

> consent in matters of faith and morals. By this appreciation of the faith, aroused and sustained by the Spirit of truth, the People of God, guided by the sacred teaching authority (*magisterium*), and obeying it, receives not the mere word of men, but truly the word of God (*cf.* 1 Th 2:13),[897] the faith once for all delivered to the saints (*cf.* Jude 3).[898] The people unfailingly adheres to this faith, penetrates it more deeply with right judgment, and applies it more fully in daily life.[899]

Since it is a fact that the "People of God," which includes "the bishops to the last of the faithful," have believed unanimously, firmly and without equivocation in the doctrine of geocentrism from the beginning of the Catholic Church and throughout two millennia, and who were "guided by the sacred teaching authority" to do so, this belief necessarily fulfills the criteria of *Lumen Gentium 12* that these same People of God "cannot err." It is an undeniable fact that all the Fathers, all the medievals, all the bishops, priests, saints, doctors, theologians and the remaining Christian faithful of every nation believed in the doctrine of geocentrism. Additionally, three popes and their Holy Offices officially confirmed this absolute consensus in the 17th century against a few men who, because of their own misguided convictions, sought to depart from that consensus, making the attempt in the wake of unproven scientific claims with the express purpose of reinstituting a novel and subjective interpretation of Holy Writ.

As we have seen, even many years after modern science began to treat heliocentrism as a scientific fact, the Catholic faithful still maintained their vigilance for geocentric doctrine. It has only been in the last one hundred years or so that this consensus has waned.

Because of the waning consensus, some objectors might themselves appeal to the principle of *Lumen Gentium 12* and posit that the Holy Spirit is now teaching the "People of God" that heliocentrism has been correct all along. But that notion, of course, is impossible, since the "People of God" could not have been "aroused and sustained by the Spirit of truth" into believing that geocentrism was correct for 1900 years and then have the Spirit suddenly change His mind to teach them the opposite. It would make the Holy Spirit a liar, which is certainly impossible. The reality is, if the "People of God" were led to believe that geocentrism was the truth, and which was, according to the stipulations of *Lumen Gentium 12*, "guided by the magisterium" to confirm their consensus, then there is simply no possibility that a change in their belief could be understood as a movement of the Holy Spirit.

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worketh that we do not depart. Wherefore it was said to Him by the mouth of the prophet, "Let Thy hand be upon the man of Thy right hand, and upon the Son of man whom Thou madest strong for Thyself, and we will not depart from Thee." This certainly is not the first Adam, in whom we departed from Him, but the second Adam, upon whom His hand is placed, so that we do not depart from Him. For Christ altogether with His members is--for the Church's sake, which is His body – the fulness of Him. When, therefore, God's hand is upon Him, that we depart not from God, assuredly God's work reaches to us (for this is God's hand); by which work of God we are caused to be abiding in Christ with God – not, as in Adam, departing from God. For "in Christ we have obtained a lot, being predestinated according to His purpose who worketh all things." This, therefore, is God's hand, not ours, that we depart not from God. That, I say, is His hand who said, "I will put my fear in their hearts, that they depart not from me."

[897] "And we also thank God constantly for this, that when you received the word of God which you heard from us, you accepted it not as the word of men but as what it really is, the word of God, which is at work in you believers."

[898] "Beloved, being very eager to write to you of our common salvation, I found it necessary to write appealing to you to contend for the faith which was once for all delivered to the saints."

[899] *The Documents of Vatican II*, Austin Flannery, O.P., NY: Costello Publishing, 1975, p. 363.

The Signs of Apostasy

The above facts, sadly enough, leave open only one other possibility for the shift in thinking against geocentrism, yet a shift that is taught and confirmed by Scripture, Tradition and the Magisterium. Quite simply, for the present people of the world to depart from the previous consensus of the "People of God" means that the people have been led astray by false teachings. Is such deception possible on a mass scale? According to Scripture and Tradition, it is not only possible, it is predicted to happen some time before the return of Christ. A worldwide apostasy from the faith predicted by St. Paul in 2 Thessalonians 2:3-12[900] may be the only possible reason why the masses could depart from almost two millennia of consistent personal belief and magisterial decrees, not only concerning the doctrine of geocentrism, but every doctrine that is affected by the same non-literal and "historically critical" hermeneutic foisted on the Church in the last hundred years. As we noted earlier, the new hermeneutic, spawned as it was by insisting that Scripture could be interpreted figuratively where it was once interpreted literally, coupled with the idea that Scripture could err when it addressed non-salvation topics, has totally undermined man's docile belief in Holy Writ in the modern age.

Another possibility is that the current rejection of the Church's original teaching on both cosmogony and cosmology is following the pattern of blindness to which Jesus alerted us in the Gospels. For example, in Jesus' conversation with the Pharisees about divorce, we learn that the practice was common in Israel, so much so that almost all the populace believed that it was one's God-given right to divorce one's spouse. For a long time, the illusion of the freedom to divorce seemed to be a positive societal development permitted by God, even as heliocentrism and evolution presently enjoy the same apparent freedom today. So confident were the people in their lifestyle of divorce that they brought the issue to Jesus even though they already knew He had condemned divorce. They reasoned that they could catch Him denying both the Mosaic law and ultimately God's law which inspired Moses to allow divorce. Jesus, as He always managed to do when He was being tested by hypocrites, turned the tables on them. Little did the divorce advocates realize, until Jesus opened their eyes to the stark reality, that their belief in divorce, which opposed the original decree of God, was given to them not because God discovered a better way for them to manage marital conflicts, but for nothing more than the "hardness of their hearts." In other words, Moses, under God's direction, allowed them to divorce because the people were spiritually destitute. It is a divine principle that is often displayed in Scripture – God turns the rebel over to his own desires as a punishment for his rebellion.[901] Similarly, many today are enjoying the illiusion that they have permission to believe and practice many things that were once condemned, claiming that modern science has enlightened them to a new way of life (contraception, artificial insemination, embryonic stem cell research, cloning, eugenics, abortion, same-sex marriage and child adoption, *etc*.). They believe that society has been enlightened as never before to wonderful inventions and increased knowledge for the benefit of the human race. But in reality, nothing has changed in Scripture, Tradition or the Catholic Magisterium. The inventions and knowledge only make them sin faster than they ever did before. They believe in false notions and engage in immoral practices because they have been deceived by the hardness of their own hearts. [902]

These examples, however, are not to say that those who do not believe in geocentrism are either

[900] 3Let no one deceive you in any way; for that day will not come, unless the rebellion comes first, and the man of lawlessness is revealed, the son of perdition, 4who opposes and exalts himself against every so-called god or object of worship, so that he takes his seat in the temple of God, proclaiming himself to be God. 5Do you not remember that when I was still with you I told you this? 6And you know what is restraining him now so that he may be revealed in his time. 7For the mystery of lawlessness is already at work; only he who now restrains it will do so until he is out of the way. 8And then the lawless one will be revealed, and the Lord Jesus will slay him with the breath of his mouth and destroy him by his appearing and his coming. 9The coming of the lawless one by the activity of Satan will be with all power and with pretended signs and wonders, 10and with all wicked deception for those who are to perish, because they refused to love the truth and so be saved. 11Therefore God sends upon them a strong delusion, to make them believe what is false, 12so that all may be condemned who did not believe the truth but had pleasure in unrighteousness.

[901] *Cf*., Nm 11:1-35; Ez 20:25; Rm 1:20-24; 2Th 2:11

[902] Matthew 19:8: He said to them, "For your hardness of heart Moses allowed you to divorce your wives, but from the beginning it was not so."

no longer individually faithful to the Catholic Church or that they are an integral part of the apostasy. The masses cannot be blamed for what they have been taught by their authorities. It only means that one of the signs of the general apostasy predicted by Holy Scripture will be a general and pervasive turning away from the previously accepted truths of Scripture and Tradition. The mass rejection of geocentrism is just one sign of that eventuality.

In closing, we will quote the words of Catholic scientist, author, and former professor of the Massachusetts Institute of Technology, Wolfgang Smith:

> Today, four centuries later, what lay concealed in that beginning has become clearly manifest, for all to see; as Arthur Koestler has said, it is "as if a new race had arisen on this planet." Could this be the reason why St. Malachy, in his famous prophesies, has characterized the reign of Pope Paul V (1605-1628) by alluding to the birth of "a perverse race"? One needs to recall that what is sometimes termed the first Galileo trial took place in the year 1616. What, then, could be the "perverse race" to which the saintly prophet refers? Given that Galileo is indeed "the father of modern science," one is compelled to answer that it is none other than the race of modern scientists, and by extension, the community of individuals imbued with the modern scientistic outlook….
>
> As everyone knows, Galileo was formally tried in 1633 and forced to recant his Copernican convictions. The proposition that the Sun constitutes the immobile center of the universe was declared to be "formally heretical, because it is expressly contrary to the Holy Scriptures." And so the matter stood until 1822, when, under the reign of Pius VII, the Church commenced to soften its stand with regard to what it termed "the general opinion of modern astronomers." Thus began a process of accommodation with "the new race" which came to a head in 1979, when Pope John Paul II charged the Pontifical Academy of Sciences to re-open the Galileo case, and if need be, to reverse the verdict of 1633. Given the mentality which came to the fore in the wake of Vatican II, the outcome of that inquiry was never in doubt: Galileo was exonerated – some would say, "canonized" – following which Pope John Paul II in effect apologized to the world for wrongs committed by the Church. Could this be the reason, perhaps, why St. Malachy alludes to this Pope in the enigmatic words "*De Labore Solis*"? To be sure, the phrase, which traditionally refers to the movement of the Sun, does relate to Galileo, the man who denied that the Sun does move. Could it be, then, that St. Malachy, having previously signaled the birth of a "perverse race," is now alluding to the fact that some four hundred years later the Church has reversed its stand and relinquished its opposition to that "race," which is to say, to that new philosophy? Certainly St. Malachy's allusion can be interpreted in other ways as well; for example, "De Labore Solis" might be taken as a reference to the fact that this Pope, who has traveled far more extensively than any of his predecessors, has so many times "circled the globe" in his papal airliner (named, interestingly enough, "Galileo").
>
> But be that as it may, the fact remains that the Church has now joined the rest of Western society in adopting a scientistic worldview; during the reign of Pope John Paul II, and with his sanction, a Copernican Revolution has finally taken place within the Church itself. Yet, to be precise, it is not the Church as such that has undergone change – that has "evolved," as the expression goes – but what has changed is simply the orientation of its human representatives: it is Rome, let us say, that has reversed its position. Humanly speaking, the ecclesiastic establishment may have opted for the only viable course: given the sophistication and prowess of contemporary science – given the "great signs and wonders" that could deceive even the elect – it may not indeed be feasible to stem the mounting tide of scientistic belief. Nonetheless one must insist, in light of our preceding analysis, that the contemporary cosmology, in any of its forms, is not in fact compatible with Christian doctrine. To the extent, therefore, that Rome has embraced a scientistic

> outlook, it has compromised the true teaching of the Church: this is the crux of the matter. Call it human failing, call it "political correctness," call it apostasy – the fact is that Rome has become "a house divided against itself."[903]

[903] Wolfgang Smith, *The Wisdom of Ancient Cosmology: Contemporary Science in Light of Tradition*, Oakton, VA: Foundation for Traditional Studies, 2003, pp. 180-181. Dr. Smith's other works include: *Cosmos and Transcendence* (1984), *Teilhardism and the New Religion* (1988), and *The Quantum Enigma* (1995).

"Human science gains greatly from revelation, for the latter opens out new horizons and makes known sooner other truths of the natural order, and because it opens the true road to investigation and keeps it safe from errors of application and of method. Thus does the lighthouse show many things they otherwise would not see, while it points out the rocks on which the vessel would suffer shipwreck."

Pope St. Pius X[904]

Let this be recorded for a generation to come, so that a people yet unborn may praise the Lord.

Psalm 102:18

[904] Pope Pius X, encyclical of March 12, 1904, *Iucunda Sane*, 35.

Chapter 15

Interpreting Genesis 1

Its Geocentric Implications

The opening verses of Genesis 1 begin:

First Day

[1]In the beginning God created the heavens and the earth.
[2]The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters.
[3]And God said, "Let there be light"; and there was light.
[4]And God saw that the light was good; and God separated the light from the darkness.
[5]God called the light Day, and the darkness he called Night. And there was evening and there was morning, one day.

Second Day

[6]And God said, "Let there be a firmament in the midst of the waters, and let it separate the waters from the waters."
[7]And God made the firmament and separated the waters which were under the firmament from the waters which were above the firmament. And it was so.
[8]And God called the firmament Heaven. And there was evening and there was morning, a second day.

Third Day

[9]And God said, "Let the waters under the heavens be gathered together into one place, and let the dry land appear." And it was so.
[10]God called the dry land Earth, and the waters that were gathered together he called Seas. And God saw that it was good.
[11]And God said, "Let the earth put forth vegetation, plants yielding seed, and fruit trees bearing fruit in which is their seed, each according to its kind, upon the earth." And it was so.
[12]The earth brought forth vegetation, plants yielding seed according to their own kinds, and trees bearing fruit in which is their seed, each according to its kind. And God saw that it was good.
[13]And there was evening and there was morning, a third day.

Fourth Day

[14]And God said, "Let there be lights in the firmament of the heavens to separate the day from the night; and let them be for signs and for seasons and for days and years,
[15]and let them be lights in the firmament of the heavens to give light upon the earth." And it was so.
[16]And God made the two great lights, the greater light to rule the day, and the lesser light to rule the night; he made the stars also.
[17]And God set them in the firmament of the heavens to give light upon the earth,
[18]to rule over the day and over the night, and to separate the light from the darkness. And God saw that it was good.
[19]And there was evening and there was morning, a fourth day.

These opening verses of Scripture are probably the most important in the book of Genesis, if not the entire Old Testament, yet they are seen as the most difficult to interpret and often fall victim to misunderstanding and exegetical abuse. One reason for the difficulty is that the exegete, if he is prepared to interpret the verses as literally as his traditional hermeneutics leads him to interpret other passages of Holy Writ, must be willing to:

- accept that the Earth was created first; three days before the sun, moon and stars which do not appear until the Fourth Day;

- accept that the light created on the First Day is prior to and independent of the light radiating from the sun and stars on the Fourth Day;

- accept the creation of an expansive firmament on the Second Day that rests in outer space and upon which water rests.

Unlike many today, the Fathers of the Church found such concepts relatively easy to accept. At the same time, they also found it easy to reject the evolutionary and Big-Bang-like concepts that were prevalent in the Greek culture. As the early third-century Father, Hippolytus put it:

> But Leucippus, an associate of Zeno...affirms things to be infinite, and always in motion, and that generation and change exist continuously.... And he asserts that worlds are produced when many bodies are congregated and flow together from the surrounding space to a common point, so that by mutual contact they made substances of the same figure and similar in form come into connection; and when thus intertwined, there are transmutations into other bodies, and that created things wax and wane through necessity..."[905]

But since today modern society is 1,500 or so years removed from the Fathers of the Church and believe they have progressed way beyond them in scientific knowledge, these biblical passages are, indeed, difficult for many people to accept on a literal basis. There seems to be little in modern science with which to coincide them. No one has ever seen a "firmament" with water resting on its surface. Rather, like Leucippus, modern science insists that the universe came into being with a "Big Bang" which originated from a cosmological "singularity," some of which, over billions of years, finally coalesced into objects such as our Earth. For people to accept, as Genesis 1 apparently teaches, that the Earth appeared first before anything resembling a Big Bang ever occurred, goes against just about everything modern man has been conditioned to believe about the cosmos. But there the words unabashedly and unforgivingly remain in Holy Writ, written by a Supreme Being who cannot lie. Whether they like it or not, the opening words of the Bible require the reader to make a crucial decision from the get-go as to what interpretive methodology he will adopt. Fortunately or unfortunately, the decision he makes will affect everything else he reads within and subsequent to Genesis 1 in the most profound way.

Today there are a number of Christian cosmologists who see little problem accepting the Big Bang and Einstein's Relativity theories, despite the inordinate anomalies discovered in them almost daily. These Christian cosmologists believe that the universe is billions of years old, although they cautiously add that it could only have developed into the complexity we see today by an intermittent divine intervention. They call themselves "Progressive Creationists" and "Theistic Evolutionists," although the latter believe that God intervened only once, at the beginning of time.

There are other Christian scientists who, although they accept Relativity, reject the Big Bang. Most of these scientists are connected with the *Creation Research Institute* (CRI) and *AnswersinGenesis* (AIG) with such names as the late Henry Morris, Duane Gish, Russell Humphreys, Donald DeYoung, and Ken Ham as their main spokesmen, respectively. Most of these scientists adhere to a strict biblical science, accepting the fact that the Genesis narratives compel them to believe in a precise six 24-hour day creation week, as well as a non-gap interpretation of the genealogies of Genesis chapters 5, 10 and 11. This interpretative methodology results in a time period of approximately 6,000 years to the present day for the universe to have been in existence since Creation. In addition, although there are a few private geocentrists among them, the official policy of *Creation Research Institute* and *AnwersinGenesis* and their affiliates is a Relativistic, Copernican universe.

For the reasons already outlined, this book, *Galileo Was Wrong: The Church Was Right*, has shown the foundational flaws in Relativistic cosmology. Although organizations such as the *CRI* and *AIG* are to be applauded for their adherence to a literal interpretation of Genesis 1:20-31 with regard to how animal species and man came into existence, by the same token they systematically avoid the same exegetical rigor in their respective interpretations of the non-biological items in Genesis 1:1-19. Russell Humphreys, for example, although he admits that

> Genesis 1:1-2 declares the uniqueness and centrality of our home planet, and mentions the Earth first...long before it

[905] *The Refutation of All Heresies*, Ch. X.

> mentions the Sun, Moon and stars over a dozen verses later, on the fourth day,

regresses from the obvious implications of this strong language since, due to his siding with various preferences of modern science, he subsequently removes Earth from the center and replaces it with the Milky Way galaxy. In other words, Humphreys' view is galactocentric, not geocentric. This, coupled with his institution's failure to offer a convincing critique of geocentrism,[906] leaves Humphreys' galactocentric view as a non-literal reading of Genesis 1:1-19 that is opposite his literal reading of Genesis 1:20-31.[907] As Walter van der Kamp observed:

> I still have to find one all-out creationist who takes Genesis 1:1-19, minus the verses 11, 12 and 13, just as straight-forwardly as Genesis 1:20-31. But sauce for the goose is sauce for the gander: he who accepts instantaneous *fiat* creation of our planet's flora and fauna has with regard to cosmogony thereby committed himself to a beginning of a Heaven containing nothing but a primeval Earth…. Popularly formulated: a Bible-believing Christian cosmogony must reject a Big Bang now having resulted in countless suns…. Contrariwise it has to postulate sudden emergence of, to quote Hoyle, 'the bubble in which we live,' and a dump of matter without form providing after five days of formation the dust out of which we are fashioned…. Just postulate not an 'etherosphere' embracing Mother Earth, but a 'galactosphere' encompassing the stars. Then you will have come close to enthroning Tycho Brahe![908]

And again:

> In the same manner, but with even less solid observations to build on, astrophysicists discuss in their diagrams the life cycles of stars, their composition, and their distance from us. Why then do creationists soundly reject Darwin, but still kowtow to Copernicus? No man should serve two masters, should he? I have as yet not been able to find one orthodox theologian willing to give me a serious hearing…. I have come to realize how it had to be expected…. Small wonder that these theologians assume the article of modern scientific faith to have the same kind of infallibility, which they take for granted in their own deductions from Holy Writ. People for whom the Bible is no more than a quaint old book, and who therefore have no interest in saving it at the cost of scientific knowledge, gladly admit that the Scriptures proclaim the pre-eminence of man in an Earth-centered universe. To doubt or to deny it, they will affirm, is to wrench the meaning of the Genesis text…. Anyway: caught between a hard rock and an immovable place the defenders of the Infallible Word do with regard to Genesis 1:1-19 not shilly-shally: the literalness of that pericope is the loser. But the thing that baffles me to no end is that in relation to Genesis 1:11-13 and 20-31 the creationists among these theologians defend tooth and nail its literalness. Why this measuring by two standards?[909]

Van der Kamp's words are logically sound. Obviously, it is hardly inspiring to watch Bible Christians display to the world how faithful they are to the literal interpretation of the divine word if they end up rejecting that very literalness when confronted with Scripture (Genesis 1:1-19) that rubs

[906] *E.g.*, astronomer D. R. Faulkner's effort in "Geocentrism and Creation" in *Ex Nihilo Technical Journal* 15 (2):110-121, 2001, which attempted to refute Gerardus Bouw's book *Geocentricity*, and which was in turn rebutted by Bouw in "The Copernican Revolution: A Fable for Educated Men," *Biblical Astronomer* technical paper, No. 2, 2002, pp. 1-16, with no return rebuttal by Faulkner.

[907] Another advocate of a galactocentric universe is Robert V. Gentry, famous for his work in Polonium haloes and reinterpretation of red shift. Gentry's view, however, while similar to Humphrey's, is highly influenced by the Seventh Day Adventist belief which holds that God resides at the center of the universe, but apart from Earth.

[908] *De Labore Solis*, pp. 54, 39.

[909] *De Labore Solis*, pp. 107-108.

against one of the more popular but unproven theories of modern science – Copernicanism. Although CRI's and AIG's decision to downplay geocentrism is based, in part, on a desire not to foment undue criticism from the secular world as they valiantly defend Creationism against the theory of evolution, still, any astute critic can see the intellectual hypocrisy in that defense, since the literal interpretation of Genesis 1-2 should be an all-or-nothing proposition for the faithful exegete of Holy Writ. The exegete, once he commits himself to a literal interpretation, cannot, without explicit directives from the text itself, arbitrarily decide when he can depart from that interpretative philosophy, especially since the non-biological sections of Genesis 1, which describe the making of a geocentric universe, take up 50% of the six days of creation (Days 1, 2 and 4).

Protestant/Fundamentalist Interpretations of Genesis 1

Hugh Ross

Although there are many Bible Christians today who have sought to establish a scientific cosmology and cosmogony based on the opening words of Genesis, they invariably distort these same Scripture passages due to the scientific presuppositions they bring to it. Scripture does not teach heliocentrism, relativity, or evolution, yet various modern Christian exegetes invariably force these unproven beliefs into the words of Holy Scripture. One advocate and prolific spokesman for such modern exegesis is Hugh Ross.[910] Although Ross is more consistent to his own principles of biblical exegesis than someone like Russell Humphreys, this often leads him to even more erroneous interpretations, since Ross is more confined by his hermeneutic to meld atheistic science's beliefs into the theism of Scripture.

For example, in Ross' view, the battle for cosmogony today is limited to the Big Bang versus the Steady-State theories. Since the Big Bang offers Ross a "beginning" to time, whereas the Steady-State model holds there is neither a beginning nor an end to the universe, logically, with only these two options at his disposal Ross feels compelled to defend the Big Bang, and consequently he interprets Genesis 1-2 exclusively from that single scientific perspective. Consequently, as we will see, he ends up with a significant number of forced interpretations.

Ross begins by affirming his belief in Copernican cosmology. As he sees it:

> Arguably the most famous example of misapplication of the scientific method was the Roman Catholic Church's rejection of Galileo's heliocentric (sun-centered) theory of the solar system.[911]

[910] Some of Ross' works include: *The Fingerprint of God: Recent Scientific Discoveries Reveal the Unmistakable Identity of the Creator*, California: Promise Publishing Co., 1989, 1991; *Creation and Time: A Biblical and Scientific Perspective on the Creation-Date Controversy*, Colorado: NavPress, 1994; *Beyond the Cosmos: What Recent Discoveries in Astronomy and Physics Reveal about the Nature of God*, Colorado: NavPress, 1996; *The Creator and the Cosmos: How the Greatest Scientific Discoveries of the Century Reveal God*, Colorado: NavPress, 1993; *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, Colorado: NavPress, 1998.

[911] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, Colorado: NavPress, 1998, p. 189. In another place Ross primes his reader to consider an Earth-centered cosmos as an example of "Bible Illiteracy," following with: "…I have heard professors assert before scholarly audiences that the Bible teaches a flat Earth geocentrism (placing the Earth at the center of our solar system or the universe)…" (*ibid*., p. 15). Ross' subtle yet deliberate attempt to bond "flat Earth" advocates and geocentrism (even though he conveniently blames it on "professors") is typical of the scientific demagoguery he uses in most of his books to persuade people to his Big Bang/Relativistic viewpoint. With just a little open-minded study, Ross could have learned quite quickly that the Fathers of the Catholic Church all believed in a spherical Earth, even though they were all firm believers in geocentrism. As even Stephen Gould admitted: "There never was a period of 'flat Earth darkness' among scholars (regardless of how many uneducated people may have thus conceptualized out Earth both then and now). Greek knowledge of sphericity was never lost, and all major medieval scholars accepted the Earth's roundness as an established fact of cosmology" ("The Persistently Flat Earth," *Natural History*, March 1994, p. 14). Similarly, Jeffrey Russell, in *Inventing the Flat Earth*, Praeger Paperback, 1997, reveals that neither Christopher Columbus nor his contemporaries thought the Earth was flat. Unfortunately, since the late 1800s this falsehood is perpetuated in academia and in the media today in order to create the perception that the medieval period was scientifically illiterate.

Ross has a somewhat freewheeling interpretive methodology that, although claiming to be faithful to the text, in actuality exhibits a faithfulness that is defined by Ross' commitment to the Big Bang theory, not a commitment to a thoroughgoing literal interpretation of Genesis. This foundation in his thinking comes from Ross' own words:

> By the time I turned sixteen, I had studied enough cosmology to become convinced that of all the origins models ever proposed, the big-bang model best fit the observational data. Soon after my sixteenth birthday, the implications of that model began to dawn on me. Without consciously doing so, I took a huge philosophical and spiritual step…. I understood that the big-bang meant an expanding, "exploding" universe. I agreed with Einstein that an exploding universe can be traced back to an explosion, a beginning. If the universe had a beginning, it must have a Beginner. The big-bang theory implied that a Creator exists.[912]

In one sense, Ross is correct, since the idea of a "beginning" is the very reason that Stephen Hawking has recently distanced himself from the Big-Bang theory[913] (and which, we suspect, a lot more secular scientists will do in the coming years, especially since the flaws in Big Bang cosmology are almost appearing daily in the scientific journals and secular newspapers). Still, Ross remains a die-hard advocate of the Big Bang, more or less denouncing anyone who rejects the theory as scientifically and biblically illiterate. We submit, however, that Ross' interpretation of Genesis consistently attempts to foster a meaning and motivation on the text that is totally foreign to what is plainly stated by its inspired words. For example, Ross writes:

> Scientifically, the movement of the sun across the sky could be the result of the sun moving relative to the Earth or the Earth relative to the sun. Biblically, the "foundations of the Earth" indeed are "immovable" in spite of any revolution of the Earth about the sun or rotation of the Earth about its axis because the Bible verses making such statements always are from the perspective, or point of view, of an observer on the surface of the Earth.[914]

The operative word in Ross' analysis is "relative." Having already accepted Einstein's Relativity as the foundation from which to view the world, it is easy for Ross to appear "scientific" as he fosters the idea that biblical language can mean either the Earth moves relative to the sun or vice-versa. To Ross there is no contradiction in such opposite propositions, since he has already made the Big Bang and Relativity the foundation upon which he stands, and he does his best to convince the reader that the biblical language allows this kind of interpretation. In fact, to support his thesis, Ross delves deeply into the Hebrew text seeking to discover its original meaning, but unfortunately his conclusions are always shaded by what he has already convinced himself is the only possible answer. For all his lexical analysis of Hebrew words, one of the main things Ross fails to see is that the Hebrews who wrote Genesis 1 did not assign the meanings to its words that Ross so desperately wants to attach to them. The writers of the Hebrew text, as is well known among biblical scholars and historians, understood the Hebrew words of Genesis to be teaching an Earth-centered cosmos that was created in six literal days, since that is obviously the plain meaning of the Hebrew words. They did not speak of "relative" perspectives or "points of view," since to them nothing was relative and there was only one point of view – the correct one. Ross attempts to sprinkle his analysis with qualifications and disclaimers that attempt to convince the reader that the Bible

> …stands apart, and dramatically so. From the first page I could see distinctions. The quantity and detail of the scientific context far exceeded what I found in the other books. To my surprise, the scientific method was as clearly evident in Genesis 1 as it is in modern research…. I calculated the odds that the writer could have guessed the initial conditions and correctly

[912] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, pp. 10-11.

[913] *A Brief History of Time*, p. 100ff.

[914] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, p. 189.

> sequenced the events…and I discovered that the odds are utterly remote…[915]

But in the end, it appears that what Ross respects more is his self-attested ability to mold the Genesis text into his own scientific presuppositions, and then he congratulates himself by asking the reader to marvel at what an accurate piece of literature Genesis turns out to be. Although his enthusiasm for the biblical text certainly shines through, it is an enthusiasm that actually gets in the way of the biblical text rather than explicating it more clearly. In brief, Ross simply makes an eisegesis out of the text from what his scientific presuppositions desire to see.

Case in point: Since he is aware that Genesis 1 specifies the existence of the Earth on the First Day of Creation but reserves the appearance of the sun and stars to the Fourth Day, Ross needs some exegetical basis for positing that the Big Bang occurred before the appearance of the Earth. Although Ross does not succumb to the temptation common among other biblical enthusiasts (*e.g*., those who claim that the clause "And God said, Let there be light" refers to the Big Bang, which causes an obvious conflict with the fact that the Earth was in existence before the "light" was called into being),[916] Ross decides that the opening sentence of Genesis 1:1 will suffice for the task. He writes:

> *Hashamayim we ha'erets* ("heavens" plural and "Earth" singular with the definite articles and the conjunction) carries a distinct meaning, just as the English words "under" and "statement" or "dragon" and "fly" put together as compound nouns take on specific meanings. *Hashamayim we ha'erets* consistently refers to the totality of the physical universe: all of the matter and energy and whatever else it contains. All of the stars, galaxies, planets, dust, gas, fundamental particles, background radiation, black holes, physical space-time dimensions, and voids of the universe – however mysterious to the ancient writer – would be included in this term.[917]

So that we don't falsely accuse Ross, we need to see his further development of this particular interpretation before we comment. Two paragraphs later he explains even more clearly his intention:

> New scientific support for a hot big-bang creation event, for the validity of the space-time theorem of general relativity, and for ten-dimensional string theory verifies the Bible's claim for a beginning. In the final decade of the twentieth century, astronomers and physicists have established that all of the matter and energy in the universe, and all of the space-time dimensions within which the matter and energy are distributed, had a beginning in finite time, just as the Bible declares.[918]

In other words, Ross has firmly sealed in his mind that two theories, Relativity and String Theory, have been proven beyond much doubt, and thus, as he puts it, this evidence "verifies the Bible's claim for a beginning." Ross is so enthused that these modern cosmologies start with a "beginning" that it doesn't really matter to him just what *kind* of beginning the two theories propose, or even if the beginning of one is different than the beginning of the other. In an ironic sort of way, Ross reverses the common cliché "the end justifies the means" to "the beginning justifies the end."

Let's examine his claims a little closer. In regard to Gn 1:1, biblical exegetes normally haggle over whether the opening sentence ("In the beginning God created the heavens and the Earth") is merely an introductory statement of all that follows in vrs. 2-31, or an actual statement of fact that the heavens and the Earth were created prior to the objects created in vrs. 2-31. The closer to Ross' view is the latter. Ross depends on this interpretation, obviously, since he must have the Big Bang placed chronologically prior to anything else in the narrative. But this presents a serious problem for Ross. By claiming that the clause "God created the heavens" refers to "All of the stars, galaxies,

[915] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, 1998, pp. 11-12.

[916] As proposed, by Professor Dermott Mullan, astrophysicist at the University of Delaware, (letters on file).

[917] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, 1998, p. 20.

[918] *Ibid*., p. 21.

planets…" this means that the Genesis writer's detailed description of the creation of the stars and sun on the Fourth Day (Gn 1:14-19) is either superfluous or does not refer to an actual creation of the stars and sun. More specifically, it means that as the Genesis writer specifies these heavenly bodies were "created" on the Fourth Day, not the First Day, Ross insists that this information simply cannot be interpreted literally. Ross must then change the normal denotation of the Hebrew words to mean something other than a creation of the sun and stars.

As an aside, Ross' type of interpretive methodology could lead to the proposition that even the remaining Days of Genesis 1 do not require a literal interpretation (although Ross is not guilty of this himself). For example, one could argue, based on Ross' line of reasoning, that since the Fourth Day is not an act of creation, then the firmament was not created on the Second Day; the plants were not created on the Third Day; and the birds, fish, animals and man were not created on the Fifth and Sixth Days, respectively. In fact, there would be little to stop someone from concluding that there is anything in the narrative we can take at face value.

Ross, however, wants to be a bit more discriminating concerning the things he applies to the "heavens and the Earth" since, although he asserted that "the heavens" includes all the "matter and energy" in the universe, he did not say that it included the plants, fish, fowl, animals and man. Perhaps Ross sees "the heavens" as completely stocked with its essential ingredients on the First Day but the Earth has, as yet, to be furbished. But this also presents a problem, since Gn 1:1 suggests no such imbalance in the constitution of heaven and Earth. Based on its simple wording, Ross cannot claim that the heavens are complete but the Earth is incomplete; not, at least, without imposing his personal view on the text.[919]

The problems continue to mount for Ross. Once he commits himself to what he believes is a literal interpretation of the words of Gn 1:1, then, to be exegetically fair with the text, he should interpret Gn 1:2-31 in exactly the same fashion. Unfortunately, he cannot do so because he has already presupposed that the sun and stars were created on the First Day as opposed to the Fourth Day.

Accordingly, now is the crucial point in whether Ross' whole approach to melding Scripture and modern cosmology will survive. This is precisely why Ross covers this particular subject (the creation of the sun and stars) in the opening pages of his book, for without a satisfactory solution to the apparent contradiction between the First Day and the Fourth Day, he knows he will be building on sand. In fact, if Ross cannot provide a convincing answer, then every book that he has written on this subject is virtually worthless, since they are all based on the same premise. So does Ross have a solution? Well, he has what he believes is the clinching argument. Titled: "A Crucial Shift," Ross explains his exegetical rationale in the next paragraph:

> The frame of reference, or point of view, for the creation account suddenly shifts in Genesis 1:2, from the heavenlies that make up the entire physical universe to the surface of planet Earth. For whatever reasons, perhaps because it comes so abruptly, most readers – even scholarly commentators – miss the shift. I am convinced that my absorption in science prepared me to see it. In fact, I was struck with amazement that this ancient document actually is structured like a modern research report…. In each case the passage identifies the reference frame (or viewpoint) from which events are described, the initial conditions, a chronology, a statement of final conditions, and some conclusions about what transpired.[920]

[919] References to the creation of the "heaven and Earth" appear many times in the Old Testament, but in each case there is no stipulation that the heavens contained their complete adornment prior to the Earth's, or that Genesis 1:1 suggests some type of chronological priority for the heavens over the Earth. Rather, the heavens, as well as the Earth, await their material constitution in the remaining six days (*cf.*, Ex 20:11; 31:17). In fact, the heavens and the Earth are often addressed separately from the material bodies subsequently added to them (*e.g.*, Ps 146:6 [145:6]; Ac 4:24; 14:15; Cl 1:16; Ap 10:6; 14:7). There is never a reference in Scripture to the heavens being created first and the Earth second (*cf.* 2Kg 19:15; 2Ch 2:12; Ps 121:2 [120:2]; 124:8 [123:8]; 134:3 [133:3]; Is 37:16). The heavens and the Earth are said to pass away at the same time (Mt 5:18; 24:35; 2Pt 3:10). The heavens may also refer to the angels and their abode, as is suggested by such passages as Dt 30:19; 31:28; Ps 69:34 [68:35]; 115:15 [113:15]; Ap 12:12).

[920] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, 1998, p. 21.

Thus, in Ross' interpretation of the text, the Genesis narrator is said to be following the "scientific method" such that he establishes the correct interpretive scheme by making a specific statement regarding the all-important "reference frame" from which he speaks. But is Gn 1:1 really a "reference frame," or is it just a plain statement about certain actions that occur? If both the "heavens" and the "Earth" are mentioned, then there is no attempt to impose a specific "reference frame" on the text, since what is being created are two viewpoints, one from heaven and one from Earth, not merely the heavens. If the passage had said something similar to the following: "In the beginning God created the heavens, *and then* he created the Earth," or "In the beginning God created the heavens, and after that was completed he created the Earth" Ross might have an argument since the text would be clear that the heavens were created first and thus would serve as the primary reference frame. But the text of Gn 1:1 insists otherwise. This is evident by the fact that Gn 1:2 continues its description of events based on the fact that the Earth now exists, and thus we are then given more information as to its condition such that the narrator adds the appropriate contiguous wording: "and the Earth was without form and void, and darkness was upon the face of the deep." Consequently, there is no particular "reference frame," and thus there is no "crucial shift" between Gn 1:1 and 1:2. If anything, there is a flow of thought since the waw-disjunctive of the original Hebrew ("and") that begins Gn 1:2 makes the continuity clear.[921]

We must also point out that if the text announces in Gn 1:1 that the Earth was created, yet insists in the remaining account that it needs to be furbished because it was initially made "without form and void and darkness on the face of the deep," then it only makes sense that "the heavens" have neither been created as yet nor have received the accessories that will make its abode functional. Needless to say, on the very same Day, the First Day, God says, "Let there be light" (Gn 1:3). This is not a light that is generated by the Earth, and thus it must have its origin somewhere above the Earth's surface, in order for it to provide the "evening-morning" sequence stipulated at the end of Day One ("and there was evening and morning day one"). Likewise, on the Second Day, God creates the firmament, a mysterious substance that has the ability to divide and form a barrier between massive amounts of water. Although some of this water remains on Earth, the remainder, according to the text, is sent to a place above the firmament or heavens (Gn 1:6-9). That the firmament is the ornamentation of the heavens, not the Earth, is noted by the fact that Gn 1:8 says, "God called the firmament the heavens."[922] The final furbishing of "the heavens" comes on the Fourth Day, wherein the sun, moon, and stars are created. All in all, the account is seamless. After the heavens and the Earth are created, both are still missing their most vital parts, that is, the parts that will make them functional and which will cause the heavens and the Earth to cooperate with one another and share each other's commodities. Thus, whatever "scientific" paradigm Genesis 1 is following, it is certainly one that neither creates preferred "reference frames" nor makes dramatic shifts in its historical account.

Consequently, Ross' thesis does not hold. Gn 1:1 does not, in any sense, describe a primordial explosion commonly dubbed "the Big Bang." If read in its plain sense, there is, indeed, a primordial birth, but it is the Earth which awaits its adornment scheduled for the remaining hours of the First Day, and the subsequent fixtures added from the Second through the Sixth Days.[923]

[921]Gn 1:2 begins with the Hebrew *waw*-disjunctive or what is also known as a *waw*-explicative (והאדץ), wherein a *waw* is placed before a noun, as opposed to a *waw*-consecutive which places the *waw* before a verb. The *waw*-disjunctive of Gn 1:2 represents a continuation of thought from Gn 1:1, not a change in scene or perspective. As such Gn 1:1 is a titular or introductory statement for the chapter, consequently leaving the earth independent of the heavens until the heavens are introduced in Gn 1:8 under the title "firmament" that is created on the Second Day (Gn 1:6-7). The *waw*-disjunctive thus makes vrs. 1-5 describe the earth existing by itself for a whole day, and subsequently have the heavens come into being in vrs. 6-9 on the Second Day. Interestingly enough, Scripture never refers to the Earth as being "in the heavens," but always independent of the heavens.

[922] The Hebrew uses the plural שמים ("the heavens") in Gn 1:8, the same as it does in Gn 1:1.

[923] What is also neutralized by Ross' failure to support his foundational interpretation of Gn 1:1 is his attempt to support theistic evolution or progressive creationism since, if there is no break between the creation of "the heavens" and "the Earth," then there is no time for a development of the cosmos on an evolutionary time scale. Moreover, without a cosmic evolutionary time-scale,

Once again, if one is going to commit himself to a literal interpretation of Genesis 1, he must acknowledge that the Earth was created before the other heavenly bodies, *e.g*., the sun and stars. That being the case, the Genesis writer gives us an Earth-centered cosmos around which all the other celestial bodies will be situated. Scientifically speaking, it only makes sense that the Earth cannot be revolving around a sun or have its day/night sequence caused by a sun that will not yet exist for three days. According to the text, the only entity moving is the Spirit (who is hovering over the waters), not an Earth in rotation. In the midst of the Spirit's movement the light is created, which, because of light's nature, also moves, and the Spirit is thus directing the light and causing the day/night sequence.

Suffice it to say, since Ross has committed himself to the stipulation that the celestial functions were already in progress in the opening moments of the First Day, this leads him to give a somewhat pedantic list of scientific processes that must be strung together in order to provide his reader with some semblance of logic to his already convoluted exegesis of Genesis 1. At one point Ross is hypothesizing about an atmosphere so thick around the Earth that light becomes impenetrable, which suddenly disappears because "a body at least the size of Mars…possibly twice as large, made a nearly head-on hit and was absorbed, for the most part, into Earth's core."[924] Indeed, these kinds of wild concoctions and unproven theories permeate Ross' books. One's head is swimming with speculation after speculation in Ross' account of what may, or must, have happened in the past in order to account for how everything should fit together in the present.

For economy of space we will analyze just one of the Days for which Ross provides a subsequent interpretation – the Fourth Day. Ross writes:

> "On Creation Day Four, the sun, the moon, and the stars became distinctly visible from Earth's surface for the first time."

Immediately we see the twisting of the text that is going to pervade Ross' interpretation in order to make his Big Bang theory fit. We now see that in order to compensate for his confinement of "all the stars, galaxies, planets, dust, gas" to the opening line of Genesis 1, Ross must now turn what has been traditionally understood as the actual *creation* of the sun and stars on the Fourth Day (and what the Hebrew writer himself believed) into a mere *unveiling* of what Ross says are already-present celestial bodies. According to Ross, these celestial bodies become visible on the Fourth Day because of the removal of a dense cloud that was already present due to the primordial condition of the Earth.

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there cannot be a geologic evolutionary time scale, since one depends on the other.

[924] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, 1998, p. 32. In his other books, Ross assumes as proven many scientific theories that are still in dispute. For example, Ross claims: "Despite the obsession of many scientists – and even some theologians – to avoid the dramatic conclusion of an expanding universe, no substitute explanation has ever been put forward to account for the red shifts of distant galaxies. All tentatively proposed alternatives have been easily struck down" (*The Fingerprint of God*, pp. 82-83). Either Ross has been selective in his reading of the redshift controversy, or the modern science establishment has led him to believe that alternatives to equating redshift to distance and speed have been "easily struck down." According to the literature, the only way the alternatives have been dismissed is by suppression of the evidence. Scores of books have been written on this issue, and at the least, Ross should have the intellectual honesty to alert his reader to these sources, especially since his book, *The Fingerprint of God*, is a voluminously annotated work. Perhaps the reason Ross has chosen not to reveal these sources is that they come from opponents to his cherished Big Bang theory, *e.g.*, Halton Arp's *Quasars, Redshifts and Controversies*, 1987; *Seeing Red: Redshifts, Cosmology and Academic Science*, 1998; Eric Lerner's *The Big Bang Never Happened*, 1992; Tom Van Flandern's *Dark Matter, Missing Planets and New Comets*, 1993; just to name a few of modern science's opponents to the popular "redshift equals distance" theory. Edwin Hubble himself doubted whether redshift could be used to measure distance, and his partner M. L. Humason had denied it outright. Opposition to alternative explanations to redshift were advertised no better than when Arp (a protégé of Edwin Hubble), after documenting hundreds of pages of controverting evidence, was suddenly denied telescope time at the major observatories in the United States (forcing Arp to go to Germany to continue his studies). Fred Hoyle, who supported Arp, also had his own persecutions. In one instance, Arp recalls dining at Hoyle's university and his mention of Hoyle's name at the dinner table. One of the diner's stated: "He is a great scientist who was treated very badly round here." Arp adds that he could never forget "the fearful whisper in which it was spoken, as if we were in some kind of occupied territory" (Halton Arp, *Quasars, Redshifts and Controversies*, p. 170).

Apparently, even though the above-described collision with the Mars-like planet cleared some of the dense atmosphere from the Earth, according to Ross it did not remove enough to allow an Earth-based observer to see the disc of the sun or the twinkle of the stars (although Ross conveniently adds that there was at least enough filtered sunlight to allow the process of photosynthesis for the plants created on the Third Day).[925] Of course, all of Ross' hypothesizing is predicated on his insistence that the account is written from an "Earthly frame of reference," yet he fails to reconcile this hypothesis with the fact that there is yet no one on Earth to view the sun and stars as they peek their way through the clouds. That, of course, will not occur until the Fifth or Sixth day.

Aware of the fact that he cannot just assert that the sun and stars are merely *unveiled* rather than *created* on the Fourth Day, Ross tries his hand at Hebrew etymology and verb parsing in order to convince the reader that although one sees the word "create" or "made" in his English Bible, it doesn't really mean what it says. Ross explains:

> The Hebrew verb '*asa*, translated "made," appears in the appropriate form for completed action. (There are no verb tenses in the Hebrew language to parallel verb tenses in English, but three Hebrew verb forms are used to denote action already completed, action not yet completed, and commands.) Verse 16 does not specify when in the past the sun, moon, and stars were made. However, the wording of verses 17 and 18 does provide a hint: "God set them in the expanse of the sky to give light on the Earth, to govern the day and the night, and to separate light from darkness." Notice the echo of wording from Day One (verses 3-5). This verse tells us *why* God created the sun, moon, and stars and suggests that the sun was in place to fulfill its role on the first creation day. The *syamayim wa'eres* (heavens and Earth) in verse 1 places the making of the sun and the stars before the first day of creation. The moon, however, could possibly have been made during the first creation day.[926]

So, according to Ross, despite the fact that Gn 1:14-19 presents itself as one specific day in the sequence of consecutive days during which God is creating new objects to place in the heavens and the Earth, Ross insists that this particular pericope is written only to tell us "*why* God created the sun and stars" but not, as he does with the other Days, to tell us that God *actually created* the sun and stars on this particular day. That Gn 1:14-19 is the only such Day to which Ross attributes such anachronism doesn't seem to bother him, even though the Genesis writer gives us absolutely no indication that such anachronistic wording is intended.

Ross' appeal either to the verb "*asa*" or to some idiosyncrasy in "Hebrew verb forms" is a form of argument that is simply incapable of proving anything so grand as the claim that these celestial bodies were not created on the Fourth Day but were already in existence in the opening words of Gn 1:1. First, the opening verb of Gn 1:14 is identical to that appearing in Gn 1:3 (information that Ross does not supply to his reader). In Gn 1:14 the narrator writes: "Let there be lights," and in Gn 1:3 he writes, "Let there be light."[927] The translation "let there be," in both verses, comes from the Hebrew verb *hayah*, each using the identical form, tense, person, number and gender.[928] This same precise verb form appears also in Gn 1:6 in the creation of the firmament. In other words, the narrator uses the same verb *three* separate times, two of which Ross has already admitted refer to the *creation* of the entity in view (*e.g.*, "let there be light" in Gn 1:3 and "let there be a firmament" in Gn 1:6), not some type of "unveiling." So why does Ross suddenly change the same verb form to mean "why" an object was created as opposed to specifying that it was actually

[925] *Ibid*., p. 39.

[926] *The Genesis Question: Scientific Advances and the Accuracy of Genesis*, 1998, pp. 44-45.

[927] The only difference between the two clauses is that Gn 1:3 uses the noun אור (pronounced: *or*) for "light," while Gn 1:14 adds the common prefix to produce the base noun מאור (pronounced: *ma'or*) for "lights."

[928] The verb is היה (*hayah*) and is used hundreds of times in the Hebrew Old Testament. In Genesis 1:3, 6, 14 it is in the Qal Imperfect, third person, masculine, singular, יהי. Other uses of the same form in Genesis noted in Gn 30:34; 33:9; 49:17.

created on that very day, just as the "light" and the "firmament" were created in their respective days? The answer is simple: it is only because of Ross' insistence on imposing modern science's Big Bang hypothesis into the text that he is willing to distort it in such a crude manner.

Ross' treatment of the Hebrew verb *asah* is equally dubious. In Genesis 1:16 the narrator writes: "And God made two great lights." The word "made" is the Hebrew *asah*.[929] Ross asserts that, because this verb represents a "completed action," it is referring to an event performed in the past, in this case, three days prior, on the First Day of Creation. But Ross' proposition is an egregious misrepresentation of the Hebrew language, not to mention the context of Genesis 1. Hebrew has only two basic tenses, the *perfect* and the *imperfect*. Of these, the *perfect* denotes a past, completed action, while the *imperfect* denotes the present or future.[930] The verb tense of *asah* in Gn 1:16 is the *imperfect*, not the *perfect*, and therefore it is referring either to the present or future, not the past. This is a terrible blunder by Ross, for it now raises the question of whether he is able to interpret the text correctly at all.

Moreover, even if, perchance, the *perfect* tense was employed in Genesis 1:16, still, the writer could be using the past tense simply because he was writing the account after the event already had taken place.[931] Unfortunately, Ross does not enlighten his reader to these vital grammatical nuances regarding Hebrew tenses, yet he confidently assures him that the verb can only refer to an event in prior time. Unfortunately for Ross, once these blunders are discovered, his whole attempt at melding Genesis with the Big Bang theory is rendered utterly futile. For all of his innovative interpretations, Ross' attempt once again confirms that Genesis 1, literally and faithfully interpreted, defies any and all attempts to escape its consecutive sequence of six days of creative *fiat*, and thus denies every theory concocted by modern science as to how the world began. The only scientific theory that the Bible will sustain (without having its words twisted and contorted totally out of context, whether intentionally or not) is a cosmos that begins with the Earth created with the heavens, and then both of which are progressively adorned in six successive days with: firmament, plants, celestial bodies, fish, fowl, animals and man, respectively. Ross can believe whatever he chooses about evolution (and his books are a virtual library of interesting evolutionary theories), but he simply will not be able to reconcile that information with the text of Genesis without distorting both his own theories and Holy Writ.

Higher Criticism and the Interpretation of Genesis 1-2

Ever since Copernicus and Galileo, the Bible has been the subject of intense scrutiny and much criticism. The prevailing question for the last 500 years, and even more intensely in the last 100 years or so with the onset of Darwinism is: Can the Bible be trusted to give us factual and truthful statements of history and the cosmos, or is theology the Bible's only reliable and exclusive domain? It cannot be dismissed that the debate between modern science and biblical science is a unique glimpse into a much larger and more critical area of controversy today, an issue that centers squarely on the very veracity of the Bible and how we are to interpret its words.

As we have shown repeatedly in this volume, we can safely believe that the Bible is to be trusted in everything it says, not only in theology, but in every area it puts its divine stamp of truth, including history and the cosmos. Unfortunately, a large number of biblical scholars who have embraced the Higher Critical theories of secularism have begun to advocate a departure from both the inerrancy of

[929] The root of the Hebrew verb is עשׂה (*asah*) and appears in the Qal Imperfect, third person masculine singular with the *waw*-consecutive in Genesis 1:16.

[930] The Hebrew language also contains infinitives, such as the Infinitive Absolute or the Infinitive Construct, or it can contain participles, but none of these are germane to what appears in Genesis 1:16. Hebrew can also put verbs in the active, passive, or reflexive voice, as well as signify the intensity of the verb (*e.g.*, the Piel, Pual, or Hitpael forms), but these do not apply to Genesis 1:16. The verb *asah* of Genesis 1:16 is one of the simplest forms in the Hebrew language, the Qal Imperfect, and thus should present no difficulty in meaning to one who knows the Hebrew language.

[931] We write the same in English. The sentence "John made Mary a hat on the fourth day of their honeymoon," does not mean that John made the hat on the first day. No matter what past tense form we use (*e.g.*, "had made," "did make") the fact that the "fourth day" is specified as the time of completion limits the action to the fourth day. The only way this interpretation could be modified is if "fourth day" were symbolic or metaphorical of a previous day. That type of interpretation, however, is ruled out in Ross' case since, by his own admission, he has confined himself to a literal, or even "scientific," interpretation.

Holy Writ and a literal interpretation of its words. Liberal Catholic scholars of today collectively voiced their dubious opinions in the *New Jerome Biblical Commentary*:

> ...of Dei Verbum.... debates show an awareness of errors in the Bible. Thus...Scriptural teaching is truth without error to the extent that it conforms to the salvific purposes of God.[932]

In other words, these neo-orthodox theologians believe Scripture is subject to error when it speaks on issues of history, chronology, science, mathematics or the cosmos. It is no coincidence that most of the theologians who espouse biblical errancy are also evolutionists. Ever since the Church's confrontation with Galileo, they simply don't trust the Bible to give accurate historical information. Fr. Raymond Brown, editor of the *New Jerome Biblical Commentary*, criticizes what he calls "the Catholic right" who insist on: (a) the literal interpretation of the Genesis account, namely, creation in six days or six periods of time; (b) that human beings did not evolve from lower species; (c) that woman was formed from man's body; and (d) that life at the beginning of time was in an idyllic state.[933]

In their reinterpretation of Genesis, neo-orthodox scholars posit that the creation accounts in Genesis 1 and Genesis 2, respectively, are contradictory. In addition, they hold that Genesis 1 is not real history but merely a Jewish recapitulation of the Babylonian creation myth *Enumu Elish*[934] concerning the ancient god Marduk and his

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[932] *The New Jerome Biblical Commentary* (c. 1990), p. 1169, edited by Fr. Raymond Brown, along with Fr. Joseph Fitzmyer and Fr. Roland Murphy. Brown deceased in 1998, but probably remains one of the most influential liberal Catholic scholars of the past fifty years. In another of his works Fr. Brown writes: "In the last hundred years we have moved from an understanding wherein inspiration guaranteed that the Bible was totally inerrant to an understanding wherein inerrancy is limited to the Bible's teaching of 'that truth which God wanted put into the sacred writing for the sake of our salvation'" (Raymond Brown, S.S., *The Virginal Conception and Bodily Resurrection of Jesus*, New York, Paulist Press, 1973, pp. 8-9).

[933] *Origins*, May 7, 1981, p. 739. Fr. Brown also calls his Catholic critics "fundamentalists," and has some very harsh words for those who criticize his methodology of biblical hermeneutics. But as Stephen Clark has written: "Many who use the term [fundamentalist] in an inaccurate, derogatory way have come under the strong influence of secular humanism (liberal Protestantism, Modernism). They use the word as a term of abuse to discredit their more orthodox opponents. These people interpret scripture as a book which does not have God as its author in any significant sense, and as a book without real authority. Their approach to interpretation comes out of a line of thought which has compromised the fundamentals of the faith (including the articles of the creed and the commandments), and that seeks to interpret scripture in a way that allows that compromise" (*Man and Woman in Christ*, p. 350).

[934] *Enumu Elish* means "When on high." Some of the lines of *Enumu Elish* read as follows: When above the heaven had not been named; and below the earth had not been called by a name; when Apsu primeval, their begetter; Mummu, and Ti amat, she who gave birth to them all; still mingled their waters together; And no pasture land had been formed and not even a reed march was to be seen; When none of the other gods had been brought into being; When they had not yet been called by their names, and their destinies had not yet been fixed; at that time were the gods created within them; Lahmu and Lahamu came into being; they were called by their names; Even before they had grown up and become tall; Anshar and Kishar were created; they surpassed them in stature; They lived many days, adding years to days; Anu was their heir presumptive, the rival of his fathers; Yea, Anu, his first-born, equaled Anshar; Yea, Anu, his first-born, equaled Anshar; And Anu begot Nudimud, his likeness; Nidimud, the master of his fathers was he; He was broad of understanding, wise, mighty in strength; Much stronger than his grandfather, Anshar; He had no rival among the gods of his brothers... (*The Babylonian Genesis*, Alexander Heidel, 2nd ed. University of Chicago Press, 1951, p. 8). It is amazing that scholars would once claim that *Enumu Elish* is the very "model" of Genesis, adding that the latter is a poor copy of the former. Enumu Elish is almost twice the length of Genesis 1, meandering from topic to topic; it is not a creation story, whereas Genesis clearly is; it is mythical poetry, whereas Genesis is didactic and academic, devoid of myth; Marduk appears on the scene very late, whereas Elohim is the only agent making his world; Marduk struggles, whereas Elohim merely speaks and the work is done; Marduk is picked by the gods because they want revenge, whereas Elohim is in competition with no one and serves no one; Marduk is a bloody warrior and creates mayhem, whereas Elohim creates beauty and order; Marduk is constantly agitated and anticipating his next battle, whereas Elohim rests contently after his constructive work. If anything, Enumu Elish appears to be a corrupt form of Genesis 1.

conquering of the "waters of chaos."[935] They also believe that Genesis 1-2 is: (a) not historical but merely a contest between two literary forms, the so-called Yahwist and the Elohist; (b) that the Genesis writer had no interest in astronomy or biology and was as primitive in his thinking as the average pygmy today in Africa; and (c) that too much insertion of God into the cosmos is "akin to the monophysite heresy of the fourth century."[936] All of these assertions can be dismissed by remembering that Scripture is very clear that, to Moses, the writer of Genesis, God spoke "face to face," and in those encounters revealed to him things about the world that could never be known by reason, observation or least of all "historical criticism."[937] Because of these encounters, starting with God's speaking to Noah, Abraham and Jacob, the Jews knew things about God and the creation that "Marduk" wouldn't even hear of for more than a millennia.[938] As Moses told them in Dt 4:6-7:

[935] Richard Clifford, S. J., in the *New Jerome Biblical Commentary*, states: "In Mesopotamian culture, evidently the model for most of the stories in Genesis 1-11, scribes explored beginnings through stories and cosmogonies, not through abstract reasoning....Genesis 1-11 then is a single story, an unusually sustained 'philosophical' and 'theological' explanation of the human race....The biblical writers have produced a version of a common Mesopotamian story of the origins of the populated world, exploring major questions about God and humanity through narrative" (pp. 8-9). In contrast, Bruce Vawter in *A Path Through Genesis* (Sheed and Ward, 1958) and *On Genesis: a New Reading* (Doubleday, 1977) admits that the author of Genesis 1 intentionally crafted a sharply different cosmology than *Enumu Elish*. Vawter writes: "Genesis took itself seriously as serious history….Genesis has been written out of an historical experience that was independent of the materials of which it fashioned its history, or better, which found in these materials resonances and insights that corresponded with the experience….Genesis stands apart from the rest of the Near Eastern myth and folklore to which it is otherwise so evidently related" (*On Genesis*, pp. 30-31). The contrasts are: many gods versus one god; gods as part of the world versus God not part of the world; matter exists first versus God exists first; stars help create the world versus stars being created on the fourth day; sea creatures rival the gods versus sea creatures as mere creatures. As Sir Frederic Kenyon states: "There is almost nothing to link the [Babylonian] narrative to that of Genesis" (*A Catholic Commentary on Holy Scripture*, London: Nelson, 1953, p. 184). Clifford's reinterpretations of Genesis contradict the finding of the 1909 Biblical Commission: "Whether we may, in spite of the character and historic form of the book of Genesis...teach that the three aforesaid chapters do not contain the narrative of things which actually happened, a narrative which corresponds to objective reality and historic truth; and whether we may teach that these chapters contain fables derived from mythologies and cosmologies belonging to older nations...Answer: in the negative to each part."

[936] As stated by Georgetown theology professor John Haught, *Commonweal*, January 28, 2000.

[937] Exodus 33:11. As Basil writes: "We are proposing to examine the structure of the world and to contemplate the whole universe, beginning not from the wisdom of the world, but from what God taught his servant Moses when He spoke to him in person and without riddles" (*The Hexameron*, Homily 6, 1; 1, 1)

[938] Unfortunately, some Catholic exegetes have been heavily influenced by the historical-critical theory that Genesis 1 was not written until the return from Babylonian captivity between 515 and 445 B.C. Stanley Jaki states: "And since Genesis 1 is, on stylistic grounds alone, a patently post-exilic document..." in *Bible and Science*, p. 45, yet Jaki equivocates in *Genesis 1 Through the Ages*, pp. 25-26 and says that "accepting higher criticism about the three or more different sources of Genesis that almost force one to date Genesis 1 as post-exilic" (*ibid*., p. 62). He traps himself, however, in his remarks on Psalm 104. After quoting, "You have spread out the heavens like a tent-cloth; you have constructed your palace upon the waters," Jaki states that the phrase, 'Nor shall they cover the earth again' "includes a post-diluvian perspective" which " does not seem to bother the Psalmist." This means that the Psalmist would have had the information both of Genesis 1 and Genesis 7-9 in order to make such a comparison between the two waters. If, as Jaki claims, Genesis 1 is "post-exilic" (a sixth century BC occurrence), Psalm 104, having been written about the eleventh century BC, would have no record of the "waters," and thus, contrary to Jaki, Genesis 1 could not be "post-exilic." We see the same sort of logic in Jaki's view that the book of Ezekiel is "certainly a post-exilic product" (*ibid*., p. 5). Jaki simply ignores the fact that Ezekiel makes it quite clear that he is predicting, and eventually in the midst of, the Babylonian captivity, not subsequent to it. To claim, as Jaki does, that Ezekiel is "post-exilic" means that there is no real prophecy in Ezekiel; rather, Ezekiel merely poses his after-thoughts as prophecy to give the impression of divine revelation. Modern scholars do the same with Daniel. All of Daniel's prophecies are said to be written "after the fact," and thus the so-called "prophecies" are merely historical recountings, not predictions of the future. Although holding to evolution, Jaki does admit: "...the evolution of the universe, from very specific earlier states to a very specific present state, nothing is, of course as much as intimated in Genesis 1. Much less should one try to find

> The people of the world will hear of these statutes and say, 'Surely this great nation is a wise and understanding people. For what great nation is there that has a god so near to it as is the Lord our God whenever we call on Him?[939]

In opposition to interpreting Genesis as recording literal and historical events, much opposition is raised today claiming, "Scripture is not a science book." This is designed to have a chilling effect on the biblical literalist. The non-literalist will claim that science has shown, for example, that the light of Gn 1:3 and the sun of Gn 1:14 are one in the same, so there cannot be two different creation days.[940] He will claim that science has shown that, in opposition to Gn 1:2, the earth could not have been the first object in the universe, since the Big Bang says that matter exploded and then formed stars and galaxies billions of years before the earth appeared. He will claim that Gn 1:6's insistence on a "firmament," which the Bible at times describes as a "vault" and at other times as being "spread out," does not match anything science has discovered in the near or far reaches of space. And even if these ideas of science have not been proven, the non-literalist believes that the circumstantial evidence for their validity is enough to put in doubt the rather primitive descriptions in Scripture. A common mantra is, if science hasn't yet found the answer, it will find it someday, but in the meantime it is justifiable to dismiss the Bible's primitive cosmology and cosmogony.

So what is the biblical literalist to do? He firmly believes that, although unsophisticated, by modern standards, the historical items in Scripture are true and trustworthy in their essence. He finds it very difficult to accept that God, who he believes inspired every word of Scripture, would record something *as if* it happened but in reality never happened. For him, the very veracity of God and Scripture are at stake.[941] Whereas the non-literalist may give a token effort to solving some of the exegetical difficulties in Genesis, he is more comfortable concluding that such solutions are not really necessary, for, after all, "Scripture is not a science book" and was never meant to be pigeon-holed into scientific cages. Moreover, he believes that because of its primitiveness Scripture is susceptible, if not prone, to error in matters too sophisticated for it to handle, but science is relatively free of error, for in confronting the questions of the modern age it relies on sophisticated tools and precise methodologies. Conversely, the literalist will strive to harmonize both Scripture and science, seeking to balance the two, always holding Scripture as the final authority. For there is one thing the literalist believes for certain: Scripture cannot err, whether in matters spiritual or physical, soteriological or historical. Conversely, science, whether the non-literalist wants to admit it or not, has one devastating handicap: its history is riddled with the overturning of one theory after another; one popular belief, which was thought to be fact, so quickly discarded for another popular belief, now proposed as fact.

Seeing the determination of the literalist, today it is not uncommon for theistic evolutionists, progressive creationists and Galileo admirers to counter such efforts by appealing to the words of St. Augustine regarding the interpretation of Scripture. In his book, *The Literal Meaning of Genesis*, he writes:

there the idea of a biological evolution..." Jaki also admits: "In other words, nothing can any longer gloss over the fact that the fossil record defies the mechanism of evolution proposed by Darwin...the paleontological record was never known to have contained clear transitional forms, let alone a series of gentle gradations leading up to man....The only solid ground for holding evolution is belief in the createdness of the universe, and therefore in the strict interconnectedness of all its parts, a feature demanded by the infinite rationality of the Creator" (*ibid*. pp. 145-146). It is hard to say why Jaki feels he must limit God's "rationality" to evolution as opposed to instantaneous, *ex nihilo*, creation.

[939] This is especially significant, since the oldest extant copies of *Enumu Elish* come from the 11th century B.C., four hundred years after Moses, and twelve hundred years after Abraham. W. G. Lambert writes: "...has shown evidence that Marduk...rose to officially sanctioned preeminence only in the late 12th century under Nebuchadnezzar I" (*New Catholic Encyclopedia*). If anything, this means the likelihood is the Hebrew tradition had influenced the surrounding pagan cultures, rather than vice-versa, but modern Scripture scholars refuse to admit this possibility.

[940] Jaki shows his displeasure by stating: "...that fourth day, perennially troublesome for those fond of waving their Bibles" (*Genesis 1 Through the Ages*, p. 168).

[941] As one who feared not to apply the science of his day to Genesis 1, Augustine stated: "...the credibility of the Scripture is at stake" (*Confessions*, Bk 2, Ch 9).

> Usually, even a non-Christian knows something about the earth, the heavens, and the other elements of this world...Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn. Reckless and incompetent expounders of Holy Scripture bring untold trouble and sorrow on their wiser brethren when they are caught in one of their mischievous false opinions and are taken to task by those who are not bound by the authority of our sacred books.[942]

Seizing on Augustine's words, the non-literalist chides the literalist, accusing him of "presuming a meaning on Scripture" that in scientific terms is "nonsense," which causes an "embarrassing situation" and a "laughing to scorn" of the "wiser brethren" of Christianity.[943] The literalist will grant that there are many difficulties in arriving at a consistent one-to-one correspondence between Genesis and science (*e.g.*, how to interpret the appearance of the earth in water in Gn 1:2; the light of Gn 1:3 coming prior to the sun and stars in Gn 1:14; the identity and extent of the firmament in Gn 1:6; the appearance of plants in Gn 1:11 before the sun in Gn 1:14). In his search for solutions, the literalist retorts that he certainly has no intention of causing an "embarrassing situation," and he can prove it by bringing Augustine to his aid. He will tell the non-literalist he is misconstruing Augustine's words, and in reality, the words are more of an indictment against the non-literalist. For Augustine goes on to explain to whom he is applying his words a few pages later. In Book 2, Chapters 4-5, the question of the "waters above the firmament" (Gn 1:6-9) comes to the fore. These distant waters have been one of the more divisive issues between literalists and non-literalists, since the firmament is, according to Genesis 1:14-17, the heavens in which the sun and stars were placed, yet Genesis 1:7 insists that there are waters above the firmament, that is, above the heavens. The logical question is: if the "water above" is to be taken literally, then when, where, why and how is this possible, for it seems to contradict the established facts of science. In answer, Augustine begins by referring to vaporous waters in the air as a possible solution. He writes:

> Taking these theories into account, a certain commentator [Basil] has made a praiseworthy attempt to demonstrate that the waters are above the heavens, so as to support the word of Scripture with the visible and tangible phenomena of nature.... Hence, from the existence of the air between the vapors that form the clouds above and the seas that stretch out below, our commentator proposed to show that there is a heaven between water and water.

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[942] *The Literal Meaning of Genesis*, Bk 1, Ch. 19, No. 39:

[943] Not surprisingly, Jaki uses Augustine's quote several times in his favor in an attempt to obliterate "concordism" from the exegetical landscape (*Genesis 1 through the ages*, pp. 90-91; 141; 174). But even before Augustine, the first "concordist" Jaki attacks is the allegorist Philo, since, "as much as he took Genesis 1 not for its own sake and in its own true character but as an illustration and embodiment of some thing else" (*ibid*., p. 43). What we find in Jaki's book is essentially a search through history to find anyone who agrees with Jaki's interpretation of Genesis 1. If the author is a "concordist," Jaki summarily dismisses him, which he ends up doing about 95% of the time. A concordist is understood as anyone who attempts to apply science, to whatever degree, to Genesis 1. Jaki's favorite litmus tests are: (a) what does the author do with the Light on the first day in contrast to the sun's light on the fourth day; (b) what does the author do with the Firmament made on the second day, as well as the waters above it; (c) what does the author do with the Hebrew word *bara* in Genesis 1:1, a word Jaki is adamant cannot mean "created" but "to split" or "to slash." (We will address this point in detail later). (See pages 79, 94, 97, 116, 119, 130 for further evidence of Jaki's litmus tests). To his dismay, Jaki finds hardly anyone who even mentions, let alone sides with, his view of Genesis 1 (*ibid.*, p. 64), which, being a repetitive droning in his book, is the proposition that the only thing with which the Genesis 1 writer was interested is demonstrating the creative power of God by means of stating the "whole" ("In a certain beginning God created the heavens and the earth") and then stating some of its "parts" (some, but only few of the things created). (See pages 21, 61, 72, 95, 132, 156 to see the repeated emphasis of Jaki's theme). To Jaki, Genesis 1 was written to the "reader at that time" (*ibid.*, p. 61) and only inadvertently for others, and therefore it could not even broach the complicated area of cosmogony, let alone explain it. For Jaki, Genesis 1 is merely "post-exilic" literature designed to reinvigorate the Jews coming out of seventy years of Babylonian captivity; not to serve as an historical model of origins, even on an elementary level.

> This painstaking enquiry is, in my opinion, quite praiseworthy.

But Augustine goes even further in the next analysis, for now he tries to show that there are waters even above the starry heavens. He does so by calling into question the prevailing scientific theories, and in the end, relying on the veracity of Scripture, no matter how hard it may be to accept. He writes:

> Certain writers, even among those of our faith, attempt to refute those who say that the relative weights of the elements make it impossible for water to exist above the starry heaven. They base their arguments on the properties and motions of the stars. They say that the star called Saturn is the coldest star, and that it takes thirty years to complete its orbit in the heavens because it is higher up and therefore travels over a wider course.

We notice that Augustine is challenging the prevailing scientific opinion current in his day regarding the nature of stars. Augustine will go on to argue that Saturn, which was then understood as a star, generates heat as it makes its orbit, but that it is cooled by the waters near it, above the heavens, even though some in Augustine's day denied that these waters existed. He writes:

> It is true, indeed, that by its own motion, moving over a vast space, it takes thirty years to complete its orbit; yet by the motion of the heavens it is rotated rapidly in the opposite direction...and therefore, it ought to generate greater heat by reason of its greater velocity. The conclusion is, then, that it is cooled by the waters that are near it above the heavens, although the existence of these waters is denied by those who propose the explanation of the motion of the heavens and the stars that I have briefly outlined.

Finally, although admitting he may not have the precise solution to the issue, nevertheless, Augustine maintains that Scripture is the greater authority in this realm, and if it says that the water is above the heavens, then it is there:

> With this reasoning some of our scholars attack the position of those who refuse to believe that there are waters above the heavens while maintaining that the star whose path is in the height of the heavens is cold. Thus they would compel the disbeliever to admit that water is there not in a vaporous state but in the form of ice. But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity.[944]

In contrast to Augustine's determination to take Scripture at its word and afterward seek for evidence, Stanley Jaki sees Augustine's resolve as misguided. After recognizing that "Augustine looked for it in a vaporous layer in the orb of Saturn," (p. 26), Jaki writes:

> Augustine's search for the firmament should seem baffling. It certainly seemed to slight the very sound principle he had already laid down in respect to reconciling truths known by reason about the physical world with corresponding propositions in the Bible.[945]

Jaki characterizes Augustine's search for the firmament and the water above it as "baffling"; an approach of Augustine's that seems inconsistent with his previous principle of giving the first place to scientific truths and only then finding the corresponding proposition in Scripture which match them. In reality, it is Jaki who has misunderstood Augustine's so-called "very sound principle." It was never Augustine's intention to give absolute authority to science. All along, although trying to be fair with science, Augustine always held that Scripture's propositions took the first place, and only then could one search for a corresponding scientific truth, not vice-versa. This is obviously the case with Augustine's view of the waters above the firmament, since for him, regardless of whether he had the right scientific answer to its location and composition, he maintained: "the authority of

[944] *The Literal Meaning of Genesis*, Bk 2, Ch. 5, No 9.

[945] *Bible and Science*, p. 95.

Scripture in this matter is greater than all human ingenuity."

The most penetrating aspect of Augustine's bold defense of Scripture is that it is said in a context in which the objector doubts whether water above the firmament exists at all. Augustine's answer is simple: we may not know where or in what form it resides there, but based on Scripture we know for certain that it exists. This is where Augustine starts. It is his bedrock of truth. The Scripture said it, and he believes it. Hence we can safely say that, for Augustine, the "embarrassing situation" does not necessarily occur when a faithful expositor tries to find scientific support for biblical propositions, but occurs when the biblical skeptic tries to elevate scientific theory into fact, requiring Scripture either to conform to the theory, or be totally ignorant of the theory. As Augustine warned:

> But more dangerous is the error of certain weak brethren who faint away when they hear these irreligious critics learnedly and eloquently discoursing on the theories of astronomy or on any of the questions relating to the elements of this universe. With a sigh, they esteem these teachers as superior to themselves, looking upon them as great men; and they return with disdain to the books which were written for the good of their souls; and, although they ought to drink from these books with relish, they can scarcely bear to take them up.[946]

So now we come back to the question of whether Scripture is a science book. Obviously, the answer to that question is not a simple yes or no. Even the heliocentrist, John Henry Cardinal Newman noted that Scripture teaches the Earth is immovable:

> It is true, then, that Revelation has in one or two instances advanced beyond its chosen territory, which is the invisible world, in order to throw light upon the history of the material universe. Holy Scripture, it is perfectly true, does declare a few momentous facts, so few that they may be counted, of a physical character. It speaks of a process of formation out of chaos which occupied six days; it speaks of the firmament, of the sun and moon being created for the sake of the earth; of the earth being immovable; of a great deluge and of several other similar facts and events.[947]

For all his fear about "concordism," even Jaki admits that the language of Genesis 1 is absolutely unique, both in comparison to other biblical passages and to various ancient documents on cosmology. He writes:

> The lucidly streamlined character of Genesis 1 should suggest that its author wanted to offer something very different from the cosmological myths of surrounding cultures. Even according to those who want to see in Genesis 1 at least the remnants of some myths composed in mythological times, Genesis 1 appears conspicuously void of mythical elements.... this also explain why Genesis 1 is so different from all the other chapters of the Book called Genesis, indeed from almost all chapters of all the Books of the Old Testament. Unlike all those chapters, whatever their great variety, this chapter is not the story of a battle, of an encounter, of a plot. It is certainly not a history. It is not a moral exhortation, a parable, a prophecy, and not even a song as some claimed, and certainly not a ledger for stock-talking as is the case in Numbers throughout. All these literary forms were present in the Hebrew scriptures...[948]

[946] *The Literal Meaning of Genesis*, Book 1, Chapter 20, Para. 41, *Ancient Christian Writers*, *ibid*., p. 44. Aquinas said the same thing regarding the superiority of Scripture to decide such matters: "Whether, then, we understand by the firmament the starry heaven, or the cloudy region of the air, it is true to say that it divides the waters from the waters, according as we take water to denote formless matter, or any kind of transparent body, as fittingly designated under the name of waters..." (*Summa Theologica*, Bk. 1, Ques. 68, Art 3).

[947] *The Idea of a University*, Garden City, NY: Doubleday, 1959, Regency Publishing, 1999, pp. 396-397.

[948] *Genesis 1 Through the Ages*, pp. 22, 27.

Nevertheless, we must also insist that interpretations such as Jaki's are not really interpretations at all. They are anti-interpretations, fearful of applying just about anything to Genesis 1, except, as Jaki claims, that it demonstrates a literary technique of "allowing the part to represent the whole."[949] But this is no great revelation. It goes without saying that in any type of discourse the part will invariably represent the whole. In fact, all people who write narratives, whether intentionally or not, incorporate that very principle. Obviously, no one could ever list *all* the parts of something since such a number would be astronomical and impractical.

Yet Jaki is insistent that the Hebrews "did not take Genesis 1 for a physics textbook, for the very simple reason that they had no physics."[950] They "had no physics"? None at all? Does it take a mathematical equation such as $F = ma$ or $E = mc^2$ to say that men know physics? Certainly the Hebrews knew that objects dropped from heights fall to the ground; that axe heads do not float on water unless by miracle; that birds fly by flapping their wings against the air. Mathematical formulas do not make physics, they only give a numerical proportion of one value compared to another. In fact, mathematical formulas can be quite deceiving, since formulas deal only with mental intuition that may or may not represent reality. The irony of ironies is that the very concepts of Galilean, Newtonian, and Einsteinian physics, especially the latter's Relativity theory, are just that – numbers that have no way of proving that they describe physical reality. In fact, modern man's ignoring of certain fundamental facts of "physics" established in Scripture has led him to postulate some of the most fantastic and absurd theories to avoid having to submit to Scripture.[951] Someday we may come to realize that the simple notions of the Hebrews are much closer to the truth than the sophisticated theories of modern man. As noted previously, there is one thing about science common to all its branches (including philosophy, psychology, medicine, chemistry, biology, *etc*.), that is, its history shows that it cannot cease from overturning its own theories, whereas the Bible's "science" always remains the same. In actuality, what little verifiable truth is discovered in science, the more the Genesis account is vindicated as being a precise record of what occurred in the past.

The Genesis Day/Night Sequence Revisited

As we have noted earlier, some Christian scholars are reticent to assign a literal day/night sequence to Genesis 1 due to nothing more than the fact that the sun and stars appear on the Fourth Day rather than the First Day. The objector claims that, since today it is obvious that the sun causes the day/night sequence on Earth, there could have been no day/night sequence before the sun was created, and therefore, the days of Genesis are neither literal nor chronological. Stanley Jaki considers this argument his strongest in denying a chronological, 24-hour/day period to Genesis 1. For him, if the sun is missing from the first day, then there can be no darkness and light, and thus the days of Genesis are symbolic of long periods of time, or the sun existed on the first day and is recapitulated on the fourth day.[952] Jaki is well aware of the fact, however, that

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[949] Jaki makes this his constant theme throughout Genesis through the ages (*cf.*, pp. 21, 61, 72, 95, 132, 156).

[950] *Ibid*., p. 25.

[951] As the sixth century theologian John Philoponus stated: "...nothing in the makeup of this world is different from the Prophet's treatment of it; in actuality, most of the things whose origins were investigated by scientists have their origin in Moses' book" (cited in Jaki's book, *Genesis 1 through the ages*, p. 99, from De opificio mundi, ed G. Reichardt, Leipzig: G. B. Teubner, 1897, p. 6. It is no coincidence that, after his instruction at the Bavarian schools which included teaching on the Catholic religion, especially of the six-day creation, which ended at age twelve, Einstein said that after the "reading of popular scientific books" he "soon reached the conviction that much in the stories of the Bible could not be true" (*ibid.*, p. ix, *Einstein: The Life and Times*).

[952] *Genesis 1 through the ages*, p. 144. Jaki claims that by 1520 "...it was no longer possible not to take the sun for the source of light in Gen. 1:3." He writes: "Where is the biblical suggestion that light crystallizes into sparkling celestial bodies" (p. 62). He lays the blame at the "...concordist exegesis of many of the Church Fathers..." (p. 169) seemingly unmoved by his dismissal of this Tradition; and at the same time dismissing Protestants for holding similar views which were derived from "waving their Bibles" (p. 168). Early claims to Jaki's view occur in such exegetes as Eusthatius, who objects to Basil's idea of "light and heat coming together on the fourth day" with the words "How can this be if there is no evidence for such a distinction, since we neither see light distinct from fire, nor fire distinct from light" (PG 18, 718); yet quite a few agree with Basil that the light of the first day condensed into the heavenly bodies of the fourth day.

neither the Fathers of the Church nor the medieval theologians who followed them saw any problem with having two sources of light on the First and Fourth Day, respectively. For example, being consistent with his literal hermeneutic, Thomas Aquinas postulated that the effusive light on the First Day was then made into the sun and stars on the Fourth Day, perhaps similar to God fashioning man on the Sixth Day from the dirt He created on the First Day.

> Now it seems to be required, for two reasons, that the formlessness of darkness should be removed first of all by the production of light. In the first place because light is a quality of the first body, as was stated, and thus by means of light it was fitting that the world should first receive its form. The second reason is because light is a common quality. For light is common to terrestrial and celestial bodies. But as in knowledge we proceed from general principles, so do we in work of every kind. For the living thing is generated before the animal, and the animal before the man, as is shown in *De Generatione Animalibus* ii, 3). It was fitting, then, as an evidence of the Divine wisdom, that among the works of distinction the production of light should take first place, since light is a form of the primary body, and because it is more common quality.
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> Basil (*Hom. 2 in Hexaemeron*), indeed, adds a third reason: that all other things are made manifest by light. And there is yet a fourth, already touched upon in the objections; that day cannot be unless light exists, which was made therefore on the first day.
>
> According to the opinion of those who hold that the formlessness of matter preceded its form in duration, matter must be held to have been created at the beginning with substantial forms, afterwards receiving those that are accidental, among which light holds the first place.
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> In the opinion of some the light here spoken of was a kind of luminous nebula, and that on the making of the sun this returned to the matter of which it had been formed. But this cannot well be maintained, as in the beginning of Genesis Holy Scripture records the institution of that order of nature which henceforth is to endure. We cannot, then, say that what was made at that time afterwards ceased to exist.
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> Others, therefore, held that this luminous nebula continues in existence, but so closely attached to the sun as to be indistinguishable. But this is as much as to say that it is superfluous, whereas none of God's works have been made in vain. On this account it is held by some that the sun's body was made out of this nebula. This, too, is impossible to those at least who believe that the sun is different in its nature from the four elements, and naturally incorruptible. For in that case its matter cannot take on another form.
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> I answer, then, with Dionysius (*De Divinis Nominibus iv*), that the light was the sun's light, formless as yet, being already the solar substance, and possessing illuminative power in a general way, to which was afterwards added the special and determinative power required to produce determinate effects. Thus, then, in the production of this light a triple distinction was made between light and darkness. First, as to the cause, forasmuch as in the substance of the sun we have the cause of light, and in the opaque nature of the earth the cause of darkness. Secondly, as to place, for in one hemisphere there was light, in the other darkness. Thirdly, as to time; because there was light for one and darkness for another in the same hemisphere; and this is signified by the words, "He called the light day, and the darkness night."[953]

[953] *Summa Theologica*, Bk 1, Ques. 67, Art. 4. Agreeing with Aquinas here are: Gregory of Nyssa (*Hexameron*, PG 44, 66-118); Ephrem the Syrian (*Genesim et in Exodum commentarii*, in CSCO, v. 152, p. 9); Chrysostom (*Homilies on Genesis* (PG 53, 57-58); See

Some scholars claim that the use of the Hebrew ויעש (from עשה (*asah*): "made" in the clause "And God made") rather than the word ברא (*bara*: "created" in the clause "In the beginning God created...") means that the celestial bodies were already in existence on the First Day but became available for observation on the Fourth Day. The fact is, however, that "made" (ויעש) is also employed in Gn 1:7 when the firmament is created to divide the waters. The appearance of the firmament is certainly a separate act of creation, since it is the only event recorded for the Second Day. Obviously, then, "made" is equivalent to "create." The same word (ויעש) appears also in Gn 1:25 in reference to the appearance of the animals. It also appears in both Ex 20:11 and 35:17 in the sentence, "For in six days God *made* the heavens and the earth..." showing again that "made" is completely interchangeable with "created."

That the sun created on the Fourth Day takes over the day/night sequence from the light created on the First Day is an important fact. Since today as in the past we know that the sequence of darkness to light caused by the sun is a 24-hour period, this allows us to take the same 24-hours and extrapolate back to the first three days of creation when there was no sun but only light. In other words, the mechanics of the Fourth Day allows us to know that the First, Second and Third Days were 24-hour periods. Moreover, since Gn 1:14-17 indicates that the sun is made to fit the day rather than the day to fit the sun, this is further confirmation that the Creation days were of the same length. Since the 24-hour period of the sun's rising and setting must fit into the Day, it means the Day must have already been established as a 24-hour period prior to the Fourth Day. In this respect, various passages indicate that heaven's time is coincident with earthly time in the day/night sequence.[954] One additional fact worthy of note is that the Light of Gn 1:3 must be light of a wavelength in the visible spectrum, that is, not long radio waves or short gamma rays, but a wavelength which would create the evening/morning sequence specified by the text.

Other scriptural accounts also indicate clearly that the Light of Gn 1:3 is separate from the sun and stars of Gn 1:14-17. For example, in the book of Job, God interrogates Job with rhetorical questions that he knows Job cannot answer. In chapter 38:18-24 God asks Job:

> [18]Have you understood the expanse of the earth? Tell Me, if you know all this.
> [19]Where is the way to the dwelling of light? And darkness, where is its place,
> [20]That you may take it to its territory And that you may discern the paths to its home?
> [24]Where is the way that the light is divided, Or the east wind scattered on the earth?

The fact that Job cannot answer these questions rules out the sun and stars Job sees everyday as a possible retort to God's question. It is thus readily apparent that God is teaching us through this revelatory dialogue a fact about the constitution of light that we could not determine on our own, that is, this particular light has a source that is not from the stars or sun. Of course, in order to accept this unique information one must accept that Scripture is giving trustworthy propositional truth and not mere fables and myths to "uneducated peoples."

Jb 26:10 reads: "He has inscribed a circle on the surface of the waters at the boundary of light and darkness." The "circle" here refers to the earth itself, and is speaking about God's creation of the earth in the midst of the waters in Gn 1:2 and 2Pt 3:5 in

especially, Basil in *The Hexameron*, Homily II, 7;Victorinus in *On the Creation of the World*. The opposite viewpoint is held by Origen in *Origen Against Celsus* "By far the most silly thing is the distribution of the creation of the world over certain days, before days existed; for, as the heaven was not yet created, nor the foundation of the earth yet laid, nor the sun yet revolving, how could there be days?" (Book VI, Ch 60). Leo the Great stated: "But what is the sun or what is the moon but elements of visible creation and material light: one of which is of greater brightness and the other of lesser light? For as it is now day time and now night time, so the Creator has constituted divers kinds of luminaries, although even before they were made there had been days without the sun and nights without the moon" (Sermon XXVII). Medieval theologians are also of the same opinion: Honorius of Autun (*Hexameron* PL 172, 257); Peter Lombard (*Lombardi opera omnia*, PL 192, 651); Colonna, aka Aegidius Romanus (*Opus Hexaemeron*); Nicholas of Lyra (*Postillae perpetuae*); Cajetan *(Commentarii de Genesis 1*).

[954] Ap 8:1: "there was silence in heaven for about half an hour"; Jb 1:6-7: "Now there was a day when the sons of God came to present themselves before the Lord, and Satan also came among them. The Lord said to Satan, 'Whence have you come?' Satan answered the Lord, 'From going to and fro on the earth, and from walking up and down on it.'"

which "long ago the earth was formed out of water and by water." It is this circle (or sphere) of the earth that is between the boundary of light and darkness at the beginning of creation.

As for the distinction between light and the sun, various passages testify to this phenomenon. For example, Psalm 74:16 states: "Yours is the day, Yours also is the night; You have prepared the light and the sun." Ec 12:1-2 prohibits one from concluding that the "light" of Ps 74:16 refers to the stars since it separates it from the sun: "Remember also your Creator in the days of your youth...before the sun and the light, and the moon and the stars are darkened." Notice how the writer mentions all the known luminous bodies that emanate light, but he insists there is still an additional independent source of light. As in Ps 74:16, these four sources are specifically put in sequence by Hebrew *waw*-conjunctions so that it does not say "sun's light" but the sun and the light and the moon and the stars.[955]

Some theories hold that the Light of Gn 1:3 represents God or that God Himself was the source of the Light. This is untenable, since before the Light of Gn 1:3 there was total darkness in Gn 1:1-2. Since God, if He were to be associated with Light, would always be luminous, then there would have been no darkness to dispel. Moreover, the finite verb "let there be" (יהי) is employed for the Light in Gn 1:3 the same as it is for the firmament in Gn 1:6 and the celestial bodies of Gn 1:14, thus showing that the verb refers to something created out of nothing and not to something already existing.

Another objection to separating the First Day and the Fourth Day is the claim that the light from both days is the same and therefore it is an unnecessary redundancy on the Creation account. There is no redundancy, however. Gn 1:15-17 state that the light of the stars and sun are to "give light on the earth," and Gn 1:14 says that they serve as markers for "seasons, and for days and years." In contrast, the light of Gn 1:3 appears prior to the separation of the waters surrounding the earth and is not considered a seasonal marker. The primitive state of the earth in Gn 1:1-5 suggests that the light of Gn 1:3 is directed more toward distinguishing the day/night sequence for the entire cosmos, whereas the light of Gn 1:14-19 is meant specifically for the earth.[956]

Another objection postulates that Gn 1:14 should be translated "Let the lights in the firmament be to separate the day and night," as opposed to the traditional reading "Let there be lights in the firmament to separate the day and night." The argument claims that since the verb "let there be" (יהי) is not repeated before "to separate" (להבדיל) the correct meaning is that the lights of the Fourth Day were already in existence on the First Day, and their specific *task* is the focus of the Fourth Day, not their creation. As in the other objections, this one also fails to incorporate all the details of the text. The First Day had already performed the task of separating the day and the night (Gn 1:4: "...and God separated the light from the darkness"). If the sun on the Fourth Day is the light of the First Day (as the above theory postulates) the sun would have already separated day from night and thus there would be no reason for Gn 1:14 to specify that the sun was assigned this same task on the Fourth Day. The easier explanation would be that the Hebrew infinitive ("to separate") serves to show that the action of separating day from night was already occurring in the three prior Days. In contrast, the marking of the seasons in Gn 1:14 is introduced by the finite verb "let there be" (יהי) since this represents a new function that was not present during the first three Days.

In the final analysis, any exegete who comes to the text of Genesis 1-2 claiming that the events did not happen as recorded would necessitate his

[955] In sequence, the Hebrew reads: לא־תחשך (are not darkened) השׁמשׁ (the sun) והאר (and the light) והירח (and the moon) והכוכבים (and the stars). *Cf.*, Ez 32:6-8; Ps 104:2; Is 45: 7; 60:19; Br 3:33; Zc 14:6-7; 2Co 4:6; Ap 22:5; Gn 19:11; Ac 26:13. Some raise the objection that Genesis 1:14-16's assigns the moon as one of the "two lights," even though the moon merely reflects light from the sun. This can be answered by pointing out that "light" in Genesis 1:14-16 is the Hebrew *meor*, (למאורת) which can refer to a emanating body or reflecting body (*cf.* Ps 74:16; Pr 15:30).

[956] Analogously, the fourfold orientation of the Tabernacle resembles the first four days of creation: Ark-throne at western end equals heaven of Day One. The altar of the eastern end equals the firmament of Day Two. The table of bread at the northern end equals the plants of Day Three. The lampstand of the southern end equals the luminaries of Day Four. (See Ex 25:1-40). Moreover, the Tabernacle was made of the spoils of the Egyptians (1Ch 26:27; Nm 31). Once built, God set a "fire" on the altar (Ex 40:38; Lv 9:23-24), resembling the light of fire he set on the fourth day after the tabernacle of heaven was built. In the same way, God lit a fire at Pentecost when he rebuilt the tabernacle of David (*cf.* Ac 2:3; 15:16).

showing that he possessed some kind of all-knowing perspective from which to judge the validity of the text's propositions. If the exegete were to de-literalize every Scripture that posed an apparent conflict if read at face value, much of the Bible would become historically useless. For example, if the critiques levied against a literal interpretation of Genesis 1 were applied to the account of the plagues of Egypt in Exodus 8-10, the latter would present even more problems. Ex 9:6 records that all the cattle of Egypt died in the fifth plague, but according to Ex 9:19 more cattle were to be killed in the seventh plague. According to Ex 8:24, the insects of the fourth plague destroyed all the plants of Egypt, but in Ex 9:31 the flax and barley were destroyed in the seventh plague, while in Ex 10:15 the locusts of the eighth plague eat the remaining vegetation. It is not the prerogative of the exegete to conclude that these apparent conflicts bar a chronological reading of the text in favor of a thematic one. The exegete must carefully compare the various accounts in Scripture and work out a viable chronology, for Scripture does not err.

All the other apparent anomalies between Genesis 1 and Genesis 2 can be solved rather easily.[957] For now, the chronology of both chapters can be summed up as follows:

The Stars and the Speed of Light in Genesis 1

Here we will tackle one of the most common objections raised against a literal reading of Genesis 1. The objection concerns the apparent anomaly regarding the speed of light and the creation of the stars. It is argued that, since it is established from modern science that the stars are very far away, so far away that light from the nearest star, *Proxima Centauri*, presently takes four years to reach the Earth as it travels 300,000 km/sec, it would have been impossible for the light from stars, which were made on the Fourth day of creation, to reach Earth on that very day; and, in fact, *Proxima Centauri* would not have been seen until at least four years after Adam was created. It could further be argued that if the other stars are hundreds of thousands of light-years from Earth, then the age of the universe could not be anywhere close to the 6000 years that a literal reading of the biblical text demands, otherwise, we would not be seeing the light from these most distant stars today.[958]

On the surface this seems to be a very logical and worthy objection, and as a result, it has perplexed and paralyzed not a few biblical scholars. Their reactions to this apparent problem are many and varied. Some have been persuaded to abandon a literal reading of Genesis 1 altogether, or at the least, have tried to advance alternative literal renderings.[959] Some have moved to a theistic evolutionary interpretation of Genesis. Others have proposed using the time-warping principles of Special and General Relativity to answer the anomaly;[960] while still others are so bothered by the anomaly that they are willing to rearrange the whole chronology of Genesis 1.[961]

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[957] Please consult the *Catholic Apologetics Study Bible, The Book of Genesis, Chapter 1-11*, by Robert Sungenis for further detail on this topic.

[958] A time span of 6000 years (~ 4000 B.C. to 2000 A.D.) is produced from interpreting the ancestral lines of Genesis 5 and 11 as strictly father-son relationships.

[959] Fr. Stanley L. Jaki, *Genesis 1 Through the Ages*, 1992.

[960] In particular, D. Russell Humphreys in the book *Starlight and Time: Solving the Puzzle of Distant Starlight in a Young Universe*, Green Forest, AR, Master Books, 1994. Humphreys' bottom line is that "God used relativity to make a young universe" as he sides with what he calls "the experimentally well-established general theory of relativity." He further suggests, "the universe started as either a black hole or white hole. I suggest here that it was a black hole, and that God let gravity take its course" (pp. 128, 127, 123, quoted in order). In other words, General Relativity's dilation of time through gravity is the basis of Humphreys' theory. Hence, a clock on Earth would measure the Earth's present age as 6000 years, whereas a clock at the edge of the universe would measure 13 billion years. In essence, Humphreys uses the mathematics of General Relativity to posit that the 13 billion years commonly associated with the age of the universe is an illusion created, but allowed, by the principles of General Relativity. However, someone who also employed Relativity's principles came to the exact opposite opinion, which is not surprising, since in Relativity everything is "relative" (G. L. Schroeder, "The Universe – 6 Days and 13 Billion Years Old," *Jerusalem Post*, September 7, 1991). Humphreys can have little argument against this, since according to General Relativity, a person standing at the edge of the universe would think that his immediate vicinity is 6000 years old and the Earth is 13 billion. All in all, this is just another case in which General Relativity becomes the wax nose that can be molded to fit a variety of cosmologies due to the very nature of its inability to have a fixed and absolute reference point.

At the outset we must note that it makes little difference if one bases his argument on the idea that the stars are billions of light years or just four light years from Earth. In either case, if the speed of light is given an unchanging value of 186,000 miles per second, yet it is agreed that when the stars were created on the Fourth day an observer on Earth would have seen their light immediately, then the light of the stars must have reached Earth either instantaneously or sometime before the close of the Fourth day. Even if we give light an extra day or two to arrive on Earth such that it would have appeared on the Fifth or Sixth days of creation, this does not provide an adequate solution to the problem, since the nearest star is, at least according to modern astronomy, four light years away. As such, the light from *Proxima Centauri* would have arrived four years after Adam was created, and light from stars that are farther away than 13,000 light years would not yet have reached the Earth, according to the biblical timetable.

Some might advance the counterargument that, after the stars are mentioned in Gn 1:16, they are not mentioned again in the biblical text until Gn 15:5, when God tells Abraham to look up at the stars and count them. This would allow their light to travel for the whole time from the creation week to the time of Abraham's old age. As such, the total time of travel could have been two thousand years (4,000 B.C. to 2,000 B.C.). If we assume light's speed has always been the same, then, at the maximum, the total miles traveled would have been 3.5×10^{16} miles in 6,000 years, or 3.5 quadrillion miles. This distance could accommodate quite a few stars in the universe. In fact, it would more than satisfy the only empirical method of determining the distance to the stars, namely, stellar parallax, which, beyond 100 parsecs or 1.92 quadrillion miles, cannot be applied as an accurate means of measuring distance.

It could further be argued that the alternative and more common method of measuring the distance to the stars beyond the limits of parallax, that is, the redshift of light, is simply an unproven scientific hypothesis that remains in the throes of controversy, and therefore no biblical scholar is required to accept or apply a redshift/distance relationship as an irrefutable scientific fact. Moreover, various astrophysicists have already proposed a mathematical model for a much shorter travel time for light in the universe. Parry Moon of M.I.T. and Domina Spencer of the University of Connecticut introduced the idea in a paper titled "Binary Stars and the Velocity of Light." The authors state:

[961] In particular, Gorman Gray in the book *The Age of the Universe: What are the Biblical Limits?*" Washington, Morning Star Publications, 2005, in which he argues that the clause in Gn 1:1, "In the beginning God created the heavens," denotes that at that time the sun and the stars must have been created, and that the text allows for an indefinite time-gap between the appearance of the stars/sun and the creation of the Earth. During this "indefinite time," starlight is said to be traveling to Earth and, based on a speed of 186,000 miles per second, would have had enough time to make the multi-million year journey. To substantiate this interpretation, Gray further argues that the Hebrew עשׂה (*asah*) appearing in Genesis 1:16 and normally translated "made" really means "brought forth," such that the light of the sun and stars is now allowed to penetrate to Earth, having previously been obscured by a "cloud of thick darkness" (*cf.* Jb 38:9) that has since been removed. This is similar to the view we noted earlier propounded by Hugh Ross, yet it must be rejected for the same reasons. There is absolutely no indication in the Genesis text that stars were created before the Earth, and it is likewise exegetically presumptuous to limit the definition of Gn 1:1's "heavens" to the existence of stars in the heavens as opposed to the heavens itself. According to Gn 1:14-16, the sun and stars are placed "in the heavens," that is, they are not *the* heavens but are attached to the heavens. The Hebrew phrase is מארת ברקיע השׁמים which translates as "lights in the firmament of the heavens," with the preposition "in" denoted by the consonant "ב" prefixing the word רקיע "firmament" This phrase is repeated in Gn 1:17 ("And God set them in the firmament of the heavens") with the addition of the word נתן ("set") to reinforce that the sun and stars are distinct from the firmament in which they are set. In addition, there is no "firmament" on the first day of creation, there is only the empty heavens, and as such, the emptiness is waiting to be filled by both the firmament and the celestial bodies, on the second and fourth days, respectively. Moreover, Gray's contention that "brought forth" is a clearer translation than "made" of the Hebrew *asah* is untenable. Although *asah* has some variation in its contextual meaning, when it appears in creation contexts, its meaning is closer to "made" than it is to "brought forth." For example, Psalm 33:6 [32:6] states: "By the word of the Lord the heavens were *made* [asah], and by the breath of His mouth all their host." Here *asah* is used in the almost identical wording that appears in Gn 1:1 ("In the beginning God *created* the heavens…") although in that case the Hebrew ברא (*bara*) is used instead of *asah*, which shows that the words are exegetically interchangeable.

> The acceptance of Riemannian space allows us to reject Einstein's relativity and to keep all the ordinary ideas of time and all the ideas of Euclidean space out to a distance of a few light years. Astronomical space remains Euclidean for material bodies, but light is considered to travel in Riemannian space. *In this way the time required for light to reach us from the most distant stars is only 15 years*.[962]

The problem with all the above proposals, however, is that they will not allow light from the stars to appear on Earth on precisely the Fourth day of creation, yet the text of Genesis insists the opposite is true since the stars are included among the celestial bodies given the task of time-keeping (Gn 1:14: "and let them be for signs and for seasons and for days and years"; Gn 1:18: "and to govern the day and the night"). We know the stars' role in time keeping today as "sidereal time," and it is an essential ingredient in chronology for it allows us to have a contrasting background in order to measure the sun's path around the Earth. So precise is this star/sun relationship that the sidereal day is always four minutes shorter in length than that which we keep by the sun on a 24-hour-per-day clock.

Although we are not compelled to include distances beyond 100 parsecs because of the uncertainty of the redshift hypothesis, still, since redshift is considered as a viable measuring device by the modern scientific community, and since, in any case, there certainly could be stars that are further away than the limits our present parallax capabilities can judge, there needs to be another solution to the starlight problem. In other words, if there is a star beyond the round figure of 10,000 light years away from Earth, biblical chronology (at least based on an unchanging speed of light) seems to have no way of explaining how that star's light reached Earth during the Earth's biblical time of existence.

When we dig deeper into the biblical text, there is an easy solution to the problem, and, in fact, there are several solutions, all of which may be working together.

(1) Any solution must never discount the possibility that the stars could have been created many thousands of light years from the Earth and their light could have been brought to Earth instantaneously by an act of creative fiat. It would certainly be illogical to argue, on the one hand, that God created the stars instantaneously, but then argue, on the other hand, that He could not perform a creative miracle and allow their light to stretch instantaneously to the Earth. If one accepts a divine intrusion for the former, on what basis can he deny it for the latter? God himself determines the boundary line for how and when His miraculous intrusion ceases and natural processes take over. None of us can set arbitrary limits on when the crossover should take place, especially in the very beginnings of creation when most events are dependent on God's miraculous direction. One of the main reasons that modern atheistic science believes the universe is 13.5 billion years old is that it denies a creative fiat *at any time*, insisting that everything, from the appearances of matter to starlight, respectively, must occur by natural processes. At some point, the biblicist must deny the premise of naturalism, whether he decides to do so on the Fourth day of creation or at the so-called Big Bang, for even the most liberal-minded biblical scholar knows that something cannot come from nothing. Hence, it is no great stretch for the conservative biblicist to include the creative fiat not only the stars themselves but also the light intervening between them and the earth.

(2) We can also address this issue by pointing out that the cosmological principle has certainly not been proven. The speed assigned to light (300,000 km/sec) has only been demonstrated in our local environment, not throughout the rest of the universe. Although it is reasonable for one to assume that the speed of light is the same everywhere in the universe, by the same token, it would be rather presumptuous to build a whole cosmological system on something that has no demonstrable proof. At the least, cosmologies that posit a faster speed of light for other parts of the universe which may be under different cosmological constraints should not be dismissed out of hand, especially since there is growing experimental evidence that the speed of light has, on the one hand, been generally slowing down since the inception of the universe in

[962] Parry Moon and Domina Spencer, "Binary Stars and the Velocity of Light," *Journal of the Optical Society of America*, Vol. 43, No. 8, August 1953, p. 635, emphasis added. By an exhaustive study of the binaries, Moon and Spencer concluded: "Velocity of light in free space is always c with respect to the source, and has a value for the observer which depends on the relative velocity of source and observer. True Galilean relativity is preserved, as in Newtonian gravitation" (*ibid*., p. 641).

conjunction with the laws of thermodynamics, and, on the other hand, has been increased *in vacuo* beyond the value of *c* in various laboratory experiments. As we noted earlier, even Einstein was caught having to modify his major premise that *c* remained constant, both in Special and General Relativity. [963]

(3) After we recognize that God could have made starlight appear on Earth miraculously, other biblicists may feel compelled to at least offer some naturalistic explanation for the starlight's reaching Earth, if for no other reason than to cover all the bases and convince the opponent that there is no escape for those looking for a more naturalistic approach to Genesis 1 (*e.g.*, evolutionists). As such, we refer ourselves to the events of the Second Day of creation, when God created the firmament. We have already noted that the firmament includes both the expanse of space to the limits of the universe (Gn 1:6-9, 14-19) as well as the space in the immediate vicinity of Earth in which "the birds fly" (Gn 1:20). As also noted, the Hebrew word רקיע *raqia* (firmament) denotes something hard and dense like metal but it also describes something ethereal and penetrable. Fitting the firmament between those two extremes means that we have a truly amazing substance in our universe. In Volume I we belabored the point that the best way to incorporate the two extremes is to understand the firmament as an extremely fine yet dense particulate substance that is frictionless and which permeates every part of the universe and constitutes its vast internal substructure.

In addition, Scripture speaks of the firmament being transformed from its original dimensions to an "expanded" state. For example, Psalm 104:2 says that God is "stretching out heaven like a curtain." Depending on the Hebrew passage cited, the expansion of the firmament is an event that occurred once in the past; occurred in the past but was also a progressive event for a certain period of time; or occurred in the past and is still continuing today.[964]

The first question regarding the expansion concerns how fast it occurred. Since the sun and stars were placed "in the firmament of the heavens," the firmament would need to be big enough at the dawn of the Fourth Day to house the sun and all the stars. As the celestial bodies were placed in the firmament, it would have continued to expand away from the Earth, and in the process it would have carried the stars with it to the outer-most recesses of the universe.

If we limit the speed of light to 186,000 miles per second at the time the stars are placed in the firmament, and also limit ourselves to affirming that their light reached Earth on the Fourth Day, this means that the size of the firmament at the end of its expansion on the Fourth Day would be no bigger than the allowable distance light could travel in 24 hours (*i.e.*, the 24 hours from the beginning of the Fourth day to the end of the Fourth day). As such, the radius of the firmament would have been no bigger than 1.6×10^{10} miles (or 16 billion miles); and its volume would have been 1.256×10^{31} cubic miles.

Here is the crucial point: within the distance of 16 billion miles, the light from the stars travels to Earth in a period of 24 hours or less. As such, we have satisfied the objection concerning how starlight could appear on Earth on the Fourth Day of creation. All that is needed now is to add the subsequent events. Consequently, as the starlight reaches Earth on the Fourth Day, the expansion of the firmament continues. After an initial expansion, the rate of expansion could then be accelerated in order to arrive at the size the universe is today. In any case, the expansion will cease once the universe reaches it

[963] See Appendix 1: "Anomalies Concerning the Speed of Light" in Volume I for more information on these laboratory experiments. Regarding Einstein's modifications to the speed of light, see Volume I, Ch. 5.

[964] Based on the stipulation in Gn 1:8 that "God called the firmament heaven," the term "heaven" is often interchangeable with "firmament." In regard to the "expansion," Jb 9:8 contains the Qal participle נטה which can refer to a progressive "stretching out," and matches the progressive speech in the preceding verse: "the One speaking to the sun, and it does not rise and to the stars he sets a seal." The same Qal participle appears in Ps 104:2 and Is 42:5 in a similar context of progressive action, whereas Is 44:24 uses the same Qal participle but could refer to a single act or a progressive action. Is 45:12 uses the Qal perfect נטו referring to a past act, as does Jr 51:15. In Is 51:13 the Qal participle is coupled with a past act ("founded the Earth"), yet Zc 12:1 uses the Qal participle coupled with two other Qal participles ("founding the Earth" and "forms the spirit of man within him," the latter of which is a continuing action). All in all, the evidence leans towards the "stretching out" as an event with a definitive beginning in the past but in continual progress, at least for some indefinite period of time, and thus a process that did not cease on Day Two of creation week.

optimal size, but we do not know when that termination point occurred, or if it has yet occurred.

As the firmament continues to expand beyond the radius of the Fourth Day it will carry the newly created stars with it. As a result, light from the star will be stretched and, depending on the intensity of the stretch due to whether the star was initially placed nearer to or farther from the Earth, it will produce a corresponding redshift in the wavelength of the starlight. Whether this is the cause of the redshift we see today is not certain, but the major point is made that, within the context of the expanding firmament, the Bible places no limitations on starlight reaching Earth on the Fourth Day.

Using the Redshift Formula for a Small and Young Universe

In regard to the redshift, it is interesting to see what happens when we use Big Bang cosmology's very own formula for measuring the age of distant objects. The age is calculated by the formula $t = t_0 (1 + z)^{-3/2}$, where t_0 is the current age of the universe and z is the redshift factor of the object.[965] Most of modern science believes the universe began during a Big Bang, and using their own assumptions and scale factors, it believes that this seminal event occurred 13.7 billion years ago, at least according to the latest data from NASA's Wilkinson Microwave Anisotropy Probe. Let's say NASA finds a distant object in the sky and assigns it a z-factor of 1. NASA will then plug in the value for t_0 as 13.7 billion years and will compute a value for t, which is understood as the age of the universe when the radiation emission of the distant celestial object took place. In the case where $z = 1$ then $t = 4{,}844{,}413{,}013$ years. Since using the number 13.7 billion years is completely arbitrary (for it is based on the unproven Big Bang assumptions of the universe), let's say we assume t_0 is 10,000 years instead of 13.7 billion. In this case, where $z = 1$ then $t = 3{,}536$ years. In other words, when an astronomer sees a star with a z-factor of 1, he might just as well assume the universe was 3,536 years old rather than 4.8 billion years old, since the z-factor is only a function of one's assumption regarding the beginning of the universe. If an astronomer finds an even more distant object that correlates to a z factor of 2, then the age of the universe when the object began radiating was 1,924 on the biblical scale but 2.6 billion years on the Big Bang scale.

Of course, the biblicist does not interpret either the 3,536 years or 1,924 years as the different times that two stars were created, for he holds, on a dogmatic basis, that all the stars were created on the same day. It only means that, as the firmament expanded and carried the variously placed stars within it, their wavelength would be stretched by their medium, the firmament, in proportion to the distance they were originally placed from Earth. (See 1Co 15:41, which teaches that "star differs from star in glory," presumably because of their specific composition and purpose, which required them to be placed at different distances from the Earth). Thus, if we were to understand redshift as a distance indicator, what we see as differences in redshift values today is merely the result of the differences of the original placement of the stars on the Fourth day of creation. The stars that were placed closer to Earth will now exhibit lower redshift values today, and vice-versa for the stars placed farther away.

Interestingly enough, if we use modern science's formula for measuring the age of the universe when the cosmic microwave background radiation (CMB) was released, we get very close to the time we have predicted that the firmament would create the 2.73º Kelvin temperature. The formula is $T = T_0 (1 + z)$. Plugging in a z-factor of 1089 for the CMB, the Big Bang theory arrives at a universe age of 380,711 years after the primordial explosion for the arrival of the CMB, whereas using the same z-factor the biblicist obtains 0.278 years, which puts the CMB well within the first three months of the first year of creation and after the fall of man when, as we will see in Chapter 16, according to Hildegard, the universe began rotating and the firmament needed to be cooled at 2.73º Kelvin.

[965] This z-factor formula is based on the so-called "dust model" of the universe wherein the major components of the universe do not exert any pressure on their surroundings. But if one were to base the z-factor on the radiation of the CMB in terms of number of particles, the formula would be $t = t_0 (1 + z)^{-2}$. This again, shows the complete arbitrariness of the formulas since they invariably depend on one's unproven assumptions.

A Critique of Fernand Crombette

As noted previously, our work accepts as a starting point the ecclesiastical decisions made by Catholic papal authorities in the Galileo case who rejected as "formally heretical," "erroneous in faith," and "opposed to Scripture" the diurnal and translational motion of the Earth (*i.e.*, that the Earth spins on an axis and revolves around the sun). As such, there are severe problems with the geocentric theory once proposed by Fernand Crombette (1880-1970) and, unfortunately, the same theory that is being advanced by the French "CESHE" group (Cercle Scientifique et Historique). Although Crombette believed that Earth was centrally located in the universe, he also held to many ideas that have little or no scriptural, ecclesiastical, traditional or scientific support.

Crombette held to the following problematic concepts:

- the Earth rotates on an axis every 24-hours.
- the Earth rotates around a universal axis once per year.
- there is a "very large and heavy planet" outside the orbit of Pluto.
- the Earth moves through space at the "pace of a man walking" (supposedly coinciding with the small positive result of the 1887 Michelson-Morley experiment).
- at the beginning of creation, the Earth was in the sun and was then pulled out of the sun.
- the moon was pulled out of the Earth.
- in order to arrive at this cosmological knowledge we must read Scripture by transposing the Hebrew into Coptic sounds.[966]

The last of these suppositions, namely, that the Hebrew Scripture must be read by retranslating into Coptic sounds in order to get to the real truth of the text is an unproven, subjective and perhaps a very serious breech of scriptural exegetical principles. Crombette based many of his interpretations on his Coptic retranslations and it seems to be the principle reason he went off the track in regard to understanding the cosmological order. We are somewhat chagrined at his approach and conclusions since no one in all of Christian history has advocated, even remotely, the cosmological views that Crombette espoused, and there was good reason: there was simply no evidence for it. Although Crombette did a lot of other valuable work, CESHE's indiscriminate support of Crombette's cosmology needs to be reassessed, especially since CESHE makes no claims of knowing Coptic, Hebrew, or Greek, nor to the art of bible translation and the science of manuscript transmission, all of which are absolutely essential in determining the veracity of Crombette's claims.

The most glaring problem with Crombette's approach is his almost total dependence on his arbitrary decision to use Coptic as the basis for translating and understanding the Hebrew text, which by his own admission are vastly different than the accepted Hebrew translations of today, especially in the crucial texts of Genesis 1-2. Even the Coptic versions of Scripture were not its main translations, the language being confined as it was to small regions of Egypt. The commonly used Coptic manuscripts (*e.g.*, the Bohairic, the Sahidic, and the Memphite) disagree among themselves, as well as being saddled with the same discrepancies when compared to the more common Hebrew Masoretic texts, the Septuagint versions, and the Greek New Testament codices. The worst part of Crombette's unsubstantiated methodology is it is foisted upon some of the most important passages in Scripture – those dealing with the beginning of creation.

Turning to the details, in Crombette's Coptic retranslation of Genesis 1, it is the sun that precedes the Earth and out of which the Earth is eventually drawn, whereas the normal reading of the Hebrew text as well as the Greek Septuagint translations, insist that Earth was created first, by itself, and was surrounded by a sphere of water in total darkness, and the sun was not created until the fourth day. Even the "light" of Genesis 1:3 does not appear until after Earth is given its name and put in its primeval condition. According to the *Biblia Hebraica Stuttgartensia's* textual notes, there are no

[966] Cromette states: "…the Hebrew Bible could – and should – be read by giving to the Hebrew letters their Coptic sound" (Noël Derose, *If the World Only Knew: Fernand Crombette, His Life and Work*, C.E.S.H.E., BP 1055, 59011 Lille Cedex, France, 1996, p. 65, and also stated on p. 192). On page 235 it is stated that Crombette, after taking "from the Hebrew text in Vigouroux's Polyglot Bible, he retranslated…basing his reading of the Hebrew letters on their value in the Coptic language, which was that spoken by Moses. Coptic was the language spoken in Egypt, where the Hebrews were living at that time." See also pages 244, 249, 295-314, 331, 334-335, 348.

significant differences among the major manuscripts in these opening verses of Genesis. Not until Gn 1:7 is there the slightest discrepancy among the various manuscripts.[967]

In Crombette's Coptic version of Genesis 1:1-2, it is reported by him to say:

> God who at the beginning…made through his Word, the system which is suspended in a circular movement around the heavens, then the system maintained below, the Earth, taken from the sun. The Earth coming from its taking out of the sun, was then constituted in the general form of a globe: it lacked boundaries…*etc*.[968]

Without giving the reader any indication of the critical textual apparatus he is using, or any indication that he might have reservations about this seeming bizarre translation, Crombette produces a text that is almost the total antithesis of the Hebrew text, and probably less accurate than the Babylonian epic *Enumu Elish*. It is difficult to know what may have been driving Crombette to undermine the traditional inspired Hebrew text to the extent represented above, as well as to ignore all previous translations of Gn 1:1-2.

All we have from Crombette's book that purports to be a synopsis of his translational methodology are a few pages of interpretive principles that he sought to apply to the Coptic text. For example, Crombette insists that Coptic should be "read in monosyllabic Coptic" and that the "Coptic language suffered from deformation rendered necessary by the technique of the rebus," and that, "The general sense of the phrase indicated what should be read."[969] Be that as it may, the fact that the author admits the Coptic language "suffered from deformation" should have been the first warning sign that Coptic was not reliable. In fact, Crombette himself suggests the dubiousness of his whole approach as he admits that the original Coptic language was written in "hieroglyphics" and only later into letters. (NB: the very name CESCHE is an acronym formed by Crombette's translation of a hieroglyphic from an ancient rebus.)[970] How he arrived at the conclusion that this primitive set of picture-words, which he admits incurred a "deformation," could ever be expected to give us an accurate picture of the first days of Genesis is quite puzzling.

The only comment Crombette offers to his reader concerning the Hebrew language is that it lacked precision because it "had no vowels," and thus could leave "doubt of the sense of the words."[971] Although there is some truth to this, Crombette's concern is more of an exaggeration than a cause for alarm. In actuality, (and Crombette admits this himself) the Jewish scribes and their meticulous preservation techniques retained the precise meaning of the text by memorizing the vowel sounds of the consonants, from generation to generation. This is precisely why the Masoretic text is so accurate and agrees almost word-for-word with the Greek Septuagint in the text of Genesis 1.

Furthermore, even without the vowel sounds, the Hebrew language is somewhat limited in the meanings available for its tri-consonant-rooted words (*i.e*., most Hebrew words are based on three consonants). Granted, there could possibly be two or three different meanings available to the root word without vowel markings, still, the correct meaning could very easily be determined by noting the context of the passage, not to mention the confidence a Hebrew scribe would possess by his total familiarity with the language, written as well as spoken.

Jerome, who of all the Fathers was one of the few who knew Hebrew and probably had at least some Hebrew manuscripts at his disposal when translating the Old Testament into Latin, and who possessed the various Greek translations of the Old Testament, gives absolutely no indication that a manuscript or translation along the lines of Crombette's rendition of Genesis 1:1-2 existed anywhere in the world. Augustine, who worked with the Septuagint text of Genesis, also offers nothing close to Crombette's translation or interpretation, nor does either Basil or Chrysostom (the principle patristic exegetes of Genesis 1-2).

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[967] E. Elliger et W. Rudolph, Textum Masoreticum curavit H. P. Ruger, Gedruckt mit Unterstützung der Deutschen Forschungsgemeinschaft 1967, 1977.

[968] *If the World Only Knew: Fernand Crombette, His Life and Work*, pp. 306-307.

[969] *Ibid.*, pp. 142, 145-146.

[970] *Ibid.*, p. 147.

[971] *Ibid.*, p. 177.

One wonders, for example, how the word "sun" even entered the Coptic rendition Crombette claimed for Genesis 1:1-2, since the Hebrew scriptures not only avoid using the word "sun" שמש (*shemesh*) until Genesis 15:12; but even the word "light" אור (*or*) isn't mentioned until Genesis 1:3. Moreover, even without vowel-pointing in the original Hebrew text, there is nothing among the rudimentary Hebrew consonants of Genesis 1:1-2 that is close in lettering or syllabic pronunciation to *or* or *shemesh*, and thus there was little, if any, possibility for confusion or imprecision in the original text of Genesis 1:1-2. There was certainly nothing close to what Crombette produced from his Coptic sounds.

It is quite apparent that, despite Crombette's choice of title for the book he wrote on this subject, namely, *La Genèse, cette incomprise* (translated: "Genesis misunderstood"), it appears that Crombette himself has grossly misunderstood the Genesis text. Perhaps not knowing any better than Crombette, the biographer, Noël DeRose, insists that "the translations produced by Crombette in no way alter the known texts of Holy Scripture" but merely give "interesting scientific details and complementary information, such as logical explanation…" Yet it should be clear to any biblical scholar who is familiar with the original languages of Scripture; the history of manuscript transmission; the traditional meaning of Hebrew and Greek words; and the overall sense of Holy Writ, that Crombette did precisely what DeRose insists that he did not do. Rather than helping us, they should be highly concerned that Crombette's interpretation somehow missed the insight of holy men of God for 4,000 years until we were blessed to receive it from his Coptic pen. That humankind has totally misunderstood a basic text of Scripture for four millennia doesn't seem to bother Crombette in the slightest, however.

Finally, Crombette's translation of Genesis 1:1-2 is not, as he claims, "scientific." There is no scientific evidence that the Earth came out of the sun, much less has any patristic or ecclesiastical source ever suggested that it was the proper interpretation of Genesis 1:1-2. And although there may be some scientists who have proposed that the moon came from the Earth, this is at best considered a hypothesis in order to support evolutionary theory, not to mention that Genesis 1:14-19 indicates quite clearly that the moon, as well as the sun, were placed in the sky by divine *fiat*, within one day, not, as DeRose proposes: "And certainly, one must believe in a Creator who made the Earth turn 17 times faster than in our days, so that it could eject the moon, and who then brought the Earth back to its initial speed."[972] Scripture does not even suggest such a scenario, let alone that we "must believe" it to be so. In the end, Crombette's theory that: (a) the Earth moves slowly through space, and (b) the Earth rotates on its axis instead of the sun revolving around the Earth, must be rejected for the simple reason that the Church was clear in 1633 that to deny the sun revolved around the Earth was "formally heretical" and to state that the Earth moved, whether rotating, revolving or moving linearly at a slow pace is "at least erroneous in faith," if not formally heretical.

This critique of Crombette's work is not to say that everything in his voluminous writings is erroneous; quite the contrary. Crombette's understanding of Pangea, for example, seems very plausible. In fact, it is supported well by the biblical and scientific evidence.

[972] *Ibid*., p. 306.

At that time Jesus answered and said: I confess to thee, O Father, Lord of Heaven and Earth, because thou hast hid these things from the wise and prudent, and hast revealed them to little ones.
Yea, Father: for so hath it
seemed good in thy sight.
Come to me all you that labor
and are burdened, and I will refresh you.
Take up my yoke upon you, and learn of me, because I am meek, and humble of heart:
And you shall find rest to your souls.
For my yoke is sweet and my burden light.

Matthew 11:25-26, 28-30

She put her hand to the tent peg and her right hand to the workman's mallet; she struck Sisera a blow, she crushed his head, she shattered and pierced his temple. He sank, he fell, he lay still at her feet; at her feet he sank, he fell; where he sank, there he fell dead.

Judges 5:26-27

"If I have spoken to you earthly things, and you believe not; how will you believe if I shall speak to you heavenly things?"

Jesus Christ[973]

"The person who thinks there can be any real conflict between science and religion must be either very young in science or very ignorant of religion."

Joseph Henry[974]

"A conflict arises when a religious community insists on the absolute truthfulness of all statements recorded in the Bible."

Albert Einstein[975]

"If God had spoken scientifically, even an Einstein would not have understood him."

Walter van der Kamp[976]

"It follows from this that our notions of physical reality can never be final. We must always be ready to change these notions."

Albert Einstein[977]

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[973] John 3:12.

[974] Joseph Henry, American physicist (d. 1878), attributed, not verified

[975] Albert Einstein, *Ideas and Opinions*, p. 45.

[976] *Bulletin of the Tychonian Society*, December 1981, p. 17.

[977] Albert Einstein, *Ideas and Opinions*, p. 266

Chapter 16

Hildegardian Geocentrism: Aristotelian Cosmology Meets Modern Science

A Brief History of Hildegard's Life

At the beginning of the second millennium stood a woman gifted with insight into cosmology that, as we look in hindsight, seems to have far exceeded the theories of Copernicus, Galileo, Kepler, Newton, and Einstein. The woman was **Hildegard von Bingen**, the eleventh century German mystic and Benedictine Abbess whom some call "The most gifted woman of the epoch."[978] She was born in 1098 and died at the age of 81, in 1179. Her complete story is truly amazing, but, of course, we are only interested in her cosmological revelations.

Hildegard received a series of mystical visions concerning the cosmos beginning in childhood, which became more intense in her forties. She writes:

> Up to my fifteenth year I saw much, and related some of the things I had seen to others, who would inquire with astonishment whence such things might come.

Her main visions are divided into three eras: *Scivias* (1152-1158); *The Book of Life's Merits* (1158-1163); and finally *The Book of Divine Works* (1163-1173), the last being the one we will investigate. The book was written in Hildegard's native medieval German, and its contents have been reproduced and analyzed by Dr. Helmut Posch in the book titled *Das wahre Weltbild nach Hildegard von Bingen* ("The World According to Hildegard von Bingen").[979] We are indebted to him for translating Hildegard's words and interpreting them in modern scientific terms. We will add our own interpretation to Posch's as is appropriate in accord with the scientific information we have produced in this book.

In Hildegard's visions we find one of the most remarkable treatises on cosmology ever told. It is elaborate and quite detailed. It answers many of the questions with which modern science has struggled but failed to obtain satisfying solutions. For example, Hildegard helps in explaining the nature of gravity, something that has escaped the understanding of modern science to this very day, although many theories, from Descartes' vortexes to Quantum Loop theory, have been proposed. She explains the nature of light and inertia, two other phenomena modern science has long sought to understand but without much success. She explains the nature of space and its makeup, a solution, we will see, that is diametrically opposed to the "*in vacuo*" concept used in Relativity theory, but in agreement with the pre-Einsteinian particulate model of space we have been discussing in this book. She explains the mechanics of solar and planetary movement from a Tychonic perspective (*i.e.*, the planets revolve around the sun, but the sun revolves around the Earth), over four hundred years before Tycho Brahe devised it in opposition to Galileo's solar system, and she did so in the midst of the reigning Ptolemaic system.

In the wake of Newton's and Einstein's inability to explain such mundane phenomena as why a body in motion remains in motion (inertia) or why bodies fall radially toward the center of mass, or even modern science's inability to explain the true nature of light (wave or particle), the Aristotelian postulates (*e.g.* that the Earth is the absolute standard of rest, or that no object has momentum or acceleration unless a force acts upon it, *etc.*) these remain an open and viable explanation of celestial mechanics. Stephen Hawking, for all his prejudices against geocentrism, put it well when he said:

[978] Michael Seidlmayer, *Currents of Mediaeval Thought: With Special Reference to Germany*, 1960, p. 92.

[979] Helmut Posch, *Das wahre Weltbild nach Hildegard von Bingen*, Deutsche Bibliothek – CIP – Einheitsaufnahme, Aufl. – A-4880 St. Georgen, 1998.

> The big difference between the ideas of Aristotle and those of Galileo and Newton is that Aristotle believed in a preferred state of rest, which any body would take up if it was not driven by some force or impulse. In particular, he thought that the Earth was at rest. But it follows from Newton's laws that there is no unique standard of rest….Is Newton right or is Aristotle, and how do you tell?….Does it really matter whether Aristotle or Newton is correct? Is this merely a difference in outlook or philosophy, or is it an issue important to science? Actually, the lack of an absolute standard of rest has deep implications for physics: it means that we cannot determine whether two events that took place at different times occurred in the same position in space….Newton was very worried by this lack of absolute position, or absolute space, as it was called, because it did not accord with his idea of an absolute God. In fact, he refused to accept the lack of absolute space, even though his laws implied it.[980]

We can see from Hawking's assessment how important is the question of whether or not the Earth is at rest. It is no exaggeration to say that all of physics and cosmology divide right at this point. If either Aristotle, on the one hand, or Galileo, Newton and Einstein, on the other hand, took the wrong path, then all subsequent physics and cosmology produced by the party at fault must be erroneous. The stakes couldn't be higher.

Whereas Galileo, Newton and Einstein gave us only mathematical equations, Hildegard, following Aristotle, gives us the physical mechanisms behind the math. In fact, as she explains the mechanics of the universe in basic Aristotelian thought forms, she is aided by visions that provide comprehensive answers that not even Aristotle's imagination could have created. Her understanding of the cosmos advances well beyond both her ancient and modern counterparts.

All this, of course, raises the question of how this simple woman could have known the nature of the cosmos so intimately. To our knowledge, she was never made privy to the Aristotelian library discovered in the Middle East two centuries earlier. But not only is Hildegard's use of Aristotle a phenomenon in itself, her visions often modify and correct the places in which Aristotelian physics and cosmology needed help. So elaborate and advanced is Hildegard's model of the universe that we are more or less compelled to accept that it came either partially or totally from divine sources. (If not, then we could be as quick to conclude that her visions, as the adage is commonly stated, may not be worth the paper they are written on). Her visions have explanations that any modern-day scientist would understand, even if he didn't agree with them. As such, one cannot lightly dismiss her cosmology by countering that she might have been deranged or hallucinating, for Hildegard was a well-respected intellect in her day as she engaged in all kinds of aesthetic and mind-demanding activities, from musical composition to theological writing, but she had little science knowledge that could provide the elaborate and technical explanations of the universe we find in her writings. She studied neither atoms nor gravity, yet she seems to know about both, and many other related issues, in ways at which even a modern scientist would marvel.

Some skeptic might resort to accusing her of being demonically possessed, a state of mind that somehow gave her the ability to produce all kinds of extraordinary insights. But this accusation is quickly neutralized. First, devils do not produce such technically accurate designs. Second, if one decides to open up the possibility of the preternatural to Hildegard, one consequently opens up the supernatural as well. Thus the objection loses its impact, not to mention the fact that no one in Hildegard's day, including layfolk and church hierarchy, saw any evidence in her life that would merit such a derogatory accusation. Rather, Hildegard was exhorted and authorized to publish her writings by Pope Eugenius III (1145-1153) after he had commissioned Albero of Chiny, the bishop of Verdun, to investigate her writings. Hildegard's immediate clerical authority in Mainz, Bishop Heinrich, pronounced her visions as having divine origin. As her fame spread far and wide, many prominent clerics and layman sought her wisdom, including St. Bernard of Clairvaux, St. Elizabeth of Schoenau, the emperor Frederick Barbarossa, King Conrad III, and dozens of archbishops and bishops throughout Europe. The Roman Catholic Church has "beatified" Hildegard, which is the last step toward sainthood.

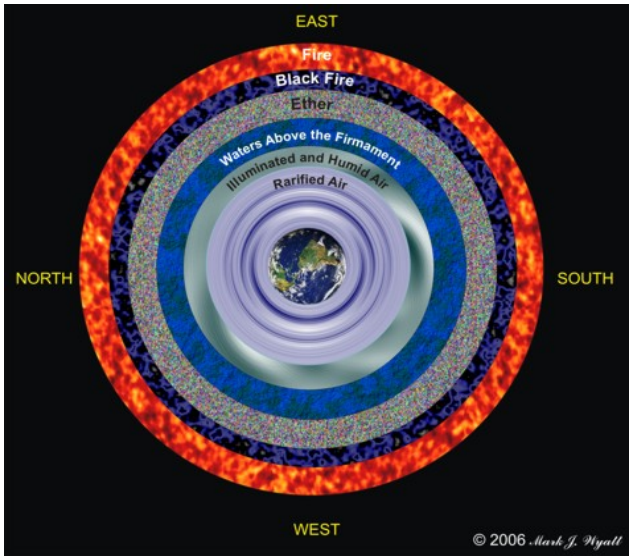
[980] Stephen Hawking and Leonard Mlodinow, *A Briefer History of Time*, 2005, pp. 22-24.

Earth: The Center of Six Cosmic Layers

To no surprise, Hildegard's visions of cosmology agree precisely with the geocentric foundation laid down in Scripture; which foundation was promoted, without exception, by a consensus of the Church Fathers; continued faithfully by Thomas Aquinas and the medievals; and confirmed by papal and conciliar decrees – not something the devil would want to accommodate if he were trying to marginalize Hildegard against the patriarchs and saints of the Church.

As Hildegard would agree, if one takes Genesis 1:1-2 at face value, one must hold that the Earth was created before the sun and stars; that it is the center point of the whole cosmos, is surrounded by the firmament that reaches to the limits of the universe, and a firmament upon which waters are presently resting. Thus was the cosmology of Hildegard's visions, but with much more detail. Accordingly, as we have outlined the scientific support for a geocentric universe in the foregoing chapters, we will now consult Hildegard's visions to give substance to many of those facts and queries.

To begin, Hiledgard's visions revealed that the Earth was in the very center of the universe, serving as the center for the compass that points north, east, south and west stretching to the edge of the universe, a universe that is finite and spherical. She revealed that the whole universe rotates around the Earth and that the Earth itself has no movement. Surrounding the Earth are **six spherical layers**, composed either of fire, water or air.[981] The two outer layers are composed of fire (energy). A layer underneath the fire layers is composed of "ether." The two layers nearest to Earth are composed of air, the Earth's atmosphere being closest and described as "very clean," followed by an "illuminated and humid" air layer. Above the two air layers is a water layer, which corresponds to the "waters above the firmament" recorded in Genesis 1:6-9. Hildegard writes that these waters "are material unlike the lower waters, that is, much finer and invisible to our eyes."[982] The words "finer" and "invisible" could mean that the water is extremely rarified and thus invisible, or that it is rarified and very far away from Earth and therefore not seen with the unaided eye. The corollary point seems to be that the water Hildegard has in view is not solid or liquid, but gaseous.



Scripture verifies that water, and the corresponding layers in Hildegard's vision, exist in these remote regions of the celestial orbs. In Psalm 104:1-6 [LXX 103:1-6], David writes:

> [1] O Lord my God, you are exceedingly great. You have put on praise and beauty:
> [2] And are clothed with **light** as with a garment. Who stretches out the heaven like a pavilion:
> [3] Who covers the higher rooms thereof with **water**. Who makes the **clouds** your

[981] Hildegard writes: "In its outer vault appeared a circle of bright Fire around the spherical wheel and immediately under it, without gap, another circle of black Fire. The thickness of the bright Fire was double of the black Fire. The two circles were linked as if they consisted of only one. Under the circle of black Fire, appeared another circle as consisting of pure ether, with the same thickness as the two other ones together. Under this ether circle there is a circle of humid Air, with the thickness of the circle of bright Fire. Under the circle of humid Air appeared another one consisting of very clear Air, which in its consistency was similar to a nerve of the human body. It was wide like the circle of black Fire. These two circles were also linked as if they consisted of only one. Under this very white Air there is also a thin layer of Air similar to some fluffy down, with dark accumulated clouds, which are divided in the whole spherical area. All these six areas were bound without an interstice. The outer circle inundated all the other spheres with its Fire, but the water area humidified all the other ones with its humidity" (*Welt and Mensch*, 35, *Das wahre Weltbild*, p. 82).

[982] Hildegard, *Die göttlichen Werke*, 56; Posch, *Das wahre Weltbild*, p. 84.

chariot: who walks upon the wings of the **winds**.
[4] Who makes your angels spirits: and your ministers a burning **fire**.
[5] Who has founded the **earth** upon its own bases: it shall not be moved for ever and ever.
[6] The **deep** like a garment is its clothing: above the mountains shall the **waters** stand.

Water in the Remote Recesses of Outer Space

Prior to our present era, water in outer space was undetectable. Modern science, however, has discovered vast amounts of water in the recesses of space. As West Marrin writes:

> Water is certainly not limited by the confines of this planet and is, in fact, one [of] the most common molecules in the universe. The more that science looks for water in the cosmos, the more places they seem to find it.[983]

Scientists have known for quite a while that massive water clouds exist in outer space. As soon as telescopes were sensitive enough to detect it, the reports came in quite frequently. One of the first was from the University of California that reported in *Science*:

> Radio spectral line radiation of water molecules at a wavelength of 1.35 centimeters has been measured from eight sources in the galaxy. The sources are less then 7 arcminutes in diameter, have extremely high brightness, temperatures, and show many spectral features...Seven of the eight H_2O line emission sources which have been observed agree in position with known hydroxide emission sources within the accuracy of measurement.[984]

The article goes on to say that the sizes of the water clouds range in length to about 80 billion miles, a distance which is 27 times the distance between the sun and Pluto. A more recent newspaper report concurred with this evidence:

> Astronomers have detected water at the most distant point from Earth so far, a discovery that adds to the growing belief this essential ingredient of life may be present throughout the universe. The water was found 200 million light years away by radio telescope in Markarian 1…said James A. Braatz, an astronomer at the University of Maryland.[985]

Often water is found in the strangest places:

> Recently, two of the brightest supergiants in the galaxy, Betelgeuse (in the Orion constellation) and Antares (in the Scorpio constellation), were discovered to actually have water in their photospheres, as well as in the circumstellar material

[983] West Marrin, *Universal Water: The Ancient Wisdom and Scientific Theory of Water*, Hawaii, Interocean Publishing, 2002, p. 67. Water has also been found on the surface of the sun. It survives the high temperatures of the sun's photosphere since the water is confined to the dark, cool regions of sunspots whose temperature is less than 3,500 Kelvin. Marrin adds: "The water discovered in the Sun and in various stars is understandably known as hot water, but it is unmistakably water, based on the wavelengths of infrared radiation that are absorbed…water is believed to filter out certain frequencies of EM radiation that are given off by stars….When these stars die, they appear to go out in a flood of water as This Element plays out its less glamorous role of mediating the destruction or recycling of the universe's stuff" (*ibid*., pp. 78-79).

[984] S. H. Knowles, *et al*., "Spectra, Variability, Size, and Polarization of H2O Microwave Emission Sources in the Galaxy," *Science*, March 7, 1969, pp. 1055, 1057. Basil writes: "Let us understand that by water, water is meant; for the dividing of the waters by the firmament let us accept the reason which has been given us" (*Hom.*, 3, 9).

[985] "Water found on distant galaxy," *Associated Press*, Minneapolis, 1994. Braatz continues to find water in space. As of 2005, Braatz's most recent abstract reveals a "Search for Extragalactic Water Maser Emission with the GBT: Independent Measurement of the Hubble Constant: Consequently, we propose to conduct a search for extragalactic water maser emission in edge-on Seyfert 2 and LINER systems. Considering the detection rates of our recent GBT surveys among edge-on active systems, we expect to detect ~20 new sources, thereby increasing the number of known water maser sources by nearly 50%" (Conducted by the National Radio Astronomy Observatory).

> surrounding their photospheres….The structure of photospheres in cool stars is due primarily to the opacity of water, which is one of the most abundant molecules in such stars. The presence of photospheric water in these red supergiants confirms that it is located within the star itself and is not just a component of the dust and gas clouds surrounding stars. Aging supergiants have been observed to release massive amounts of water as they die.[986]

Regarding the water in and surrounding the constellation Orion, Marrin adds:

> Recent data indicate that this cloud complex contains an extremely high concentration of water vapor, which has been estimated on the order of 1 part in 2,000 or about 500 parts per million. This is about twenty times greater than the water concentration in other interstellar gas clouds and represents enough water to fill the Earth's oceans ten million times![987]

In addition to water's ubiquity, modern science is continually amazed at the makeup and function of the water molecule. The simple combination of two hydrogen atoms and one oxygen atom has, as it turns out, a dizzying array of combinations and actions that is highly unique among nature's compounds. As Marrin tells it:

> Water is not simply H_2O, but rather is a complex network of interconnected water molecules, especially in its solid and liquid states. Moreover, this network is constantly shifting its connections (known as hydrogen bonds) among neighbors so that the resulting geometries are exchanged as many as a trillion times per second….Many of water's most puzzling properties, as well as its ability to solvate or "include" an amazing variety of substances within its network, are a direct result of these molecular gymnastics…[988]

And later:

> Based on the percentage of water versus carbon-containing compounds in biological organisms, there is little doubt that the biosphere is water-based rather than carbon-based. Not only does water constitute most of our mass, it is required in essentially every biological structure and process. It was formerly understood that water simply acted as the solvent or matrix within which the carbon-containing compounds (*e.g.*, DNA, proteins) orchestrated the drama that creates and sustains biological life. It now appears as though water participates in directing the processes to an extent that was previously unimagined.[989]

The purpose of detailing the above facts is to point out that, as modern science has confirmed the presence of water in outer space, it is certainly no stretch of the imagination to accept that there is "water above the firmament," as both Genesis 1:6-9 and Psalm 148:4 indicate. Considering the complexity and versatility of the water molecule, it no doubt plays a vital role both on Earth and in the cosmos, the latter being a dimension of water's existence that science is just now beginning to discover and confirm. We will see more of the precise function of this cosmic water later in Hildegard's writing.

Scriptural Accounts of Primordial Water and Plasma

As we noted above, according to Hildegard the water above the firmament is just one of six layers surrounding the Earth. If this is, indeed, the correct understanding of the structure of the universe, we can then reconstruct the process of its development and its constitution by employing other information from Scripture. The relationship between the layers is expressed in various passages. For example, 2 Peter 3:5 confirms Genesis 1:2's stipulation that the

[986] *Universal Water*, pp. 76-77.

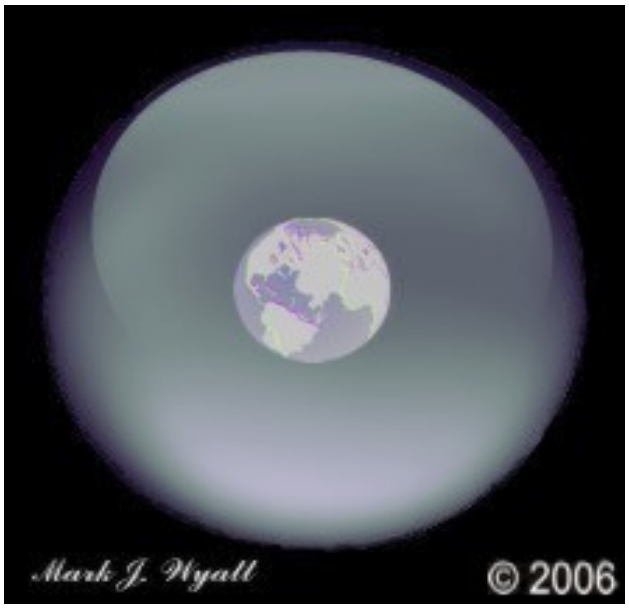
[987] *Universal Water*, p. 78.

[988] *Universal Water*, p. 93.

[989] *Universal Water*, p. 125.

Earth was originally created inside a spherical mass of water:

> …that by the word of God the heavens existed long ago, and an Earth formed out of water and by means of water, through which the world that then existed was deluged with water and perished. But by the same word the heavens and Earth that now exist have been stored up for fire, being kept until the day of judgment and destruction of ungodly men. (RSV).



The clause "Earth formed out of and by means of water" is the Greek γῆ ἐξ ὕδατος καὶ δι ὕδατος, wherein ἐξ means the Earth came from water, while the Greek δι, in this case, does not mean "through" but is closer to "between," and thus tells us that the Earth was surrounded by water (*i.e.*, water covered the entire spherical circumference), and held there, as Peter says, by the word of God. The original mass of water surrounding the Earth was huge, measuring multi-thousands of miles in diameter, since later it would be used to cover the vast circumference assigned to it in the distant cosmos. Hildegard tells us that the original **water surrounding the Earth was solid ice**, until the Spirit moved upon it and light was created.[990] Consequently, the Earth of the First day of creation was like a seed in the middle of a vast frozen ocean. We can assume that once the light was created its heat melted the ice. Moreover, since science shows that a great residue of water remains in the cosmos, we can surmise that as the firmament expanded on the Second day and took the greater portion of the primordial waters with it to form the "waters above the firmament," a substantial residue of that water was left in the cosmos and it is this amount that science is now detecting in outer space, and whose importance we will discover momentarily.

In addition, 2Peter 3:6 indicates that the original water surrounding the Earth was later employed in the Great Flood (Genesis 7-9). This does not necessarily mean that the "waters above the firmament" were called down, for they are permanently fixed in their respective cosmic layer; rather, the water left behind in the cosmos after the expansion of the firmament could have been accumulated and dispersed on the Earth at the proper time, and its source is thus appropriately called the "windows of the heavens" (Genesis 7:11; 8:2). Since, as noted above, astronomers have discovered huge water clouds in space that stretch in length by as much as 27 times the distance from the sun to Pluto and could thus fill our oceans a billion times over, it is certainly reasonable to surmise that such massive deposits of water in space could have been used in the Great Flood. The water presently found in our local system may be the remnants of that event.

Interestingly enough, St. Peter says in the same context:

> But by the same word the heavens and Earth that now exist have been stored up for fire, being kept until the day of judgment...the heavens will pass away with a loud noise, and the elements will be dissolved with fire, and the Earth and the works that are upon it will be burned up" (2Pt 3:7,10).

The source of this destructive energy may be Hildegard's two outer layers of "fire." We can surmise that at the appropriate time they will be brought down from their remote recesses in space and squeezed toward the center of the universe until

[990] "During the Creation, the Water was then cold and didn't flow, while the Earth was still empty. But the Spirit of God moved up the waters and heated them, so that they should contain the Fire and flow as liquid" (*Ursachen u. Behandlung der Krankheiten*, 68; *Das wahre Weltbild*, p. 89). In Gn 1:2, 6, 7, the Hebrew dual form for water, המים, implies two water forms or sources.

the world is destroyed. As opposed to the *Big Bang*, we might call this scenario *The Big Implosion*. In the beginning of creation, however, what most likely occurred is that these two layers of energy originated from the "light" created on the First day. This primordial light (which was distinct from the sun and stars that would not be created until the Fourth day), initiated the day/night sequence on Earth for the first three days of the creation week. The daylight was produced by a confinement of the light to less than a hemisphere (Genesis 1:3 says "and God separated the light from the darkness"), which light moved around the Earth every twenty-four hours, perhaps in tandem with the Spirit that "moved over the face of the waters," to keek it liquefied.

One way in which the luminosity would be possible is if the light of the First day were in the form of a fire or plasma, since in that form it can be contained and moved.[991] For the purposes of comparison, the sun (which modern science has confirmed is a giant ball of fire), is also called a "light" in Gn 1:14-17, and it is also assigned the same function, that is, "to separate the light from the darkness" (Gn 1:18). Presently, as the sun revolves around the Earth, it creates the day/night sequence. In the same way, the rotational movement given to the primordial light of the First day was the means by which God "separated the light from the darkness" on the first three days. Hildegard speaks in a similar way:

> Almighty God, who is life without beginning and without end, and who constantly knows everything, made the material for all heavenly things and all mundane things together, that is, heaven as lucent matter, and earth, which was opaque matter. This luminous matter, however, from the glory of eternity flashed like a dense light that lit up over the opaque matter in such a way as to join itself to it. And the two substances were created at the same time *and appeared as if in a circular orbit*….The six days are six acts; for the beginning and the completion of each act is called a day. Neither was there an interval after the creation of primary matter, but instantly, as it were, the Spirit of God hovered over the waters, and afterwards, too, there was no delay, but God said immediately: "Let there be light" and light was made.[992]

Scripture later maintains this distinction as it speaks of four separate celestial sources. For example, in Ec 12:2 the preacher writes: "Before the sun, and the light, and the moon, and the stars be darkened."[993] Notice that the sun and stars are distinguished from the "light." The same four sources are noted again in Psalm 148:3: "Praise ye him, O sun and moon: praise him, all ye stars and light." Thus we know that this detailed description is not merely an idiosyncrasy of only one biblical writer.

Since at the beginning of creation the Earth was surrounded by a huge mass of water, the light created subsequent to the initial 12 hours of evening on the First day would have radiated through the water on its way to the Earth's surface.[994] Water,

[991] We note here that Aristotle held a view of light close to the modern view, that is, that light is ἐνέργεια (energy) and travels through or vibrates in a δίαφανες (diaphanes) or medium filling all of space. This is close to the Pythagorean view that understood light as a stream of particles that hit the eye, and opposed to the view of Plato that the eye emits a "divine fire" that is directed to the object. The Arabs of the Middle Ages adopted Pythagorus' view. It wasn't until 1690 that a wave theory of light was proposed by Huygens, and Newton understood it as "vibrations in the ether," thus developing the view of Aristotle. Today the theory of what constitutes light is still not settled. It is best described as waves that carry particles or waves composed of particles, since light has properties both of a wave and of particles. As Oliver Lodge once quipped: "the two concepts are like a shark and a tiger, each supreme in its own element and helpless in that of the other."

[992] Briefwechsel, *Das Wahre Weltbild*, p. 22. Regarding the creation of the angels, Hildegard states that it occurred during the creation of light. She writes: "For at the first fiat, 'let there be,' the angels came forth…" (*ibid*.).

[993] The Hebrew contains four separate nouns with an article for each of the four, in addition to each being separated by the *waw* conjunction, denoting in the clearest of terms that the four sources are separate and distinct. Reading from right to left:
עד אשר לא־תחשך השמש והאור והירח והכוכבים

[994] If we assume that the primordial light was created immediately after the Earth and the water surrounding the Earth were created, yet "darkness" or "evening" would have transpired for 12 full hours before the light appeared on the surface of the Earth, this would allow 12 hours for the light to travel through the water to reach Earth. In other words, while the light is traveling through the water,

then, was the first medium in which light traveled. Being on the outer circumference of this multi-million-mile layer of water, these primordial fires would, indeed, have been immense, much larger than our present sun, and even much larger than thousands of suns. But since the massive water beneath it would have proportionately diffused its light and heat, the Earth would have received the proper amount of radiation. As Hildegard says, the four elements of fire, earth, water, and air are kept in perfect balance, during and after the creation week.

The Sequence of Events from the First Day to the Fourth Day

One might ask why there were two separate light sources: one source for Days 1-3 and another source for Days 4-6. The reason is that the major portion of both the primordial light and the primordial water created on the First day are to be transported away from the Earth, a migration which happened on the Second day, when God created the firmament. After the water is sent away, it is the firmament's turn to serve as light's medium. As the firmament was being "stretched out"[995] it created the fabric of space (which, as we stipulated earlier, is a rigid yet flexible particulate, not a vacuum), and at the same time, took with it the fire and water to their new recesses in the outer universe, and which subsequently formed the layers of fire and water existing there in Hildegard's cosmology. Our present sun would have been too small to provide the light for the day/night sequence required by the text of Genesis 1:5: "and there was evening and there was morning, one day." As we noted, the size of the sphere of water that covered the Earth on the First day was thousands of times bigger than the sun itself and therefore the sun's light could never have penetrated to the Earth in order to provide enough light to dispel the darkness.

Although the expanding firmament carried the greater portion of the light and water to outer layers of the universe, a small portion of the water remained on Earth and a portion of the fire was left above the Earth. This residual water was then used to fill the ocean and river basins on the Third day, while the residual light was confined to a hemispherical region above the Earth and rotated with the same twenty-four cycle as did the larger hemisphere of fire on the First day. On the Second and Third days, of course, much less light would be needed to illuminate the Earth since after the First day there is no longer any water surrounding the Earth to diffuse the light. As these residual fires surrounding the Earth burned out just after the second 12-hour period on the Third day, this would necessitate the creation of additional "fires" on the dawn of the Fourth day, namely the sun, in order to provide the Earth with an uninterrupted sequence of day and night. (NB: Genesis 1 keeps track of time by "evening to morning," not morning to evening).

It is more likely, however, that the residual fire (or energy plasma) circling the Earth on the Second and Third days was not exhausted (the same is true for the sun for the foreseeable future) and was thus used to form the sun on the Fourth day, a position held by a number of Church Fathers and medieval scholars.[996] This sequence of events fits the text of Genesis 1, since the size and intensity of the residual fires on the Second and Third days would have to be the same as our present sun, otherwise the Earth would not have been hospitable to the vegetation created on the Third day. The firmament, having already been created for the purpose of being a depository for the heavenly bodies, will have the sun

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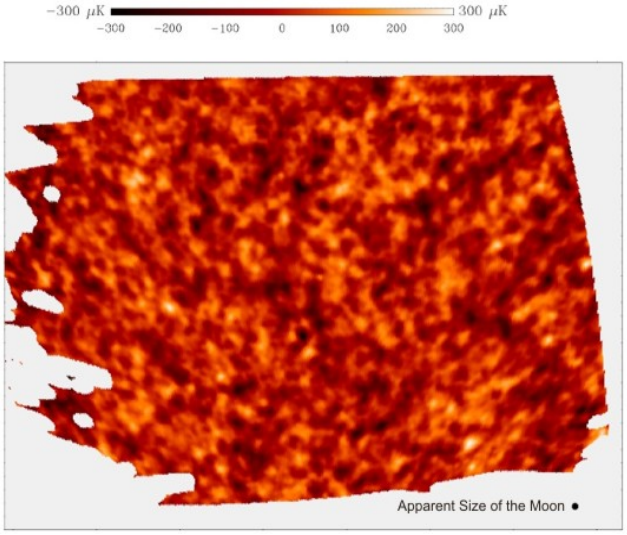
the surface of the Earth is still in its 12 hours of "darkness" or "evening." Considering that light travels two-thirds of its normal air speed in water, it would have traveled 123,000 miles per second through the primordial water. Traveling 12 hours at 123,000 mps means that the radius of the surrounding water could have been as long as 10,627,200,000 miles, which equals 1.54×10^{28} cubic miles of volume. This is more than three times the spherical volume of our solar system.

[995] *Cf.* Jb 9:8; Ps 104:2; Is 42:5; 44:24; 45:12; 51:13; Jr 51:15; Zc 12:1. We also note that, although Scripture says many times that the sun, stars and moon are "in the heavens," the Earth is never said to be "in the heavens."

[996] Gregory of Nyssa (*Hexameron*, PG 44, 66-118); Ephrem the Syrian (*Genesim et in Exodum commentarii*, in CSCO, v. 152, p. 9); Chrysostom (*Homilies on Genesis* (PG 53, 57-58). Thomas Aquains also held this view (*Summa Theologica*, 1, Qs. 67, Art. 4, Re. 2), as did a few other medievals: Honorius of Autun (*Hexameron* PL 172, 257); Peter Lombard (*Lombardi opera omnia*, PL 192, 651); Colonna, aka Aegidius Romanus (*Opus Hexaemeron*); Nicholas of Lyra (*Postillae perpetuae*); Cajetan (*Commentarii de Genesis 1*), and followed by Moses Mendelssohn (*Commentary on Genesis*) Zwingli (*Werke*); Luther (*Commentary on Genesis*); Calvin (*Commentary on Genesis*); Petavius (*Dogmata theologica*) *et al*.

placed in it on the Fourth day. As the firmament rotates on a twenty-four hour cycle, it will carry the sun with it, and thus the day/night sequence will be uninterrupted for the remainder of time.

The Outer Layer of Plasma Confirmed by Modern Science



The original mass of fire, however, is still at the outer recesses of the universe. Its heat is very intense, and thus we can understand why it will someday be used to destroy the inner universe. Interestingly enough, modern science may have received a glimpse of this layer, or something close to it. In December 1998 a team of international cosmologists sent up the BOOMERANG (Balloon Observation of Millimetric Extragalactic Radiation and Geophysics) telescope over Antarctica for ten days.[997] It took pictures of the cosmic microwave background radiation as it would appear at the edge of the universe. The picture shows what looks like a **mass of fire or plasma**, evenly dispersed throughout the universe. As one caption described it: "In this picture, we see the distant universe as it makes its transition from a glowing 2700ºC plasma to a perfectly transparent gas….BOOMERANG is the first telescope with the resolution and sensitivity required to image these…" Not surprisingly, most scientists who interpreted the picture believe in the Big Bang theory, thus they add that the plasma is from "approximately 14 billion years ago, a mere 300,000 years after the Big Bang." Of course, since the Big Bang never occurred, this leaves the primordial plasma as a created artifact of the First day of Creation, when God said: "Let there be light."

This conclusion is supported by the fact that the BOOMERANG's depiction of the primordial plasma does not support the Big Bang theory. Although the world's scientists were initially enthused by the pictures, that enthusiasm soon turned to dismay when it was discovered that the plasma contained too many unexpected anomalies. As *Scientific American* reported it:

> Usually cosmology goes something like this: new observations come in, scientists are baffled, models are upended. After the dust settles, however, patches are affixed and the prevailing theory emerges largely intact. But when the measurements by the Boomerang and Maxima telescopes came in, the sequence was reversed. Scientists were elated. "The Boomerang results fit the new cosmology like a glove," Michael S. Turner…told a press conference in April. And then the dust settled, revealing that two pillars of Big Bang theory were squarely in conflict…[998]
>
> …follow up studies soon showed that the lingering discrepancy, taken at face value, indicates that the universe is in fact spherical….The second …suggests that the primordial plasma contained surprisingly many sub-atomic particles….But accounting for those extra particles is no easy matter. According to Max Tegmark…the Boomerang results imply that subatomic particles account for 50 percent more mass than standard Big Bang theory predicts – a difference 23 times larger than the error bars of the theory. "There are no known ways to reconcile these measurements and predictions," says David R. Tytler of the University of California at San Diego.[999]

A similar finding was found by the Goddard Space Flight Center headed by Alexander Kashlinsky. Discovering the same "strange background glow" from having "peered all the way

[997] *Nature*, April 27, 2000, pp. 907-1021.

[998] "Boomerang Effect," *Scien. Amer.* July 2000, p. 14.

[999] "Boomerang Effect," *Scien. Amer.* July 2000, p. 15.

to the most remote objects in the universe," *Discover* writes:

> Kashlinsky and his team at Goddard examined a deep-exposure image of a patch of sky taken by NASA's orbiting Spitzer Space Telescope and then subtracted the light from all the evident stars and galaxies. What was left was a dim background glow never seen before…." We see a signal that cannot be explained by stellar populations that we know," Kashlinsky says.[1000]

So here we see that the scientific evidence does not support the Big Bang theory; rather it supports Hildegard's spherical universe with the hot plasma she says resides at its outer layers. According to Hildegard, the ether and water layers beneath it cool the high temperatures created by the plasma. The ether layer would serve as the initial thermal cushion to diffuse the heat, while the water layer would complete the process. As Hildegard puts it: "The outer sphere throws its fire equally on the other spheres. On the opposite side, the water sphere humidifies equally with its humidity all the other spheres," yet she also tells us that these cosmic waters "are in their own state, different than the lower waters [on Earth]."[1001] As we will see later, the cosmic water may be in a super-gaseous state, yet it humidifies the whole universe, and, as Hildegard adds: "The humidity and fire produce the appropriate heat to strengthen the firmament."[1002] This exchange of the four elements, among other processes (such as the cosmic winds upon which we will elaborate later), would leave the ambient temperature of the universe as cool as the present 2.73º Kelvin, while the water nearest the fires could be as hot as 3500º Kelvin and still allow the water to survive in the form of molecules.

The Purpose of the 2.73º CMB

The maintenance of 2.73º Kelvin[1003] brings up a very significant dimension of Hildegard's cosmology. Modern science has struggled to understand the origin and homogeneity of the 2.73º temperature, the most popular theory being that it is the remnant of the radiation from the so-called Big Bang explosion that various scientists believe occurred 13.5-15.5 billion years ago. Others hold that it is the resulting energy from the vibration of dense particles in space; while still others believe it is the residual temperature of all the stars and galaxies in the universe.

According to Hildegard's visions, the 2.73º Kelvin is a well-designed and precise residual temperature that is employed to keep the universe stable. It is the result of a cyclical thermic process occurring in the whole universe precisely so that it won't overheat. The very high density of the firmament (which we will detail momentarily) allows it to act as an ideal gas, and according to the well known formula: $P \times V/T = R$,[1004] the 2.73º

[1000] Susan Kruglinski, "Hunting of the First Stars," *Discover*, February 2006, p. 17. George F. R. Ellis recognized this same trait in inhomogeneous [Earth-centered] models of the universe, stating: "Just as in the standard universe models, the region beyond would be occupied by a hot cosmic plasma; and this could be the source of the blackbody radiation" (G. F. R. Ellis, R. Maartens and S. D. Nel, "The Expansion of the Universe," *Mon. Not. Royal Astronomical Society*, 184, 1978, p. 444).

[1001] *Die göttlichen Werke*, 56; *Das wahre Weltbild*, p. 84. Posch adds: "The volume of these elementary quantas of fine matter is smaller by many orders of magnitude than the atomic corpuscles, and which are invisible to our eyes. The upper waters are also invisible, as is the cosmic air and fire. The upper water is not comparable to H_20, as the cosmic air is not comparable to our atmospheric air" (*ibid*).

[1002] *Die göttlichen Werke*, 56; *Das wahre Weltbild*, p. 84.

[1003] The Kelvin scale begins with absolute zero, below which temperatures do not exist. Absolute zero, or 0ºK, corresponds to a temperature of -273.15° Celsius. Thus, a temperature of 2.73º Kelvin is very cold and very near absolute zero. The Kelvin degree is the same size as the Celsius degree. For example, the freezing point of water is 0° Celsius; the boiling point of water is 100° Celsius, which correspond to 273.15º Kelvin and 373.15º Kelvin, respectively. The Kelvin scale is named after the British mathematician and physicist William Thomson Kelvin, who invented it in 1848.

[1004] The behavior of an ideal gas is described by the relationship $PV = kT$ (pressure × volume = k × temperature). The proportionality constant, k, is usually expressed as the product of the number of moles, n, of the gas and a constant R, known as the universal gas constant, which has a value of 8.3149×10^3 joules/kilogram-mole-degree. The ideal gas law is simplified by replacing the

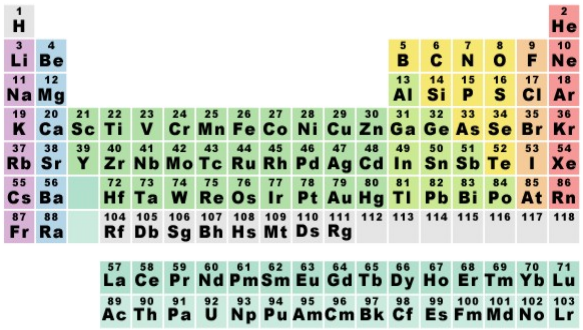
Kelvin is the precise temperature needed to coordinate with the volume and pressure within a finite and closed universe. If these values were not maintained, then, as Hildegard says, the universe would "melt." We have already seen in our discussion of helium-4 in Volume I that at the right Kelvin temperature (between 0.25º and 3.0º for helium-4) what we know as a gas at room temperature becomes a frictionless "supersolid" at the low end of the Kelvin scale. As we will see, Hildegard tells us the same principle is true with the firmament.

The Four Elements of the Universe

Hildegard's visions show that she understood matter to be composed of four basic elements, the same ones that Aristotle recognized: fire, air, water and earth, which Aristotle obtained from Empedocles. Tempted as we might be to dismiss these as primitive concepts or think of them as referring merely to specific physical substances (*e.g.*, dirt, flames, oceans/rivers, wind/breath), in reality the four terms represent the general makup of all matter. On one level of understanding, "earth" refers to solids; "water" refers to liquids; and "air" refers to gases – the three states of matter that any modern scientist would recognize. The "fire" represents energy, or what some identify as the fourth state of matter – plasma. In fact, plasma physicists consider fire to be plasma, as they do the sun, the stars, intergalactic nebulae, quasars, radiogalaxies, galaxies, auroras, lightning, the flow of electrical current in conductors and semiconductors, fluorescent lights and neon signs. Thus we have matter and energy, the two entities constituting anything physical that the universe has to offer. Even modern scientists recognize the fire-air-water-earth terminology. For example, biogeochemist Egon Degens writes:

> The element air is described by molecular kinetics and statistical physics. The "simple" substance fire is thermodynamically defined as heat or energy. Quantum mechanics, solid-state physics and chemistry refer to matter rather than to Earth. The problem child, however, is water, because so far no equation can thermodynamically describe its reaction and properties at the molecular level.[1005]

As we relate Hildegard's description of these four elements to even deeper facts from modern science, we find that the four also correspond to the fundamental building blocks of nature that we moderns have assigned such names as protons, neutrons and electrons. The "fire" is the energy of the atom, otherwise known as the electron, whereas the protons and neutrons, known as a nucleon, are the "earth" (proton) and "water" (neutron). As we will see later, the atom is also comprised of "air," which occupies the space between the "fire" of the electron and the "earth" and "water" of the nucleon. In a very similar way, Hildegard's visions show the universe is constructed with the energy zones in the outer layers; the air/water layers in the middle zones; and the earth material in the center.



Accordingly, Hildegard adds: "More or less than these four elements there is nothing."[1006] Scientifically speaking, we understand this to mean that the 103+ elements of the **Periodic Chart** do not represent substances that have differing fundamental components. Lead, for example, is not made of lead protons and lead electrons; rather, lead has 82 protons and 82 electrons. If we take away two protons and two electrons to leave an 80-80 balance, we will have the element mercury. Take away one more proton and electron and we now have gold. The fundamental building blocks are the same; only their number and ratio change from element to element.

ordinary volume V by the specific volume v, which is equal to V/n, which then yields the formula $Pv = RT$.

[1005] *Universal Water: The Ancient Wisdom and Scientific Theory of Water*, Hawaii, Interocean Pub., 2002, p. 93.

[1006] *Ursachen u. Behandlung der Krankheiten*, 71, *Das wahre Weltbild*, p. 85.

The cosmic spheres of fire, air, water and earth are in constant communication and exchange in order to produce the proper balance required for the universe's stability. This, we might say, is the *Ultimate Unified Field Theory*. As Hildegard puts it:

> God has built the world by means of the four elements, so that no one of them may be separated from the others, for then the world would go back to nothingness if an element could exist separately from the others.[1007]

For example, to varying degrees, fire (energy) permeates the other three elements: water, air and earth. The very formula we moderns use, $E = mc^2$, is, in Hildegardian terms, little more than the permeation of the element fire (energy) into earth (matter). As we noted above, on a macro scale astronomers have seen evidence of "fire" in the form of plasma all throughout the universe, the study of which is commonly known as plasma cosmology.[1008]

In addition, it is fire (energy) that turns solids into liquids, and liquids into gases. Each state must maintain a certain energy envelope in order to remain a solid, liquid or gas. As Hildegard puts it in her scientific terms: "The water contains in itself fire…the water could not flow if it didn't contain some fire."[1009]

In Hildegard's terminology, "fire" represents many things, and we moderns have to accommodate her language to what we know scientifically. Although we speak of energy coming in the form of the entire electromagnetic spectrum – from gamma rays, to visible light, to microwaves – in Hildegard's vision "fire" represents all of these various energy forms. As Dr. Posch has suggested, we would venture to say that Hildegard's "fire" comes in three states, just as matter comes in solid, liquid and gaseous form. The fire we see as flames is analogous to the solid state; electrical current or light waves are analogous to the liquid state, while radiation and high-energy plasma are the gaseous state. Similar to solids, flames are confined to a certain locale. But as liquids flow, so light energy flows from one place to another. For example, a lightning bolt that descends and hits the ground will suddenly burst into flames, and in such cases one could say that the liquid form of energy was turned into a solid form. We also know that light can penetrate its medium only so far, for opaque substances will deter it, whereas radiation, like a fine gas, can penetrate through various surroundings. Radiation also produces heat, and thus makes it similar to a flame. In fact, there is so much "fire" in the element radium that it literally overflows with radiation. In the words of Marie Curie, the discoverer of radium:

> A glass vessel containing radium spontaneously charges itself with electricity.…Radium possesses the remarkable property of liberating heat spontaneously and continuously. A solid salt of radium develops a quantity of heat such that for each gram of radium contained in the salt there is an emission of one hundred calories per hour. Expressed differently, radium can melt in an hour its weight in ice. When we reflect that radium

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[1007] *Ursachen u. Behandlung der Krankheiten*, 68, *Das wahre Weltbild*, p. 89.

[1008] Nobel laureate, Hannes O. G. Alfvén, "Cosmology in the Plasma Universe: An Introductory Exposition," IEEE Trans. *Plasma Science*, Feb, 1990; "Plasma Physics from Laboratory to Cosmos – The Life and Achievements of Hannes Alfvén," by Carl-Gunne Fälthammar, IEEE Trans. *Plasma Science*, June 1997; *World-Antiworlds: Antimatter in Cosmology*, 1966; Eric Lerner, *The Big Bang Never Happened*, 1992; US Dept. of Energy advisor and Associate Director of Los Alamos National Laboratory, Anthony Peratt (A. Peratt and D. Nielsen, "Evolution of Colliding Plasmas," *Physical Review Letters*, 44, pp. 1767-1770, 1980); Oscar Buneman in "A Tribute to Oscar Buneman – Pioneer of Plasma Simulation," IEEE Trans. *Plasma Science*, Feb, 1994; Nobel nominee, Kristian Birkeland, in "The Worlds in the Universe," wrote: "This theory differs from all earlier theories in that it assumes the existence of a universal directing force of electro-magnetic origin in addition to the force of gravitation, in order to explain the formation around the sun of planets (which have almost circular orbits and are almost in the same plane) of moons and rings about the planets and of spiral and annular nebulae" (*Sky and Telescope*, "Birkeland and the Electromagnetic Cosmology," May 1985). The first to recognize the plasma state was Sir William Crookes, who discovered it in 1879, and which was later given the name "plasma" by Nobel laureate Irving Langmuir in 1929. Interestingly enough, Hildegard's visions portray something very close to plasma cosmology for the origin of the sun's energy and its relationship to the planets.

[1009] *Ursachen u. Behandlung der Krankheiten*, 68, *Das wahre Weltbild*, p. 89.

> acts in this manner continuously, we are amazed at the amount of heat produced, for it can be explained by no known chemical reaction. The radium remains apparently unchanged.…As a result of its emission of heat, radium always possesses a higher temperature than its surroundings.…When a solution of a radium salt is placed in a closed vessel, the radioactivity in part leaves the solution and distributes itself through the vessel, the walls of which become radioactive and luminous… We may assume, with Mr. Rutherford, that radium emits a radioactive gas and that this spreads through the surrounding air and over the surface of neighboring objects. This gas has received the name emanation. It differs from ordinary gas in the fact that it gradually disappears.[1010]

Another important relationship among the four elements is the affinity, on the one hand, of fire and earth, and, on the other hand, air and water. As we noted earlier, one example of the former relationship is that as "fire" represents the electron, the "earth" represents the proton. These two substances each carry a charge and thus relate to each other electrically or electromagnetically. All communication flows from positive to negative and back again. In another way, light is invisible unless it reacts with matter. We cannot see a light beam until some solid object impedes it, and this is one reason why the night sky is so dark. It is different for air and water. The communication between their domains consists largely of mechanical waves, incorporating pressure and temperature and other motions.

Upon these four elements and their communicative principles is based the workings of the whole universe. It is really quite simple. Modern science assigns various values and proportions to these entities and their relationships, such as Planck's constant, Boltzmann's constant, Avogadro's constant, the Gravitational constant, the electron charge value, etc., but they are all essentially describing the four basic elements of Aristotelian science and how they interact with one another.

[1010] "Radium and Radioactivity," Mme. Sklodowska Curie, *Century Magazine*, January 1904, pp. 461-466. The "gas" is now known as radon.

The Rotation of the Firmament

As we have indicated the point earlier in this volume, the form and substance of the biblical "firmament" is particulate. Although its discovery has eluded both biblical scholars and scientists, some, like St. Augustine, never doubted its existence. As he once said in his famous book *The Literal Meaning of Genesis*: "…we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity."[1011] This is the consistent testimony of the patristic era, and it is a haunting voice against modern scholars who have given up the hope of finding the firmament, thus forcing them to declare that "Augustine's search for the firmament should seem baffling."[1012] Unlike many modern scholars who have accepted Copernican cosmology with its attendant Big Bang origins, the Fathers were faithful to the biblical text, no matter how difficult it was to understand from their limited science. The medievals who followed them adhered with the same tenacity to the literal words of Scripture. As such, the Creator did not leave us in the dark regarding the correct understanding of Holy Writ.

As we noted earlier, geometrically speaking, there is no relative difference between a rotating universe around a fixed Earth and a rotating Earth in a fixed universe. They are, indeed, mirror images of one another. Nevertheless, there is only one true reality. As such, only one cosmology can be correct. In Hildegard's visions, it is the firmament that rotates, not the Earth, and this fundamental fact is mentioned many times in her description of the universe. As Helmut Posch notes it:

> This true world-view is no invention of mine. It is the result of Hildegard's statements. So that every reader may see this for himself, in what follows let me quote those statements which are of decisive import for the world view….All this detailed physical knowledge far

[1011] *The Literal Meaning of Genesis*, Book 2, Chapter 5, Number 9. Aquinas adds: "Whether, then, we understand by the firmament the starry heaven, or the cloudy region of the air, it is true to say that it divides the waters from the waters..." *Summa Theologica*, Book 1, Question 68, Art. 3.

[1012] Stanley Jaki, *Bible and Science*, p. 95.

> exceeds our present-day knowledge. Only someone who knows how the universe is really designed can speak like this. Since Hildegard was not a genius but a simple woman, all this knowledge can only arise from instructions of the Omniscient One."[1013]

Accordingly, Hildegard writes:

> And further I saw the world vault, through powerful drifts of the east and the south winds with their crosswinds, allowing it to circulate over the Earth from east to west, and there the west wind and the north wind caught it together with its crosswinds and tossed it underneath the Earth back from west to east.[1014]

Posch gives us the meaning of her words:

> According to this, the entire universe is put in motion by the cosmic winds. They supply the unimaginable propulsion energies for the rotation of the firmament. Observed from the north, the firmament rotates equatorially and clockwise from east to west. Not a single heavenly body moves by its own power. All of the kinetic propulsion energy flows entirely from the stationary-positioned winds. Without these winds the entire universe would be completely without gravity, weightless like thoughts…. Even the largest stars would not weigh a gram because mass without the wind energy flowing through it would contain no gravity-forming power ….Mass and energy only appear to be equivalent. At close observation, energy is an interaction between matter and the winds.[1015]

Thus, the entire universe rotates 360º per day, moving clockwise, or east to west, from the position of one standing at the North Pole. To reinforce the picture Posch adds: "Therefore, geostationary satellites travel against the rotation of space in order to appear stationary [to us]." We also see that the phenomenon of inertia in the cosmos is not due to some mysterious property of matter (that modern science has yet to explain), but is merely the result of cosmic winds pushing the firmament and its heavenly bodies in the designated direction. In this system, as Posch notes: "Thus it has been clarified physically why the sun, with its enormous mass, can move around the little spot of Earth. According to the current law of gravity, there would be no explanation for this."[1016] Hildegard's vision thus adds a deeper understanding to the mundane meaning often assigned to the winds of Ecclesiastes 1:4-6:

> A generation goes, and a generation comes, but the Earth remains forever. The sun rises and the sun goes down, and hastens to the place where it rises. The wind blows to the south, and goes round to the north; round and round goes the wind, and on its circuits the wind returns.

Moreover, because "the Earth remains forever," Hildegard's visions see a real "up" and "down" to the universe, which is due to the immobility and permanence of the Earth from which all other movements in the universe are measured. She writes:

> For the sun, God has determined that it should shine above the Earth and hide under the Earth. That's why during the day it shines on the Earth, just as a man lives watchfully with open eyes during the day; at night, however, it moves beneath the Earth, just as a man sleeps with his eyes closed at night.[1017]

The Local Cosmic Counter-Current

In addition to the rotation of the firmament by the force of the cosmic winds, Hildegard sees a local counter-current in her vision. She writes:

[1013] *Das wahre Weltbild*, pp. 119, 121.

[1014] *Das wahre Weltbild*, p. 113.

[1015] *Das wahre Weltbild*, pp. 113-114.

[1016] *Das wahre Weltbild*, p. 120. Note: Posch is referring strictly to the Newtonian explanation for gravity, an explanation that does not take into account the Machian view that the whole universe is involved in the forces experienced by our solar system.

[1017] *Welt und Mensch*, p. 164; *Das wahre Weltbild*, p. 120.

> Also I saw: in the upper fire of splendor there appeared a circle that girded the entire firmament from east to west. From there a wind forced the planets to go from west to east against the rotating direction of the firmament. However, it did not send out its blows toward the Earth, like the other winds, but only moderated the course of the planets, as we said before already….The firmament rotates speedily, and the sun, together with the other planets, slowly moves towards it in the opposite direction and hampers its velocity.
>
> For if the sun did not impede the firmament by its resistance to it, or if it ran counter to the firmament even with the other planets and with the same velocity with which is revolves, everything would be mixed up and the entire firmament would burst asunder. For if the firmament were immovable so that it would not revolve, then the sun would be above the Earth almost throughout the entire summer, without it becoming night, and almost during the entire winter under the Earth, without it being day.
>
> Now, however, the firmament revolves in such a manner that it moves counter to the sun, and the sun counter to it, for which reason the firmament compresses itself through the heat of the sun and is made more resistant all the more quickly, that is to say: when the sun traverses the firmament and wholly penetrates it and pours through it with its fire.[1018]

So we have a counter-clockwise current that is moving the entire solar progeny from west to east against the clockwise movement of the firmament from east to west. As Posch sees it: "This relative movement is the actual centerpiece of Hildegard's celestial mechanics." The sun, which carries the planets, is moving ever so slowly against the rotating firmament due to the presence of a local cosmic wind. We can readily see the physical results of these motions and counter-motions. For example, the local motion of the sun against the firmament causes the sun to retard in its movement with respect to the Earth and the stars by about 1º of arc per day. This will cause a difference in the amount of time the stars, which are stationary inside the firmament, revolve with the firmament around the Earth, as opposed to the time the sun and the planets revolve around the Earth. The difference between the two is commonly known as the "sidereal day" as opposed to the "solar day." The sidereal day is 23 hours and 56 minutes. The solar day is 24 hours. Thus, the sun needs 4 minutes more to complete its revolution around the Earth, which is due to the fact that it is being slightly retarded by the cosmic winds in the firmament.[1019] The 4 minute lag will make the sun appear to travel through the 12 stations of the Zodiac each year.

The Force that Moves the Planets

There is something even more significant about the solar wind. It is strongest nearest the sun and weakest at the planet Pluto. It can be thought of as a cyclone-like whirlwind or solar eddy within the larger circular current that pushes the firmament. As in a natural eddy, the angular velocity is fastest near the center. Hence, those planets nearest to the sun will revolve faster than those farther away. Not having any suitable mechanical reason for the various speeds of revolving planets, modern science is limited to explaining this phenomenon mathematically by the formula $F = ma$, or $a = v^2/r$, wherein a planet that is revolving around the sun is said to be accelerating, while the force of its movement is the rate of acceleration multiplied by the mass of the planet. At the same time, the planet is said to be pulled into the sun and the strength of the attraction is represented by the formula $F = Gm_1m_2/r^2$, wherein the mass of the sun and planet are multiplied with a gravitational constant G (determined in the laboratory by measuring the force of attraction between two small objects), divided by

[1018] *Das wahre Weltbild*, p. 116; *Ursachen u. Behandlung der Krankheiten*, 24 in *Das wahre Weltbild*, pp. 120-121.

[1019] In the heliocentric explanation, the extra four minutes is said to be due to the Earth revolving around the sun, wherein the Earth must rotate 361º per day rather than 360º in order for the sun and stars to line up with the same point on the Earth each day. We might add that Hildegard's cosmic wind may find its evidence in the modern science's claim that the solar system is moving in the direction of various constellations (*e.g.*, Draco, Hercules, et al). By Mach's principle, it may just as well be that the solar system is fixed and the ether wind is moving against it.

the distance squared between the sun and the planet. This is commonly known as the Inverse Square Law. The balance between $F = ma$ and $F = Gm_1m_2/r^2$ is said to keep the planet on its circular path so that it neither falls into the sun nor flies off into outer space. The problem with these formulas, however, is that they do not explain what, precisely, is the physical nature of the attracting force between the sun and the planet, nor do they explain why a planet has continual acceleration. It is similar to watching the dial on a scale calibrate the weight of an object without being able to see the object that is placed on the scale. The object could be an animal, mineral or vegetable, but we could never know by merely observing the scale's dial. Analogously, modern science has no physical explanation for gravity or inertia. They merely 'watch the dial,' as it were, and compute the result with mathematical formulas.

One scientist, Josef Tsau, has broken away from the constraints of Newtonian physics and believes that the universe is bathed in a primary ether particle, the neutrino, which seems to answer to Hildegard's solar wind. Tsau has a lot on his side, since the existence of neutrinos has been verified many times. Although they have mass, neutrinos are extremely small entities. They can apparently travel through the empty space of the atom and do so at the speed of light. Having no charge, they can only affect other masses by their high kinetic energy. Fifty trillion of them are said to pass through our human body every second. Seventy billion neutrinos hit each square centimeter on the surface of the Earth. Tsau has developed a whole science of physics based on how the neutrino wind interacts with atomic particles, explaining everything from gravity to how light travels to how planets revolve around the sun.[1020]

As we noted earlier in remarks about Newton, the much-ballyhooed 'inverse square law' is not really as stupendous as it is claimed to be, for it is simply a natural geometric phenomenon. The inverse square law applies not only to the decrease in the force of gravity with increase in distance, but of practically any substance that can travel away from its source at a constant angle of dispersion. For example, one could obtain the inverse square law from an action as simple as measuring the amount of paint dispersed from the nozzle of a can of spray paint. The density of the paint sprayed will be inversely proportional to the square of the distance at which the paint ends up from the nozzle. In other words, the inverse square law is based on a simple law of geometry, and has nothing to do with the nature of gravity, *per se*. Anything that radiates away from the source at a constant angle (*e.g.*, gravity, electricity, sound, force, light, gas density, charge) will follow the inverse square law, for at greater distances from the source, that which is dispersed must cover an increasing area and volume, and if it is distributed evenly in that larger volume, its density will decrease proportionately, by a rate that is the inverse to the square of the distance.[1021]

As we can see, the Hildegardian model exceeds the Newtonian system. Hildegard gives us a physical reason for gravity, inertia and the combined movements of the constituents of the universe. Pluto moves slower than Mercury because Pluto is farther away from the vortex of the solar wind that pushes the planets. Near the sun the speed of the vortex is at its fastest, and this increased velocity, as Posch interprets Hildegard, "is necessary in order to carry the enormous heat away from the sun, otherwise the sun would become too hot and scorch everything on Earth."[1022] In other words, the circulating current acts as a giant fan to radiate the proper amount of heat from the sun to the planets.

[1020] Josef Tsau, *Discovery of Aether and its Science*, 2005. It is Tsau's belief that a neutrino wind generated by the sun pushes the planets in their orbital paths, thereby answering the mysterious phenomenon of inertia. He writes: "The high energy neutrino particles produced by the dense-matter object of the Sun affected by its rapid rotation and the strong force fields created by the rotation may form a constant spiral neutrino-particle wind that provides a directional pushing effect only, which may cause the outer layer of the Sun to rotate and is utilized by all planets to stay in orbit. If a planet is orbiting in the right direction, such a spiral wind at equilibrium would constantly give it a push in both its orbiting and anti-gravity directions to keep it in orbit" (p. 22).

[1021] This rule does not apply to plasma and magnetism, however, due to the internal workings of their specific properties.

[1022] *Das wahre Weltbild*, p. 117. Since the period of the planet will be proportional to its distance from the center of the vortex, the vortex nearest to the sun is traveling very fast. Posch holds that within 1.5 kilometers the vortex is moving at the speed of light. At 3 million kilometers it is moving at 210.66 km/sec, and at Mercury, which is 57.9 million kilometers, it is moving at 47.94 km/sec, which is equal to the orbital speed of Mercury around the sun. These values are reached by dividing the constant 364.87 by the square root of the distance (*ibid*., pp. 130-131).

From Hildegard's vision, Posch further explains the nature of the current:

> The counter-rotating wind current is narrow, like a belt. We should imagine the current as a disk-shaped rotating field in which the planets and the sun are carried. The planets, in fact, revolve on a plane, namely the ecliptic plane. This plane is unstable. It gyrates, and does so within a constant angle of 23.5º, forming a complete precessional movement around its fixed point, Earth, in one year. The Earth is the center of rotation for both the rotation of space and the point of intersection for the precessing counter-rotation of the ecliptic plane.[1023]

The Cause of the Four Seasons

Here we have the explanation for the four seasons. The seasons are not caused by an Earth that is tilted 23.5º toward the North Star, but by the swaying movement of the ecliptic (that is, the path of the sun through the zodiac) as it changes the plane of its orbit by 23.5º every six months. The plane of the sun's path will precess up and down by 23.5º just as a spinning gyroscope wobbles up and down. The total amount that the sun's plane moves against the Earth's equator is 47.0º per year, or 0.2568º per day. (See enclosed CD animation for a demonstration).

If this is true, then what force is making the sun's plane of orbit change? This force, Hildegard's vision reveals, comes from the same counter-current described above. She writes:

> The sun emerges as the largest planet; it heats up the firmament and its fire and strengthens it, and with its radiance it illuminates the Earth…By means of the strength of the revolution of the firmament the sun is driven in a slanted orbit from east to west through the south, even though in its journey it makes an effort to move counter to the motion of the firmament.[1024]

Hence, as the countercurrent moves against the firmament's current, it creates an eddy of force around the sun. This force pushes the sun up and down within the margin of 47.0º each year. As Posch describes the force of the solar eddy: "The effect resembles kite-flying. If you walk against the wind with the kite, it goes up in a slanted manner."

The Universe Flips Over

As the firmament rotates, Hildegard's visions show another dimension of its action:

> Further I saw the south wind with its side winds, starting the day of the winter solstice, gradually lift the primordial vault from south towards north, supporting both, as it were, until the summer solstice….From the same day onward, when the days start to become shorter, the north wind with its side winds, eschewing the sunlight, pushes this vault from north to south, until, the days getting longer, the time has once again come for the south wind to push it back up.[1025]

This is most amazing. Hildegard is telling us that the whole universe is flipped over every six months. The flipping occurs between the north and south poles of the universe. The side of the universe that was nearest the north region is, six months later, nearest to the south region, and vice-versa six months later. The slow flip is caused by the universal winds. The universal south wind pushes the south universal pole toward the north; while the universal north wind pushes the north universal pole toward the south. Later we will see precisely how these cosmic winds are able to push the universe.

Here is another interesting facet to Hildegard's cosmology. In her vision, the north and south poles of the Earth do not lie in a vertical direction but horizontal. Thus, the universe rotates daily around the north-south pole like chicken on a rotisserie or a wheel rotating on an axle, and which axle slowly changes its polar orientation on a semi-annual schedule. The horizontal position of the north-south axle will allow the four compass points to form a horizontal plane, which then explains why Scripture sometimes refers to the "four corners of the Earth." A square with a corner positioned at each of the compass points is horizontally circumscribed in a

[1023] *Das wahre Weltbild*, p. 117.

[1024] *Die göttlichen Werke* 96, 100; *Das Weltbild*, p. 119.

[1025] *Das wahre Weltbild*, p. 119.

sphere.[1026] Another means of compensating for Scripture's language is that the "corners" are the tips of the four hemispherical cones that converge at the center of the Earth.

Modern cosmologists seem to have found recent evidence for the twisting or flipping of the universe. In 1997 physicists Borge Nodland and John Ralston discovered that radio waves traveling through space rotated the plane of their polarization.[1027] C. Wolf believes this phenomenon to be of such importance that it may force "modifications to particle theory and cosmology" and "possible alterations of fundamental physical theory…in the future."[1028] Even though Nodland and Ralston's rotation was small (one period of polarization rotation completed in about ten billion years), they could be measuring merely the slight differences in Hildegard's semi-annual universe rotation. In other words, the universe's polar rotation is so precise that the finest instruments detect only a one in 10^{10} variation. Whatever the correct application, the news of rotating electromagnetic waves was not well received from the science community, since it would automatically deny Einstein's cherished theory of General Relativity that claims there is no center or distinction in the universe.

The reason the universe must make this annual 180º change is that its constant daily rotation in one direction (east to west) causes an increasing momentum, which, if there were no compensating factor, would begin to deform the universe's spherical shape. The universe would become elongated and eventually break into two or more pieces. As Hildegard puts it:

> For if the sun did not impede the firmament by its resistance to it, or if it ran counter to the firmament even with the other planets and with the same velocity with which it rotates, everything would be mixed up and the entire firmament would burst asunder. For if the firmament were immovable so that it would not rotate, then the sun would be above the Earth almost throughout the entire summer, without it becoming night, and almost during the entire winter under the Earth, without it being day.
>
> Now, however, the firmament rotates in such a manner that it moves counter to the sun…for which reason the firmament compresses itself through the heat of the sun and is made more resistant all the more quickly, that is to say: when the sun traverses the firmament and wholly penetrates it and pours through it with its fire.[1029]

The Tilma of Our Lady of Guadalupe

Another fascinating feature of Hildegard's horizontal axis of the North-South poles of the universe is that it matches the tilma of the miraculous image of Our Lady of Guadalupe given to Juan Diego in 1531 A.D. In the image of the tilma, corresponding to the Earth's meridian with the actual positions of the constellations in the sky, the tilma falls on the four compass points in such a way that the North-South axis cuts across Our Lady's

[1026] Is 11:12; Ap 7:1; 20:8.

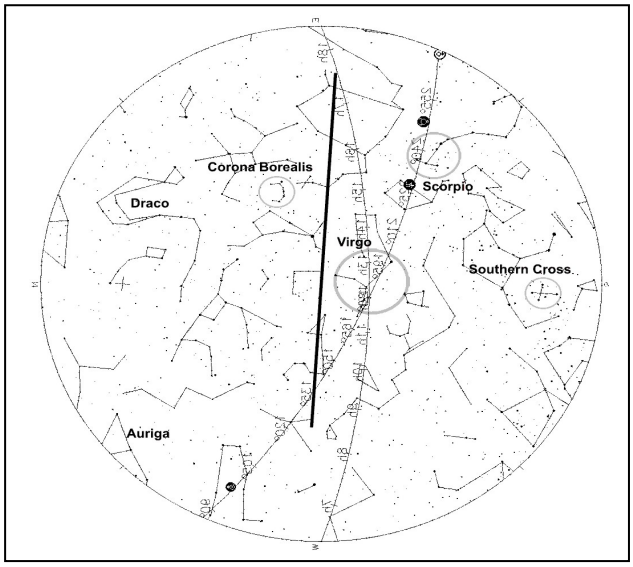
[1027] "Indication of Anisotropy in Electromagnetic Propagation Over Cosmological Distances," *Physical Review Letters* 78, 16: 3043-3046, April 21, 1997. For a selected data set, the axis they found had a declination and right ascension of (d, a) = ($0° \pm 20°$, $21^h \pm 2^h$), within 45° of the "opposite" pole. The statistical probability that the two axes are only accidentally within 45° of each other is not negligible. Ralston and Nodland added that the twisting of the waves increased the more it receded further into the universe, suggesting that the rotation was a truly universal phenomenon. They also pointed out that the rotation was specific to the direction one looked. It twisted right if one looked in one direction, but left if one looked in the opposite direction. In 1982, Paul Birch was the first to report the basis for such a phenomenon when he observed a correlation of the polarization angle with the source location angle relative to a preferred axis in the universe (*Nature*, London, 298, 451, 1982). Kendall and Young confirmed Birch's results two years later (D. Kendall and G. A. Young, *Monthly Notices of the Royal Astronomical Society*, 207, 637, 1984), as did M. Beintenholz and P. Kronbert (M. Beintenholz and P. Kronberg, *Astrophysics* J, LI, 287, 1984).

[1028] C. Wolf in "Polarization Rotation Over Cosmological Distances as a Probe to New Physics," *Aperion*, Vol. 8, No. 3, July 2001, p. 95. Nature also has other such "flipping" motions. The magnetic fields of the sea floor switch their poles. The magnetic field of the sun switches its poles once every 22 years.

[1029] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.

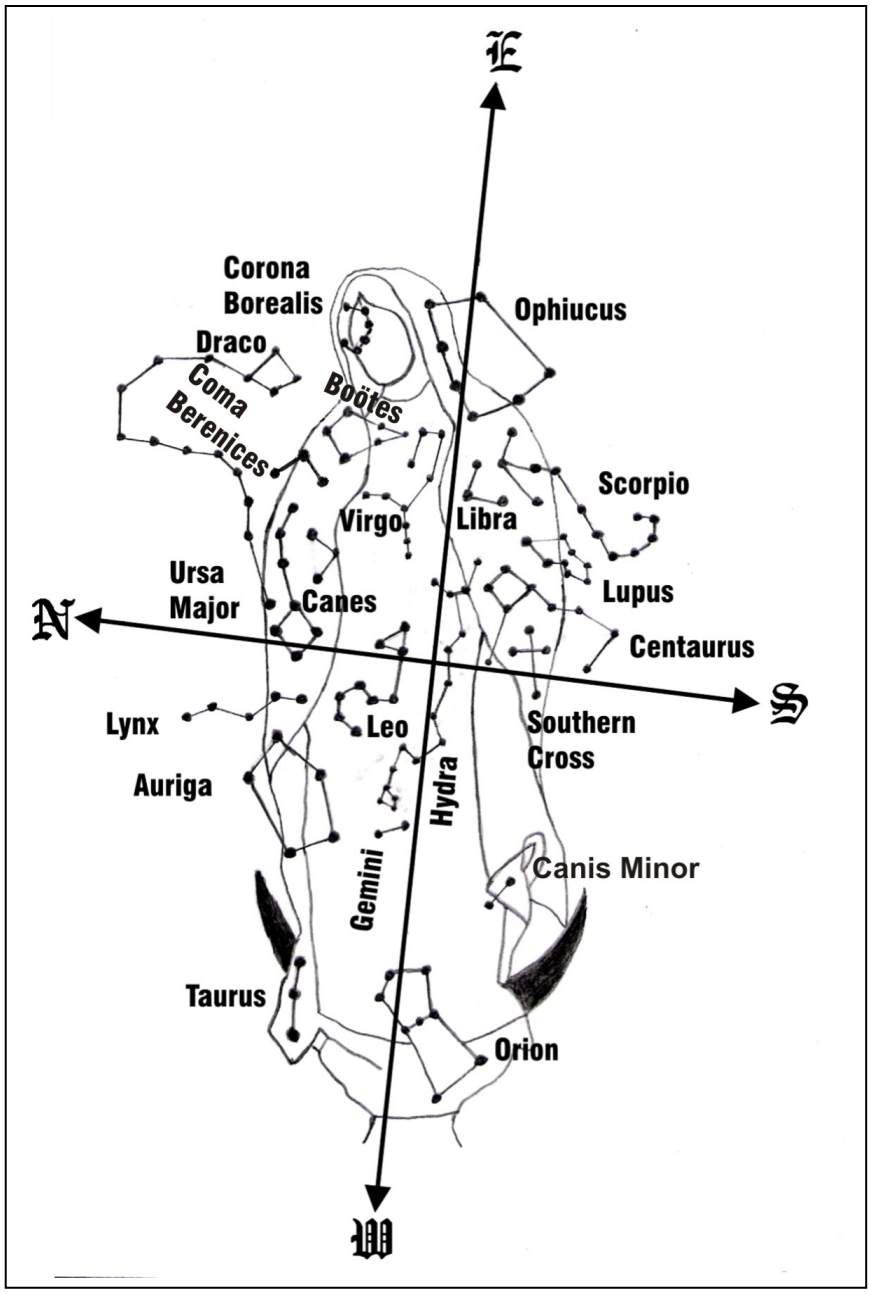
abdomen from her right side to her left, and the East-West axis cuts across her abdomen from her head to her feet. The stars on her mantle are situated as they would appear on this axis in the sky on December 12, 1531 in Mexico at 10:30, with the eastern sky above her head and the northern sky to her right. The compass points that we superimpose on the body of Our Lady of Guadalupe would be of no special significance except for the fact that we assume her body is perpendicular to the Earth's equator (*i.e.*, straight up and down) and serves as the foundation for universal direction. Also, at this point in time (1531 A.D.) the North region is slightly higher than the South, which may be due to the rotation of the North-South axis at six-month intervals as noted in Hildegard's cosmology.

Below is an actual star map of December 12, 1531, 10:30 with viewpoint in Mexico City. The star map on the tilma is also significant for another reason. As seen from where the apparition took place, the star pattern on the tilma is one of the most dramatic assemblages of constellations that have ever occurred at one time and captured in a photo-like image. These are the only star images that could appear in these precise locations on the day of December 12, 1531 at 10:30, in addition to being the very stars that would be observed from the precise angle to the sky created from a Guadalupe, Mexico viewing point. Obviously, no wide-angle lens was being used but all the constellations of that portion of the sky are fitted on the tilma.



Additionally, it seems that the placement of the star patterns was deliberate, since on Our Lady's left side the tilma is doubled-over and hangs on her left arm, yet it contains, from the observer's viewpoint, the same constellations in their proper portions as would appear in the sky. In other words, it is as if the stars were placed on the tilma after Our Lady raised her arms to pray. In comparison, the tilma on her right arm is not doubled-over yet it also contains the same pattern of stars that would appear in the sky. All of this speaks of a designer who superimposed the constellations after he took into consideration that the folds and drapery of the tilma would be permanently captured in an image. Additionally, deliberate designing is demonstrated by the width of the clothing between the right and left sides of the front of the tilma. The space is just wide enough to place the other constellations of the sky in their proper proportions that would normally appear in the sky on that particular day.

Also significant in the image of the tilma is the moon. Our Lady is standing on a crescent moon. The concave side of the moon is facing east, since both it and Our Lady are pointing upward in the image. Not coincidentally, on December 12, 1531 there was a crescent moon in the sky whose concave side faced to the east. A star map of this day at 6pm, as viewed from Mexico, shows this to be the case. (See facsimile of star chart. The large black spot with a slight white crescent is on the lower right of the chart. The smaller black spots are the positions of the planets).


E
N
S
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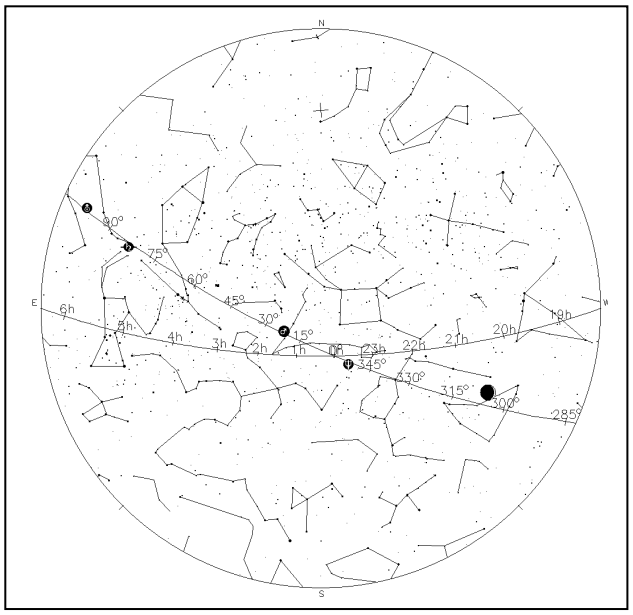
Corona Borealis
Ophiucus
Draco
Coma Berenices
Boötes
Scorpio
Virgo
Libra
Ursa Major
Canes
Lupus
Centaurus
Lynx
Leo
Southern Cross
Auriga
Hydra
Gemini
Canis Minor
Taurus
Orion



A skeptic might argue that the stars on the tilma seem to be evenly spaced and thus represent no particular pattern of constellations in the sky. The fact remains, however, that if the star pattern and the precise number of stars on the tilma are matched to the constellations in the sky, the only way this specific count of stars can be represented is by the twenty-two stars on her right and the twenty-four stars on her left, which is a total of forty-six. Any other constellation pattern in the sky would have contained significantly more or less than forty-six stars.

As the number and placement of the stars on the tilma seem to be the product of none other than a divine hand, the materials employed to make the image are literally out of this world. In May 1979, a biophysicist, Dr. Philip C. Callahan, examined the tilma and concluded the following:

> The original figure including the rose robe, blue mantle, hands and face…is inexplicable. In terms of this infrared study, there is no way to explain either the kind of color pigments utilized, nor the maintenance of color luminosity and brightness of pigments over the centuries. Furthermore, when consideration is given to the fact that there is no under-drawing, sizing or over-varnish, and that the weave of the fabric is itself utilized to give the portrait depth, no explanation of the portrait is possible by infrared techniques. It is remarkable that in over four centuries there is no fading or cracking of the original figure on any portion of the ayate tilma, which being unsized, should have deteriorated centuries ago.[1030]

The tilma is also known for its miraculous images contained in the eyes. Examinations of the eyes reveal reflected images of Juan Diego and two other people that have not been positively identified but could be Juan Gonzalez and Bishop Zumarraga who were in the room when Juan Diego presented the tilma to them. Dr. Charles J. Wahlig, a nuclear physicist, has suggested that Our Lady must have been in the room at the time of the presentation of the tilma to the bishop, perhaps invisibly, and the tilma served as a type of photographic plate to capture the scene. In fact, the images are slightly curved in accordance with how the human cornea would reflect the light.[1031]

[1030] Christopher Rengers, OFM Cap., *Mary of the Americas*, New York, St. Pauls, Alba House, 1989, p. 89f.

[1031] Fr. William P. Saunders, "Our Lady of Guadalupe," *Arlington Catholic Herald*, Dec. 16, 2004.

Other outstanding miraculous claims of the tilma include:

- Various studies of the tilma, including one conducted by NASA, conclude that the substance of the colors corresponds to no known element on earth.
- The colors of the image disappear when viewed from a distance of less than 3-4 inches. Viewed from less distance, only the fibers of the maguey cactus can be seen.
- When the image is examined with lasers, it reveals that the colors are not directly touching the cloth but hover above it by 0.3 millimeters or 0.01 inches.
- When the eye of Our Lady of Guadalupe is exposed to light, the iris contracts, as it does normally in human beings.
- The temperature of the tilma within the fibers of the maguey cactus, is a constant 98.6 degrees, as it registers, on average, in human beings.
- A stethoscope placed below the black band near the uterus of the image captured sounds of a rhythmic heartbeat of 115 pulses per minute, which is normal in human babies living in the womb.
- Several years ago, a replica of the image was painted on an identical cloth of maguey cactus but it deteriorated within a few decades. The image of Our Lady of Guadalupe has survived nearly 500 years.
- In 1791, one of the strongest acids known, muriatic acid, was spilled on the upper right of the tilma. During the next 30 days, the tilma was re-constituted and fully repaired.
- In 1921, a man placed a high-powered explosive at the foot of the tilma. After the explosion, everything within a short distance of the tilma was destroyed, but the tilma remained intact with no damage.[1032]

[1032] These additional facts were obtained from a video presented by Andre Fernando Garcia. No claims to their accuracy are endorsed or denied.

The Tilma's Constellations and the Christian Gospel

These scientific facts are all the more significant when we consider the breadth of the potential Christian symbolism represented in the constellations on the tilma (that is, if the tilma was meant to portray Christian symbols). The constellations are not only accurate from an astronomical viewpoint, they also happen to employ the most precise spiritual number in divine revelation, the number seven. There are a total of twenty-one constellations that can be positioned on both the drapery of the tilma and Our Lady's dress between the two flaps of the tilma and these constellations can be viewed in several ways due to the overlap. One way is to divide the twenty-one constellations into seven on her left side,[1033] seven on her right,[1034] and seven on the dress between the tilma's two flaps.[1035] Twenty-one is 7 × 3. In Christian symbolism, seven is the number of perfection and three is the number of the Trinity. From another perspective the constellations might also be divided with five in the middle and eight on each of the tilma's flaps. In Scripture, five is symbolic of salvation, and the constellations in this group are the very ones that are symbolically tied to salvation and its recipient, mankind.[1036] The remaining sixteen constellations on the flaps are a combination of 4 × 4, which, by the number 4, represents the universal reach of the Gospel, both for salvation and judgment (2 Cor. 2:15-16).

Taken together, the twenty-one constellations also explain the components of the Gospel in its full flower like no other set of symbolic pictures. At the top is the **Corona Borealis** (the Borean Crown), which would appear on the head of Our Lady, appropriately signifying her royalty as the queen of heaven (Ap 12:1). Below the crown is **Virgo**, near Our Lady's heart, showing her purity and virginity (Lk 1:35). **Leo** the lion, identifying with Christ as

[1033] Ophiucus, Libra, Scorpio, Lupus, Centaurus, Southern Cross, Canis Minor.

[1034] Draco, Coma Berenices, Canes, Ursa Major, Lynx, Auriga, Taurus.

[1035] Corona Borealis, Boötes, Virgo, Leo, Hydra, Gemini, Orion.

[1036] Corona Borealis, Virgo Leo Gemini, Orion.

the Lion of the tribe of Judah (Ap 5:5), is near her abdomen, representing her virgin conception of the Christ child. Our Lady is wearing a black band, which is the symbol of pregnancy in Indian culture. Regulus, meaning royalty, is Leo's brightest star and symbolizes Christ's kingship (Ap 12:5). **Coma Berenices** is the tuft of Leo's tail. Near the bottom is **Gemini**, the twins, placed near her two legs and symbolize the birth of Christ (Gn 49:10).

Draco, the dragon, **Scorpios**, the stinging scorpion, and **Hydra** the serpent, are off to the north, south and west, respectively, forming a triangle, or perhaps a mock trinity, surrounding the woman from all sides except heavenward. This represents Our Lady being in a constant battle with Satan, as described in Ap 12:1-14; and perhaps coincident with the dragon, the beast and the false prophet (Ap 13:1-18). In fact, Hydra's tail, which appears fork-shaped on the image, is just below Virgo, as if it is waiting to devour the Child to whom she will give birth, which is the description John gives in Ap 12:4: "And the dragon stood before the woman who was about to bear a child, that he might devour her child when she brought it forth." As noted earlier, in accord with Ap 12:4: "And his tail swept away a third of the stars of heaven," seven constellations from the total of twenty-one are missing from the tilma, the space being filled in by the serpent Hydra. It is no coincidence that Hydra is the longest constellation in the sky, taking about seven hours to rise, and is thus an appropriate symbol of Satan's pervasive power.

On Our Lady's right side, is the constellation Draco the dragon, but it is represented by only one star. But if Draco is completed by drawing it as it would appear in the sky, the head of Draco would come within a short space of Our Lady's head, symbolizing Our Lady's face-to-face battle with the dragon (Ap 12:1-4; Gn 3:15). It is almost as if Our Lady and the dragon are staring at each other.

Other constellations in the tilma that represent various aspects of the Christian Gospel are also quite significant. **Ursa Major** (the Great Bear) represents the work of Satan through man (Dn 7:5; Ap 13:2), while **Lupus**, the wolf, represents Satan's attack on the Church (Jn 10:12). **Boötes**, the herdsman, represents the shepherds of the Gospel (Rm 10:15), while **Canes** represents the shepherd's staff and his authority over the Church (1Tm 3:1). **Libra** represents God's justice through the Gospel (Ps 37:28) and the **Southern Cross**, of course, represents the cross of Christ. **Ophiuchus**, the serpent-holder, represents the Virgin's strength and power from heaven to crush the devil (Gn 3:15). **Lynx** represents the power of spiritual vision to discern the Gospel given by the Holy Spirit (Mt 13:15-16).

Centaurus (half man, half animal) represents the wicked on Earth (Rm 1:23), while **Auriga**, the goat, represents those who have been damned (Mt 25:33). The three constellations at her feet, **Orion**, the hunter; his dog, **Canis Minor**, and **Taurus**, the bull, represent man and the animal world on Earth that is now in a life and death struggle for salvation against the Devil (Gn 1:20-31; Rm 8:19-22; 1Pt 5:8).

As noted, there are forty-six stars on the tilma, and this number also has symbolic significance. Forty-six is 2 × 23. The number 2 is symbolic of the Church's witness of the Gospel (Lk 10:1), while 23 is symbolic of God's judgment on mankind (1Co 10:8). In Scripture, the stars in collapse often symbolize the end of the world and the coming of Christ (Mt 24:29-31; Dn 8:10). As noted, at present a third of the constellations are missing from the Guadalupe image (represented by the opening between the right and left flaps of the tilma), which represents the "third of the stars swept away by the dragon's tail" (Ap 12:4). There is also be symbolism in the 22 stars on her right, since it is 2 × 11, representing the witness of the Apostles, minus Judas, the betrayer (symbolic of the future apostasy);[1037] as well as the 24 stars on her left, since it is 2 × 24, representing the 12 tribes of Israel and the 12 Apostles, symbolic of all believers from the Old and New Testaments.[1038]

The Behavior of Man and the Reaction of the Cosmos

In Hildegard's next series of statements, she reveals one part of the interconnection between the events in the cosmos and the behavior of mankind. After the fall of man in Eden, nature was altered or damaged in various ways. Death entered the world, animals became fearful of men, the ground produced thorns and thistles, and the whole universe was made subject to gradual deterioration.[1039] Hildegard tells us that the same is true with the firmament:

[1037] Mt 28:16; Mk 16:14; Lk 24:9, 33; Ac 1:26.

[1038] *Cf.* Mt 28:16; Ac 1:26; 26:7; 1Co 15:5; Ap 21:12f.

[1039] *Cf.* Gn 3:17-19; Jr 12:4; Rm 8: 19-22; Ac 3:21.

> Before the fall of Adam the firmament was immovable and did not rotate. After his fall, however, it started to move and to revolve. From the Last Day onward, however, it will again stand still as it was on the first day of creation and before Adam's fall.[1040]

This means that the light of the first three days of creation, and, after that, the sun and stars of the Fourth day up until the sin of Adam, were revolving around the Earth without being carried by the firmament. Apparently, the firmament was in a pristine condition prior to the Fall and this condition changed drastically afterwards. As it stands now, unless the firmament rotates it will become unstable and disintegrate. As Hildegard puts it:

> Now, however, it rotates so that it will receive its power from the sun, the moon and the stars, because, if it stood still, it would become liquefied and weakened, melting in a short time.[1041]

> The firmament is subservient and compliant with the shiners [stars] for the benefit of the Earth, and serves the Earth, as the fire stabilizes it [the firmament], the air restrains it, and the water dashes it; the firmament performs as one who serves and the Earth stands as someone who is seated and ruling.[1042]

According to Posch's interpretation of Hildegard:

> Through its [the firmament's] rotation, the elements are purified; otherwise we would have suffocated in the world's stench long ago. The elements interact with the cosmic elements, as we know by now, and are constantly "filtered" and "distilled" thereby.[1043]

The Constitution of the Firmament

Our present knowledge of science may also confirm what Hildegard's vision reveals about the firmament. Very special factors are necessary to have such a versatile and undetectable medium permeate the entire universe. Notably, this subject is approached, albeit indirectly, by one of the world's most respected physicists, John A. Wheeler, professor emeritus of Princeton University and co-author of the most comprehensive book written on gravitation to date. In an article he wrote with C. M. Patton titled: "Is Physics Legislated by Cosmology?" Wheeler, interestingly enough, begins with an offhand comment about the first two days of Genesis. He writes:

> No one sees any longer how to defend the view that 'geometry was created on Day One of creation, and quantized on Day Two. More reasonable today would appear the contrary view, that 'the advent of the quantum principle marked Day One, and out of the quantum principle geometry and particles were both somehow built on Day Two.[1044]

In a simplified way we can summarize Wheeler's concern by noting that his remarks show that physics has wrestled with the proverbial problem of the chicken and the egg. Which came first, the chicken (geometry) or the egg (the composition of the universe that allows geometry and, even more basic, the concept of extension)? Technically speaking, an *ex nihilo* understanding of Day One and Day Two would have no such concern, since things are merely called into being by divine fiat and made to work with whatever material is

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[1040] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.

[1041] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121. The condition of the firmament may have also affected the speed of light. In the more ideal condition prior to the Fall, the speed of light through the firmament would have been much faster, which would help account for the fact that starlight would have appeared on Earth on the fourth day of creation, otherwise, in contradiction to Genesis 1:14-19, they could not have been used as timekeepers (*e.g.*, sidereal time) by the patriarchs. Since light travels faster or slower depending on the medium, there is no scientific anomaly in the above scenario.

[1042] *Berliner Fragmente*, 38, *Das wahre Weltbild*, p. 131.

[1043] *Das wahre Weltbild*, p. 132.

[1044] J. A. Wheeler and C. M. Patton, "Is Physics Legislated by Cosmology," in *The Encyclopedia of Ignorance*, 1977, p. 22.

present on the respective Days of creation. Nevertheless, Wheeler's point about the "quantum principle" does not go unappreciated by an *ex nihiloist*, for the point of his remark is that the "geometry" of the cosmos has a substratum which is defined by the principles of quantum mechanics, and which thus allows for the phenomena of extension and collapse. As Wheeler puts it:

> The black hole, as "experimental model" for gravitational collapse, brings us back full-circle to the paradox that continually confronts us, and all science, the paradox of big bang and gravitational collapse of the Universe itself. The existence of these two levels of collapse reminds us, however, that theory gives us also what is in effect a third level of collapse, small-scale quantum fluctuations in the geometry of space taking place and being undone, all the time and everywhere.[1045]

We, of course, are only interested in Wheeler's "third level of collapse," since it relates directly to the constitution of the firmament of Day Two, or what Wheeler sees as the means by which the "…quantum principles of geometry and particles were…built." In this regard, Wheeler states:

> Among all the great developments in physics since World War II, there has been no more impressive advance in theory than the analysis of the fluctuations that take place all the time and everywhere in the electromagnetic field. There has been no more brilliant triumph of experimental physics than the precision measurement of the effect of these fluctuations on the energy levels of the hydrogen atom….These developments tell us immediately that the electron in its travels in a hydrogenic atom is subject not only to the field Ze/r^2 of the nucleus, but also to a fluctuation field that has nothing directly to do with the atom, being a property of all space.[1046]

In other words, the electron not only has to interact with the nucleus, but with the field of space between the nucleus and the electron, yet a field that "has nothing to do with the atom" itself, but is a property of the independent existence of something other than the atom. So, according to Wheeler, we have protons, neutrons, electrons and an undefined but experimentally proven "field" which constitutes the fabric "of all space." We will see shortly that Wheeler's explanation is precisely what Hildegard's visions tell us of the constitution of the universe and the physical cause for gravity, nearly one thousand years before "the great developments in physics since World War II"! The only difference is that, whereas Wheeler sees "changes in connectivity with 'handles' and 'wormholes' in the geometry all the time and everywhere forming and disappearing, forming and disappearing ('foam-like structure of space'),"[1047] Hildegard's visions tell us that the "foam-like structure of space" is permanent and non-fluctuating. It doesn't "disappear" into "other universes" and come back a split second later. It is here to stay because it was made, *ex nihilo*, on Day Two, and which we call the Firmament.

Wheeler goes on to explain the dimensions and magnitude of this "field…of all space…is the Planck length,"[1048] which is what we have been arguing as one of the basic constituents and dimensions of the firmament's granularity. He continues:

> One who had never heard of electricity, looking for evidence of this multiple connectivity of space, would *predict* electricity as [a] consequence of it. Thereupon *finding* electricity in nature, he

[1045] J. A. Wheeler and C. M. Patton, "Is Physics Legislated by Cosmology," p. 24.

[1046] *Ibid*., p. 24.

[1047] *Ibid*., p. 25.

[1048] "In a region of observation of dimension L the calculated fluctuation field is of the order, $\Delta\varepsilon \sim (hc)^{1/2}/L^2$… The consideration of principle that give one in electrodynamics the fluctuation formula [$\Delta\varepsilon \sim (hc)^{1/2}/L^2$] tell one that in geometrodynamics, in a probe region of extension L, the quantum fluctuations in the normal metric coefficients –1, 1, 1, 1 are of the order, $\Delta g \sim L^*/L$. Here $L^* = (hG/c^3)^{1/2} = 1.6 \times 10^{-33}$ cm is the Planck length. These fluctuations are negligible at the scale of length, L, of atoms, nuclei, and elementary particles, as the wave-induced fluctuations in the level of the ocean appear negligible to an aviator flying 10 km above it. As he comes closer, or as L diminishes, the fluctuations become more impressive. Finally, when the region of analysis is of the order of the Planck length itself, the predicted fluctuations are of the order $\delta g \sim 1$."

> would take this discovery as evidence that space really is multiply connected in the small. Nothing prevents our rising above the accidents of history to take the same position.[1049]
>
> These fluctuation charges are not a property of elementary particles. The relevant scale of distances is twenty orders of magnitude less than nuclear dimensions. The charges are not quantized in magnitude. The charges occur everywhere, not only where there is a particle.[1050]
>
> The view that large fluctuations go on at small distances puts physics in a new perspective. The density of mass-energy associated with a particle…is as unimportant compared to the calculated effective density of mass-energy of vacuum fluctuations down to the Planck scale of lengths…10^{94} g/cm^3…as the density of a cloud, ~ 10^{-6} g/cm3, is unimportant compared to the density of the sky, ~ 10^{-3} g/cm^3…the proper starting point in dealing with physics…is the sky, not the cloud…no theory of particles that deals only with particles will ever explain particles.[1051]

Not only do we have Wheeler admitting that science gives us no answer for the origin of electricity (something Hildegard has answered by saying it is a form of plasma), we have him describing the basic constituents of Hildegard's firmament. Our quest now is to show how Hildegard's vision of the firmament "melting" if it did not rotate is true in scientific terms. Gerardus Bouw has done the most productive work in this area. Using Wheeler's equation,[1052] Bouw writes:

> The *Planck density*, as this density is called, is today regarded as due to fluctuations in a vacuum caused by the uncertainty principle. Because of this, some have looked to this density as an explanation of the origin of the big-bang, assuming that the latter started at that density. But if the universe started at the Planck density, then it would also have to start at the Planck length and then the total mass of the universe would only be of the order of 10^{-5} grams. Furthermore, there is nothing vacuous about the firmament and so it is more logical to assume this to be a pervasive density which on sub-nuclear scales the universe can only suspect; but of whose existence it can never be certain. This, then is the density of the firmament.[1053]

Obviously, if the firmament has such a tremendous density (10^{94} g/cm^3) one wonders how anything could move through it. A mere teaspoon full would weigh hundreds of millions of tons. As we noted earlier, however, science itself has found the answer since the discovery in 1923 of deBroglie waves. Material objects, from things as small as the electron to as large as stars, move in wave motion through the firmament.

Since the firmament is rotating, this will create a centrifugal force. Hence, to remain stable, the firmament will require an equal and opposite force to keep it from disrupting. Or, perhaps a better way to phrase it is by Hildegard's description: "if it stood still, it would become liquefied and weakened, melting in a short time."[1054] This opposite force will come from the universal winds that blow inward and create a ubiquitous pressure (the force which we understand as gravity) to keep the firmament from radiating outward, as well as the internal cohesion of the firmament itself that holds it together. If one of the fundamental substrates of the firmament is in the Planck dimensions, then a certain rotation period

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[1049] Concluding with: "Accordingly we are led to think of space as having a kind of fluctuating foam-like structure, with everywhere positive and negative charges of order $q \sim (hc)^{½} \sim 10e$ continually being created and annihilated."

[1050] "Is Physics Legislated by Cosmology?" p. 26.

[1051] *Ibid*., p. 27. In his arrival at the density of the substratum of 10^{94} g/cm^3, Wheeler uses the equation $\rho \sim [(hc/L^*)/c^2]/L^{*3} \sim M^*/L^{*3} \equiv 2.2 \times 10^{-5}$ g/$(1.6 \times 10^{-33}$ cm$)^3 \sim 10^{94}$ g/cm^3.

[1052] $\rho \sim [(hc/L^*)/c^2]/L^{*3} \sim M^*/L^{*3} \equiv 2.2 \times 10^{-5}$ g/$(1.6 \times 10^{-33}$ cm$)^3 \sim 10^{94}$ g/cm^3.

[1053] *Bulletin of the Tychonian Society*, No 43, 1987, p. 17. In a related series of equations, Bouw finds that the energy flux of the firmament is 3×10^{125} ergs/cm^2/sec.

[1054] *Ursachen u. Behandlung der Krankheiten*, 24, *Das wahre Weltbild*, p. 121.

will be required to compensate for the inward pressure (gravity). The amount of centrifugal force created by the rotation will not equal the inward pressure; otherwise there would be no gravity. Rather, the rotation will be just enough to allow a residual inward pressure in order to give us the strength of gravity we see today. The rate of rotation required of the firmament to reach this equilibrium is approximately 24 hours, which means it will turn 4.166×10^{-3} degrees per second, or 7.27×10^{-5} radians per second. Since the centrifugal and centripetal forces are balanced in favor of gravity in the rotating firmament, then the firmament's angular momentum should be proportional to the gravitational constant (G), the density (ρ) and the mass (M).

A similar discovery in physics may help us understand how the rotation of the universe helps keep it stable. In the book, *The Ether of Space*, after speaking about the tremendous elasticity and density of the ether as an "incompressible," "perfectly frictionless inviscid fluid," and "a perfect continuum, an absolute plenum,"[1055] Sir Oliver Lodge states the following:

> But we must go on to ask, To what is this rigidity due? If the ether does not consist of parts, and if it is fluid, how can it possess the rigidity appropriate to a solid, so as to transmit transverse waves? To answer this we must fall back upon Lord Kelvin's kinetic theory of elasticity: that it must be due to rotational motion – intimate fine-grained motion throughout the whole ethereal region – motion not of the nature of locomotion, but circulation in closed curves, returning upon itself – vortex motion of a kind far more finely grained than any waves of light or any atomic or even electronic structure.[1056]

Lodge, of course, did not believe that the universe rotated around the Earth. He made the same mistake that all other scientists made when interpreting the Michelson-Morley experiment. Several times in his book Lodge refers to the Earth moving "nineteen miles a second" around the sun as his basis for interpreting the famous interferometer experiment.[1057] Thus, the "rotation" to which Lodge refers here is to the vortex motion of the ether itself, but according to Kelvin's kinetic theory, the required rotation could just as well be satisfied by a rotating universe.

Lodge makes further comments regarding ether, matter and rotation:

> The Essential distinction between matter and ether is that matter moves, in the sense that it has the property of locomotion and can effect impact and bombardment; while ether is strained, and has the property of exerting stress and recoil. All potential energy exists in the ether. It may vibrate, and it may rotate, but as regards locomotion it is stationary – the most stationary body we know: absolutely stationary, so to speak; our standard of rest.[1058]

Here, of course, we see that, identical to Lorentz and other physicists of this day, the ether was understood to be stationary while the Earth moved "nineteen miles per second" through it, which is why they were all so disconcerted when the Michelson-Morley experiment did not detect any such movement. Instead of having the Earth as their "standard of rest," they chose a stationary ether. Still, they possessed the scientific intuition that space contained a medium, and their quest was to understand the nature of that medium. They reasoned that it remained stable because of its rotation, which rotation allowed this "frictionless fluid" to also act as a solid. Lodge elaborates as follows:

> But now comes the question, How is it possible for matter to be composed of ether? How is it possible for a solid to be made out of fluid? A solid possesses the properties of rigidity, impenetrability, elasticity, and such like; how can these be imitated by a perfect fluid such as the ether must be?
>
> The answer is, They can be imitated by a fluid in motion; a statement which we

[1055] Sir Oliver Lodge, *The Ether of Space*, 1909, pp. 47, 90, 95.

[1056] *Ibid*., pp. 102-103.

[1057] *Ibid*., pp. 55, 58, 61, 63, 66, 68.

[1058] *Ibid*., p. 118.

> make with confidence as the result of a great part of Lord Kelvin's work. It may be illustrated by a few experiments. A wheel of spokes, transparent or permeable when stationary, becomes opaque when revolving, so that a ball thrown against it does not go through, but rebounds. The motion only affects permeability to matter; transparency to light is unaffected. A silk cord hanging from a pulley becomes rigid and viscous when put into rapid motion….A flexible chain, set spinning, can stand up on end while the motion continues. A jet of water at sufficient speed can be struck with a hammer, and resists being cut with a sword. A spinning disk of paper becomes elastic like flexible metal, and can act like a circular saw.[1059]

Of course, the remaining question for Lodge and the scientists of his day was how the ether could spin. As they understood it:

> If the ether can be set spinning, therefore, we may have some hope of making it imitate the properties of matter, or even of constructing matter by its aid, But *how* are we to spin the ether? Matter alone seems to have no grip on it. As already described, I have spun steel disks, a yard in diameter, 4000 times a minute, have sent light round and round between them, and tested carefully for the slightest effect on the ether. Not the slightest effect was perceptible. We cannot spin ether mechanically.[1060]

We have already seen, however, that Lodge's experiments were sullied by his assumption that the Earth was moving at "nineteen miles per second" and thus his, and other experiments, would not be able to detect any significant effect on the ether. The point here is that Lodge and his colleagues recognized that the plenum of ether could perform as a rigid, solid mass if it were spun. Again, this mechanism is precisely what the Hildegardian system supplies to the universe of ether – a daily spin to keep it rigid and, as Hildegard puts it, "to keep it from melting" (that is, turning into a fluid).

In addition to the above, rotation is also involved in the relationship between electricity and magnetism, which will allow us to draw out further answers to the versatility of the geocentric universe. As Lodge explains the relationship:

> Rotation is supposed to exist whenever we put a charge into the neighborhood of a magnetic pole. Round the line joining the two, the ether is spinning like a top. I do not say it is spinning fast: that is a question of its density; it is, in fact, spinning with excessive slowness, but it is spinning with a definite moment of momentum. J. J. Thomson's theory makes its moment of momentum exactly equal to *em*, the product of charge and pole; the charge being measured electrostatically and the pole magnetically.
>
> How can this be shown experimentally? Suppose we had a spinning top enclosed in a case, so that the spin was unrecognizable by ordinary means – it could be detected by its gyrostatic behavior to force. If allowed to "precess" it will respond by moving perpendicularly to a deflecting force. So it is with the charge and the magnetic pole. Try to move the charge suddenly, and it immediately sets off at right angles. A moving charge is a current, and the pole and the current try to revolve round one another – a fact which may be regarded as exhibiting a true gyrostatic action due to the otherwise unrecognizable etherial spin. The Fact of such magnetic rotation was discovered by Faraday.[1061]

This principle may explain why the Earth has a magnetic force pivoting off its poles and surrounding its entire circumference. Simply put, the rotation of the universe with its accompanying ether, which carries an electric field with its own impedance,[1062] will create a magnetic force on the poles of a stationary Earth.

[1059] *The Ether of Space*, pp. 118-119.

[1060] *Ibid*., p. 120.

[1061] *The Ether of Space*, pp. 121-122.

Hildegard and the Cause of Gravity

As we have noted earlier, Isaac Newton did not discover the nature of gravity. He merely gave us a mathematical formula to calculate its effects. Although Newton and his devotees usually describe gravity as an attractive force, the most that can be said for this view is that it satisfies the appearances. The main problem with viewing gravity as a local force due to some innate property of matter is that it would not begin to explain how gravity can operate over vast distances, otherwise known as the "action-at-a-distance" problem, something Newton hardly addressed, let alone solved.

Recall in our earlier discussion concerning the makeup of the atom that there exists a huge volume between the nucleon and the electron. In 1911 Ernest Rutherford, after bombarding very thin sheets of gold with alpha particles, discovered that even though the alpha particles were 8,000 times larger than the electron, and the metal foil was 400 atoms-thick, nevertheless, most of the particles penetrated the foil with little problem. Only a few, perhaps 1 in 1,000, were scattered, some deflected 90 degrees, others 180 degrees. An obvious interpretation of this phenomenon is that most of the alpha particles move through the atom as if it were almost completely empty. The few alpha particles that were deflected had done so because they hit the nucleus of the atom, which means that most of the mass of the atom is concentrated at the central point. As it turns out, only a quadrillionth of the atom is occupied by mass, that is, only 0.000,000,000,000,1%. What constitutes the other 99.999,999,999,999,9%? Hildegard's vision tells us that it is the fourth element, "air," or what we would understand as a subatomic ether that pervades the whole universe, yet it does not penetrate the nucleus or the electron but only the space between the two. In a simple analogy, we could say that the "fire" of the electron is bathed in a sea of cosmic "air" in order that it can continue to "burn." As Hildegard describes it: "In each of the elements there indwells an air that corresponds to its nature."[1063] Every cubic centimeter of space, and even matter itself, contains trillions upon trillions of these little entities, forming an invisible medium throughout the universe. As Oliver Lodge wrote, quoting J. J. Thomson:

> "In fact, all mass is mass of the ether; all momentum, momentum of the ether. This view, it should be said, requires the density of the ether to be immensely greater than that of any known substance."
>
> Yes, far denser – so dense that matter by comparison is like gossamer, or a filmy imperceptible mist, or a milky way. Not unreal or unimportant – a cobweb is not unreal, nor to certain creatures is it unimportant, but it cannot be said to be massive or dense; and matter, even platinum, is not dense when compared with the ether.[1064]

This subatomic ether performs a number of important tasks, but probably the most important is that it helps create gravity. As it occupies the space in the atom, as in Rutherford's experiment, most of it passes through, but some of it hits the nucleus, yet it cannot penetrate the nucleus because of the latter's density. This fits the science we already know concerning protons. They are virtually indestructible and do not decay. Experiments with the proton reveal that its average lifetime must exceed 10^{32} years.[1065] Although the nucleus is about 10^{-14} cm in length, its density is far more compact. No one really knows how dense it is. In any case, the atom moves in whatever direction the ether moves the nucleus. There is no longer any need to wonder why atoms were designed with mostly "empty space." They were designed as such to allow them to be penetrated by even smaller unseen entities to create the phenomenon of gravity.[1066]

[1062] According to "Space Must Be Quantizied," *21st Century*, May-June, 1988, p. 26ff, the impedance of space is 376 ohms.

[1063] "Einem jeden der höheren Elemente wohnt eine Luft inne, die seiner Beschaffenheit entspricht" (*Die göttlichen Werke*, 122, cited in *Das wahre Weiltbild*, p. 103).

[1064] *The Ether of Space*, p. 116.

[1065] James S. Trefil, *The Moment of Creation: Big Bang Physics from Before the First Millisecond to the Present Universe*, 1983, pp. 141-142. Although protons have been theorized to consist of other particles (*e.g.*, leptons, quarks), nevertheless, in the cosmic realm the proton remains indestructible. Whereas 100 MeV is needed to remove an electron from an atom, and 10^6 MeV to remove protons from neutrons, it would take 10^{11} MeV to break down a proton. By comparison, the best modern accelerators can presently produce 10^{12} MeV.

As we noted above, modern science has found substantial evidence that open space is not a vacuum; rather, it is filled with infinitesimal particles. It was for this very reason that the interferometer experiments in the course of 50 years all demonstrated positive results for an ether circling the Earth, but results that were not even close to coinciding with an Earth revolving around the sun at 66,000 mph. We also noted earlier that Carl Anderson discovered the positron in 1932. From this discovery various scientists have understood that space is packed with electron-positron pairs (or what we have coined as "electropons"), such that the sudden appearance of an electropon pair when a 1.02 MeV charge is administered in open space is that the charge is jarring the particles loose from the all-pervading electropon lattice. One scientist, Menahem Simhony, estimates that the number of electropon pairs in one cubic millimeter of space is 6×10^{30}, with a binding energy of 27 quadrillion kilowatt hours, yet this energy is a million times smaller than the binding energy of the atomic nucleus.[1067] Hence, the nucleus would remain impenetrable to the electropons, and thus the electropon sea could move the nucleus. Thus we have a viable mechanism for gravity. Later we will discover what might move the electropon sea against the nucleus.

Simhony's value of 10^{30} electropons per cubic millimeter of space is precisely the same value found by another researcher in the field, Allen Rothwarf (although the two scientists worked independently).[1068] Moreover, setting their sights on specifically addressing the gravity question, Frederick Rothwarf and Sisir Roy combine the electropon pairs into a second ether composed of particles on the Planck scale, so that there are "two ethers." Offering a solution to gravity, they write:

> These particles, called partons or gravitons, are assumed to have a mass equal to the Planck mass[1069] and to constitute an ether A_G, that transmits gravitational forces at a speed c_G, which exceeds the speed of light c_0. Along similar lines, Van Flandern and Vigier have analyzed planetary and cosmological data to obtain a lower limit of c_G , 2×10^{10} $c_0 = 6 \times 10^{18}$ m/s" [*i.e.*, 20 billion times the speed of light].[1070]

Einstein, of course, had limited the speed of gravity to luminal parameters, but many physicists admit that this limitation simply will not survive in a universe of Planck dimensions, and it is one of the reasons why Relativity and Quantum Mechanics have never had a successful union.

That gravity is based on an ether-pressure is related to the various corpuscular theories of gravity originating in the work of Nicholas Fatio de Duillier (b. 1664) and Georges-Louis Le Sage (b. 1724), and continuing in modern times to the more advanced theories. For example, astrophysicist Toivo Jaakkola writes:

> A few words about the gravitational ether, and the ether concept in general may be in place here. The ether hypothesis was thought to be buried by the Michelson-Morley experiment, but today it is more alive than ever, in the form of the CBR [Cosmic Background Radiation]: experiments capable of finding the ether were not possible in the 1880s, but were possible in the 1960s. In a sense, the electromagnetic ether has always been

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[1066] For an example of how this principle can be demonstrated, Posch cites that the Earth consists of only 10^{-14} % mass, based on the current atomic model in use today. This, of course, leaves 9.9×10^{15} % as empty space. If, in turn, the ether penetrates the Earth with a pressure of 10^{14} *p*, only 10^{-14} of this pressure is absorbed by the Earth's mass. The difference between the unhindered permeation and the resisted amount is as small as 10^{14} % [corrected]. As such, 10^{-14} % of 10^{14} $p = 1$ *p*. This equation corresponds exactly to the Earth's measured gravity, which is 1 *p* or 1 gram per square centimeter (*Das wahre Weltbild*, p. 104).

[1067] Menahem Simhony, *Invitation to the Natural Physics of Matter, Space and Radiation*, 1994.

[1068] Allen Rothwarf, "Cosmological Implications of the Electron-Positron Ether," *Physics Essays*, 11, 1998. John Kierein finds a similar density to the electron-positron model, and by it shows that redshift is due to the Compton effect (John Kierein, "Implications of the Compton Effect Interpretation of the Redshift," *IEEE Trans. Plasma Science* 18, 61 (1990).

[1069] $m_p = (hG/c)^{½}$

[1070] "The Time Dependence of Fundamental Constants and Planck Scale Physics," in the paper dated November 14, 2003, p. 8.

observed – as the heat of the Sun (since as pointed out, CBR is reprocessed photons).

The gravitational ether must be structured much like its electromagnetic counterpart. Local fields would cause the ordinary gravitational processes. Corresponding to CBR, there must be a cosmic background gravitation, CBG, probably with its specific gravitational spectrum. How to observe CBG? It has been already observed, as the cosmological redshift effect, *z*.

Gravitation works *via* gravitational quanta, gravitons…. Quantized gravitation is also required by the redshift and other equilibrium effects. Gravitons are gravitational equivalent to electromagnetic quanta, photons, both those of the cosmic background radiation CBR and incident photons from galaxies. Gravitons and baryonic matter interact and are in equilibrium on the cosmological scale. The graviton-baryonic interaction is the redshift effect, and the CBR is re-emission of energy gained by the cosmological gravitons in the redshift effect.

Gravitation on a body is a pressure effect of gravitons flowing from the background space. As a rule, due to the equilibrium principle, the flow is proportional to the mass of the body. As for all concentric flows (*e.g.*, radiation) the surface density of the graviton inflow follows the familiar inverse square distance law….The energy of the gravitons is proportional to the parameter which we call "strength of gravitation," *G*. Therefore, we obtain for the surface gravity on a spherical body with mass *M* and radius *R* the familiar Newtonian $a = GM/R^2$.

All the main cosmological, astrophysical and physical facts: the gravity and Olbers paradoxes, redshift effects and CBR, gravitation and radiation, and the existence of particles can be conceived in the framework of this ether concept.[1071]

In summary, Jaskkola holds that:

- The CMB [CBR] radiation shows that ether exists all over the universe.
- The redshift shows that a Cosmic Background Gravitation in the form of gravitons also exists.
- Gravitons interact with baryonic matter (the atomic nucleus).
- Gravitation on a body is a pressure effect of gravitons flowing from the background space.
- The strength of the gravitons is equal to the gravitational constant *G*, and the force is measured by the inverse square law.

Halton Arp adds that gravitons are:

> …very low mass particles with a huge de Broglie wavelength compared to photons [and thus] have much less interaction with the intergalactic medium….The photon is transmitted through the average cosmic false vacuum, material vacuum or zero point energy field – to use just a few names given to the old fashion concept of 'ether.' But the graviton interacts with much less of this molasses and hence moves much faster.[1072]

Reginald T. Cahill adds that interferometer experiments dating back to Miller in 1925 and the coaxial cable experiments up through DeWitte in 1991 show the presence of gravitational waves. These waves are said to be the proper interpretation of the periodic and non-random fluctuations in the same forces measured by the "Stanford University-NASA Gravity Probe B" satellite experiment that measured a geodetic precession and the Lense-Thirring 'frame-dragging.' Cahill concludes that the data shows "gravity may be…well represented in terms of a 'flow' system involving a velocity vector field…and this formalism is physically indistinguishable from the Newtonian formalism…"[1073]

[1071] "Action-at-a-Distance and Local Action in Gravitation," in *Pushing Gravity*, pp. 157-159.

[1072] "The Observational Impetus for Le Sage Gravity," in *Pushing Gravity*, p. 4.

[1073] Reginald T. Cahill, "Novel Gravity Probe B Gravitational Wave Detection," Flinders University, Adelaide, Australia, August 21, 2004, p. 3. Various

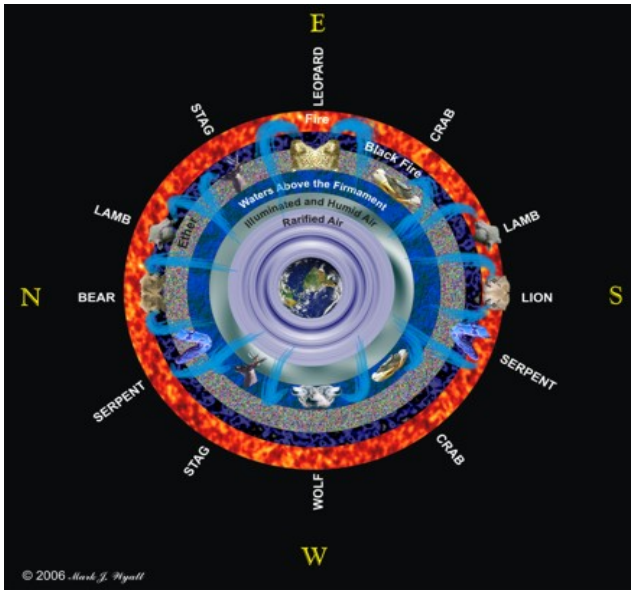
The Physical Cause of Gravity

How might this ether "flow" system work, mechanically speaking, to cause the effect of gravity? As we noted previously in Volume I and will repeat here, the mechanism may actually be very simple. The ether has a granularity and concentration that is far finer and far denser, respectively, than ordinary matter. As such, ether will serve as the interstitial substance that fills the so-called "empty" space within the atom, as well as the space outside the atom. Since, however, the ether does not penetrate the atom's individual particles (protons, neutrons, etc), these atomic particles thus account for a percentage of the mass of the atom. But since the atomic particles are less dense than the ether, yet they occupy space in the atom, this means that the total density within the atom will be slightly less than the density of ether outside the atom. This imbalance will cause what can best be described as a partial vacuum in the ether, and the ether will seek to correct the vacuum by attempting to come to equilibrium. Here is the key: *The effort to correct the vacuum is the cause of gravity*. The less-dense ether within the atom will seek to draw inward the denser ether that is outside the atom, and this force will continue until a balance is reached, but, in fact, a balance is never reached, and thus the force of gravity persists indefinitely.

In Newton's case, for example, the apple falls to the Earth because the larger the mass, the stronger the vacuum. The Earth, which is the larger mass, will create a stronger ether vacuum than a smaller mass, and thus the smaller mass (the apple) will be drawn toward the larger mass by the force of the Earth's greater ether vacuum. The reason the Earth creates a greater ether vacuum than the apple is that the more atomic mass an object has, the less interstitial ether it will possess in its given volume, and thus the greater the imbalance it will have with the ether outside its mass. The Earth, having more mass than the apple, has less interstitial ether within its particular volume and thus a greater ether vacuum.

By the same principle, Jupiter will have more gravitational force than the Earth because Jupiter, having more atomic mass than Earth, will have less interstitial ether for its given volume, and thus create a greater ether vacuum, which then attempts to pull more forcefully the ether from outside the planet in order to reach equilibrium.

The Twelve Cosmic Winds



Interestingly enough, the foregoing descriptions of gravity are very similar to what Hildegard saw in her heavenly visions. She reveals a universe filled with cosmic winds originating at the background of deep space. Altogether there are **twelve cosmic winds** and their points of origin are symmetrically and evenly divided around the perimeter of the universe. Essentially, the winds are arranged in such a way that they create a continual flow of pressure towards the center. We can imagine these as concentric spheres of cosmic ether waves moving toward the center at a constant speed, a sort of pressure wave.

The movement of the winds is somewhat complex. One set of winds begins outside the outer fire layer of the south side of the universe and blows laterally around the circumference and, after bouncing off the edge of the universe, curls inward toward the center of the universe where the Earth is located. Another set of winds begins at the north side of the universe in the inner fire layer and performs the same action as the south side winds. Another set of winds begins at the east side of the universe in the ether layer and performs the same action as the north and south winds. Finally, a fourth set of winds begins at the west side of the universe in the water layer and follows the same pattern as the

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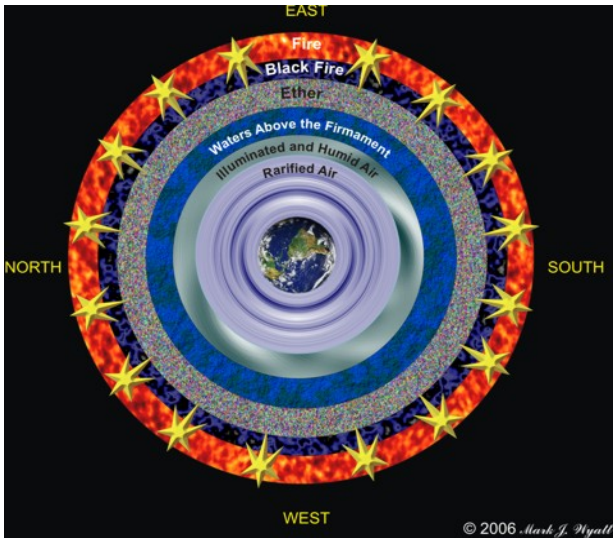
universities around the world have established Gravitational Wave Physics. The lab headed by Lee Samuel Finn and Benjamin Owen at Penn State University is one example.

other three winds. Hildegard employed the names of animals both to distinguish each originating point (*i.e.*, south, north, east, or west) and to distinguish the separate winds within each origin point. Altogether, in Hildegard's vision, there are four main winds (which originate from the four compass points) and eight adjacent winds.[1074] These twelve winds, symmetrically situated in space as if they were each at the hour position of a giant clock, produce cosmic waves distributed to the whole universe and which are directed, like spokes of a wheel, toward the center, where Earth is located. The pressure created by the twelve winds is distributed evenly at all points and consequently, as they reach the center, they are in mechanical equilibrium and thus hold the Earth in the exact center. These same winds, as they travel from the outer edge of the universe toward the Earth, create the phenomenon of gravity and inertia for every other celestial body in the universe. Consequently, any celestial body outside the Earth's immediate area will experience disproportional cosmic wind currents and thus move with respect to those currents.

Hildegard intimates that the winds originate both by the energy latent within each celestial layer (based on the principle that "fire" is included in each of the other three elements: air, water, and earth), yet the largest and primary cosmic wind begins in the layer of pure energy that is in the outer layer of the universe where also the universe's most massive stars are located.[1075] In a fashion easily explainable in terms of modern science, the energy from the outer layer of the universe creates the inward gravitational pressure as it moves the particulate substance in space in symmetric wave motion towards the center of the universe. In this way, every object of the universe will experience gravity and inertia. Hildegard insists that there is neither movement nor force without these cosmic winds. Thus gravity is not a "curvature of space" and inertia is not an inherent property of motion, but both are the result of a well-designed universal machine working on the principle of mechanical cause and effect. Hildegard's vision of universal winds thus replaces the need for Dark Matter, for we can easily see that gravity is not dependent on the presence of matter; rather, it is a pressure force caused by the transfer of some type of electrical or plasma energy into a kinetic energy so that the cosmic winds can carry the waves of gravity and interact with the matter in a closed universe. It is possible that the high energy gamma-ray bursts or X-ray bursts found over the entire perimeter of the cosmos may be the peep holes by which we can verify the existence of this universal energy.

The Sixteen Controlling Stars



In conjunction with the cosmic winds, Hildegard's vision reveals **sixteen** of the most massive and powerful stars placed symmetrically at the perimeter of the outer fire layer of the universe. Four stars are positioned between a pair of compass points. Since they are evenly spaced from one another around the universe's circumference, their center of mass is the Earth itself and their energy is directed towards it like the spokes of a wheel. As Hildegard puts it: "If there were more stars they would overload the celestial vault. Fewer would weaken and damage the vault….They are equally effective and adhere to the firmament like nails in a wall. They never leave their place but rotate with the primordial vault, which they help sustain."[1076] The

[1074] *Welt und Mensch*, 36; *Das wahre Weltbild*, p. 100.

[1075] In one instance, Hildegard attributes the origin to God himself, as she quotes what the man in the center of the universe said to her: "I am hidden in them as a fiery power. They blaze upwards out of me!" (*Die göttlichen Werke*, 42, *Das wahre Weltbild*, p. 101). This revelation thus makes an intimate connection between God and the universe, as suggested by Colossians 1:16-17: "for in him all things were created, in heaven and on Earth, visible and invisible, whether thrones or dominions or principalities or authorities – all things were created through him and for him. He is before all things, and in him all things hold together."

two outer stars from each compass quadrant radiate their tremendous energy towards the center (Earth), while the two inner stars in the quadrant (eight in all) radiate as far as the inner fire layer. All in all, Hildegard says:

> …these stars strut the entire primordial vault and offer resistance to the adjacent winds so that the winds do not move the firmament too much. They provide the cosmic air with the proper balance and are compatible with each other, because one helps the other carry the celestial vault.[1077]

The purpose for the two inner stars radiating only to the inner fire layer is "that they support the adjacent winds and offer resistance to the fire so that it need not send out excessive blazes."

As for the billions of other stars in the cosmos, Hildegard states that they are evenly spaced throughout that "ether" layer and the "illuminated air" layer, and "warm up the firmament and strengthen it" (*viz*., the 2.73º Kelvin temperature). This would mean, then, that there are stars above and beneath the "water" layer, or what we commonly call "the waters above the firmament."

Modern science has confirmed the existence of massive stars in the universe. Already in the time of Albert Michelson in the 1920s, their existence was known and measured. Using the 100-inch Mount Wilson telescope, Michelson and Francis Pease were able to calibrate stars with linear diameters of 20 million miles (Arcturus); 30 million miles (Aldebaran); and 400 million miles (Antares). These figures haven't changed much from recent calibrations.[1078] They also found that Betelgeuse, a variable, pulsating star, measures between 360 and 500 million miles in diameter. To get a grasp of how big these stars are, at its widest diameter, Betelguese would be twice as big as all of the spherical volume between the sun and the orbit of Mars. It is these types of stars, sixteen of them, that Hildegard says rule the universe's distribution of energy.

The Effects of the Cosmos upon Earth

In Hildegard's cosmology all the heavenly bodies communicate with one another through the four elements of fire, air, water, or earth. Nothing is wasted or idle. For instance, Hildegard's visions show that the stars have a direct effect on the clouds in the Earth's atmosphere. She writes:

> With their rays they penetrate the clear air all the way to the clouds under the strong, white, luminous air and hold them so that they stay within their God-given boundaries.[1079]

Current science literature remarks on a similar cosmic-to-cloud exchange. In the 1990s, H. Svensmark of the Danish National Space Center found a connection between cosmic-ray intensity and cloudiness on Earth. Svensmark found that the influx of cosmic-ray muons created large numbers of sulphuric acid droplets, which then served as condensation nuclei for cloud formation. Writing about the phenomenon in *New Scientist*, Nigel Calder remarks:

> He [Svensmark] found that when the sun's activity was at its lowest, during which time about 25% more cosmic rays reach Earth, the planet was 3 per cent cloudier than during solar maxima.[1080]

Hildegard continues:

> And this same air – the illuminated air over the atmospheric layer – also seems to carry the clouds a little higher, which are soon flying high and full of light, soon descending and dark. This spews out the watery air and gathers it back together, just as a smith's bellows brings forth a blow and draws it back in. Therefore certain stars, while put into the element of fire, then ascend in their circulation, drag the cloud upwards, whereby they too become illuminated. But when they descend in

[1076] *Die göttlichen Werke*, 111, *Das Weltbild*, p. 102.

[1077] *Die göttlichen Werke*, 111, *Das Weltbild*, p. 102.

[1078] Arcturus: 30 million; Aldebaran: 35 million; Antares: 410 million. Bernard Jaffe, *Michelson and the Speed of Light*, p. 159.

[1079] *Die göttlichen Werke*, 111, *Das Weltbild*, pp. 102, 105.

[1080] Nigel Calder, "Cosmic Rays Before Seven, Clouds by Eleven," *New Scientist*, Oct. 10, 2006, p. 13

> their circulation, they release the clouds again and thus they are dark and trigger downpours.[1081]

This revelation explains a heretofore mysterious phenomenon (*i.e.*, how water, which is much heavier than air, can stay above air), but it is a solution that neither modern meteorology nor astrophysics has ever considered. According to Posch, Hildegard is describing a process whereby the electromagnetic impulses of the stars (which can act on the Earth's entire atmosphere instantaneously since they form a giant sphere of constant and inexhaustible power) act like an anode and cathode. The starlight ionizes the air, which, in turn, creates differentiated layers of gas. The gas layers, reacting to the flow of gravity, create changes in air pressure while also seeking to stabilize the total energy of the system. Hence, the cosmic pressure from gravity coupled with the reverse pressure created by the ionization of the atmosphere describes Hildegard's "bellowing" effect, which we experience as high- and low-pressure pockets throughout the Earth. The whole process results in a continual regeneration of the atmosphere. One of the effects of such atmospheric purification is the production of soft rainwater through a type of distillation process, a distillation that is initiated by the immense energy of starlight from billions of stars.

Moreover, a similar process of gas exchange occurs throughout the universe and is one of the reasons that the temperature can remain at precisely 2.73º Kelvin. Such a process would require the existence of massive amounts of water in space similar to the way water exists in the Earth's atmosphere. Indeed, our earlier citations of the scientific evidence show that such amounts of water exist not only in space but also in the stars themselves.

Regarding electrical processes playing some part in the attraction and repulsion of cosmic entities, as early as 1830, Ottavio F. Mossotti, a French physics teacher at the University of Buenos Aires, postulated that attractive force was caused due to the very slight excess of attractive forces between electrical particles as opposed to the particles' force of repulsion. Since matter is understood to contain positive and negative electricity, obviously, if the attractive forces between particles of opposite electrical charge exceed the repulsive forces of the like particles, an attraction would result.[1082] Since electrical forces are so much stronger than what we experience as gravitational force, it would only require a slight residue of attractive electrical force to produce the forces we experience in the cosmos. This would require that Coulomb's law, which holds that two repulsions and two attractions cancel each other, could be slightly weighted to one side or the other. Of note, Ampère had shown that another motion is produced between electrical charges that are not described by Coulomb's law. Wilhelm Weber added that attraction also depends on the velocities and accelerations of the bodies in view, whereas Coulomb's law applies to bodies at rest.[1083] In any case, Weber seriously considered Mossotti's hypothesis, publishing a paper on the relationship between electricity and gravitation which relates the difficulty in testing whether there is, indeed, a slight difference between attractive and repulsive forces.[1084]

Following Weber, Walter Ritz also questioned the electrodynamics of Maxwell and Lorentz, and attempted to revive the abandoned approach of Gauss and Weber. He postulated that the result of the electrical forces between two bodies would be attractive. His reasoning was not based on Mossotti's theory, however. Ritz based his on the internal motions of the electrical particles in the atoms. Having died prematurely, Ritz had no opportunity to develop his idea. Current Plasma cosmology is just now delving into these areas of research and much has been written on what has come to be known as the "electric universe."[1085]

[1081] *Die göttlichen Werke*, 66, *Das wahre Weltbild*, p. 105.

[1082] O. F. Mossotti, "On the Forces which Regulate the Internal Constitution of Bodies," 1830.

[1083] Wilhelm Weber, "Elektrodynamische Maasbestimmungen: Über ein allgemeines Grundgesetz der elektrischen Wirkung," Werke, Berlin: Julius Springer, 1893, pp. 25-215. Cited in *21st Century Science* by Laurence Hecht, Spring 2001.

[1084] *Ibid*., pp. 479-525. Cited in *21st Century Science* by Laurence Hecht, Spring 2001.

[1085] As plasma physicist Eric Lerner suggests in his book *The Big Bang Never Happened*, Vintage Books, 1992; also Erwin Saxl, "An Electrically Charged Torque Pendulum," *Nature*, v. 203, pp. 136-138 (1964). C. F. Brush discovered anomalies between mass and gravity in certain materials, and concluded: "the ratio of mass to weight is not the same for all kinds of matter, as has been supposed, and the mass-weight ratio is not constant even

Energy Supplied to the Sun

Interestingly enough, plasma cosmology holds that the energy from the sun and stars that creates heat and light does not originate from a process of nuclear fusion within the cores; rather, it originates from the energy given to the star from external electrical forces in the cosmos which are then distributed on the surface of the star. Hildegard's visions portray something very similar, at least for our sun. Her visions reveal that in order for the sun to remain aglow, it must always be supplied with the cosmic air current. As we have already noted, the air current originates in the outer layers of the universe, yet Hildegard adds that the planets themselves help radiate the air current toward the sun. Mars, Jupiter and Saturn work as a three-blade fan circulating the rarified cosmic air. As Hildegard says:

> And there are only three, for if they were more, they would ignite the fire too much and disturb it through their orbits. Or if they were fewer, the fire would become cold in its blaze."[1086]
>
> The planets enable the sun. Without them, the sun could not exist. They add warmth to it….The planets move from west to east counter to the firmament. Thereby they restrain the fire of the sun with their fire and, on the other hand, renew it for the great kindling. If they did not run counter to the firmament and hurry towards the sun from behind, the sun would not be renewed but freeze into solidity….That's why the planets have effectively been put in the firmament by the Creator of the world in this manner.[1087]

Mathematical Constants in the Geosystem

As we have noted, although we commonly accept that the sun rises in the east and sets in the west, in actuality the firmament is rotating east to west (or clockwise for someone standing at the North Pole) and it is carrying the sun. At the same time, the sun is making a very slow counter-clockwise movement, from west to east, against the firmament. Analogously, we might say the sun is moving slowly upstream like a salmon. As it moves against the current, the sun takes 27.2753 days to make a complete counter-revolution within the firmament, based on sidereal time and position.

While the sun is orbiting the Earth, so is the moon, and in almost the same way and in the same time. As the firmament moves clockwise (from east to west) it carries the moon, and thus the moon appears to rise in the east and set in the west, just like the sun. Its time between rising and setting is almost identical to the sun's, except that it needs an extra 0.0447 days to make its revolution around the Earth, based again, on sidereal time and position. In all, the moon takes 27.32 days to complete one revolution around the Earth. (Keep in mind, however, that compared to the background of the stars, both the sun and the moon are slowly moving west to east on a daily basis).

That the sun and the moon have an almost identical time of revolution around the Earth is no mere coincidence. Since each revolves in about 27 days, there is a one-to-one ratio. This ratio is needed to establish the balance in the universe's movements. Any faster or slower and the movement would be out of kilter, namely, the balance between what Newtonian physics understands as the centrifugal and centripetal forces, but also other important

in the same kind of matter" (*Physical Review*, vol 31, p 1113(A); Vol 32, p 633 abstract. Proc. Amer. Philosophical Soc. Vol IX No. 2, 1921; Vol LXVII No. 2, 1928; Vol LXVIII No. 1, 1929. *Journal of the Franklin Institute*, Vol. 206, No. 1, 1928). The *Biefield-Brown Effect*, as found by Thomas Townsend Brown in the late 1920's, produced a slight weight change in a specially constructed capacitor when it was subjected to an extremely high DC voltage. Others have verified the effect and several patents have been granted over the years, but no one has been able to explain what the effect is or its source. Roger Brown, in *The Biefield-Brown Effect Revisited* (1996), offers an explanation to the origin of the force. Many others have written on this topic, but theories postulating that electrical forces cause gravity contradict the tenets of General Relativity, and therefore such papers are usually shunned by the major physics periodicals.

[1086] *Die göttlichen Werke*, 92. *Das wahre Weltbild*, p. 133.

[1087] *Die göttlichen Werke*, 101. *Das wahre Weltbild*, p. 134. Posch notes: "Accordingly, it is manifestly known that the periodic activity of the sun is linked to the orbits of the planets. The fluctuating number of sun spots was discovered by Samuel Schwabe the previous century. They can become so big that sometimes at sunrise one can see them with the naked eye. Emerging in a period of about 11 years, the sun spots indicate a cooling of the sun's surface" (*ibid*).

forces, such as the gravitational constant, the angular momentum of subatomic particles, and most if not all of the other fundamental constants we have noted previously.

According to Posch, the precise number 27.32 becomes very important in cosmological mechanics. Basing the rotation of the firmament on a 366-day-per-year cycle, there are certain fixed ratios that naturally develop. That is, 1 year divided by 366 days equals 0.002732 years; and 1 year divided by 27.32 days equals .03660 years. For the first value, we can say that 1 day equals 0.002732 years, or that the firmament rotates 360º every 0.002732 years. Other uses appear in, for example, the acceleration of the moon as it orbits the Earth at 0.273 cm/sec^2, and the moon's radius being 0.272 of Earth's radius, which shows that there exists an intimate mechanical connection between the Earth and the moon. Perhaps Hildegard's statement that the moon's orbit around the Earth is the basis "by which everything else is reckoned" can now be better understood.[1088]

No Ellipses for the Solar Movements

Another interesting facet of Hildegard's universe is that the path the sun traces out as it orbits the Earth is not an ellipse. In keeping with the Aristotelian model, the sun moves in a circle. As Hildegard describes it:

> The other planet moves counter to it and drags the sun upwards to the constellation of Aries….These propel the sun forward with great force [acceleration]….The two planets accompany the sun for a while so that it won't move downwards too fast. [At Virgo] the sun moves more slowly on its path [deceleration].[1089]

Actually, in the relationship of the sun to the Earth, a non-elliptical path is not critically significant. Although in heliocentric illustrations the ellipsis of the Earth's path around the sun is often exaggerated for effect, in actuality it is very close to a perfect circle, with only a 3% variance. Still, there is slight difference, and this difference would accumulate over time and thus a precise understanding of these movements is necessary to know.

We noted earlier in comparing Kepler's solar system against Copernicus' that, whereas Copernicus sought to keep the perfect circles of Aristotle and Ptolemy, this system did not work properly, forcing Copernicus to include 48 epicycles to his planetary movements. Seeing these flaws, Kepler found that the data of planetary movement (which he obtained from Tycho Brahe) fit much better when the orbits of the planets around the sun were elliptical, some of the planets having a sharper ellipse than others. In that comparison, we also noted that an elliptical path is equivalent to a circular path if the speeds of the orbits are adjusted. Hence, as long as Hildegard's geocentric model can account for these differences, her system is equivalent to the Keplerian elliptical system. This is not to say that the Keplerian system is the standard by which all other systems are judged (for we have seen that even the Keplerian solar system has its difficulties), but only to say that Hildegard's model explains the motions of the sun and planets in circular orbits just as well as the best heliocentric model explains elliptical orbits.

We start this analysis by making reference to the phenomenon of the **Analemma**. By

[1088] *Das wahre Weltbild*, p. 123.

[1089] *Das wahre Weltbild*, p. 143.

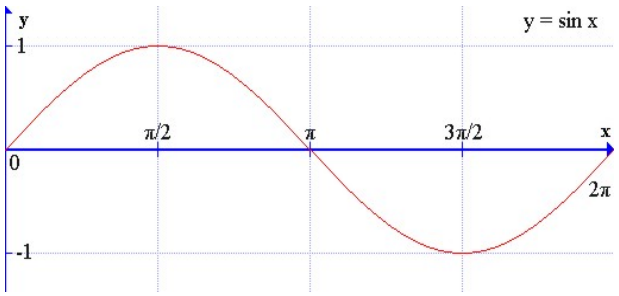
photographing the sun at the same time each day for an entire year and assembling the photos so that they show the progressive movement of the sun, a figure-eight pattern is revealed. In addition, the lower loop of the figure-eight is longer and covers more area than the upper loop. The first composite photograph of this phenomenon was produced by Dennis Di Cicco and published in *Sky and Telescope* in 1979. In the heliocentric system the Analemma's asymmetry is explained by the Earth's tilt of 23.45º in addition to the ellipses it forms as it travels around the sun. In the Hildegardian geocentric system it is explained by the precessional movement of the sun in addition to its acceleration and deceleration at specific points in its orbit. As Posch discovered, these two independent movements of the sun follow the principle of the Cardanic function. As one text stated:

> A mechanism that is particularly useful, surprisingly, is the cardanic joint, which is well-known in other applications. Its precision is based on a caprice of nature. Moreover, it is certainly an interesting coincidence that certain basic relations of celestial mechanics describe the same functional relations as the movement of the universal joint or cardan joint. The effect of the cardan is understood in the following relation: Tangent B = Cosine N × Tangent A, where A = angle at the drive; B = angle at the output; and N = slope between A and B. The exact same function describes the relation between the eccentric and the true anomaly….Further, the relation between the center of the ellipse and the eccentric anomaly is, in turn, the Cardanic function.[1090]

The "caprice of nature" to which the author refers is that, although the drive of a universal joint is uniform, the output is asymmetrical. This causes the mechanism to wobble or create a precession. This is why all rotating shafts that use a universal joint will vibrate, and it is the same reason why a gyroscope will wobble around its center of mass when it is hit by an external force. In essence, an elliptical orbit in which the sun or a planet accelerates or decelerates in keeping with Kepler's law of areas is equivalent to the same principle that governs Cardanic movement. The question is: which system is correct? If the sun and planets travel in circular orbits although at asymmetric velocities, and by doing so match Kepler's elliptical orbits, then there is nothing in the mathematics that can deny it as a viable order of celestial movement. In fact, Kepler knew that the sun moved faster through the stars at various times of the year. As Einstein notes of Kepler:

> To begin with it followed from observations of the sun that the apparent path of the sun against the background of the fixed stars differed in speed at different times of the year…[1091]

This is quite significant, since if Kepler understands the stars as fixed in space, then the sun's acceleration and deceleration against such a fixed background means that the sun is producing an absolute movement. In any case, whereas Kepler's model is quite complicated, Hildegard's model can be represented by a simple **sine curve** in which the acceleration and deceleration of the sun represents the positive and negative curves on the *x*-axis of the graph.

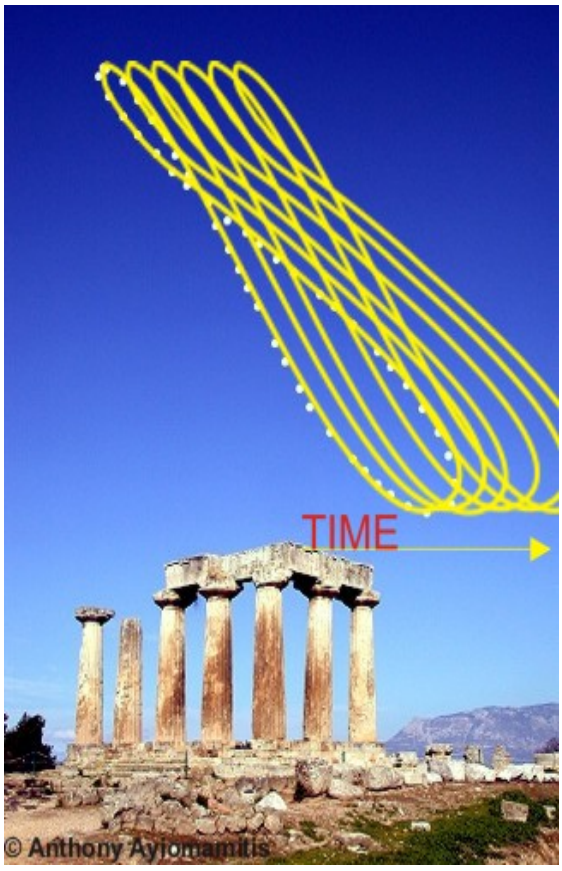


Yet there is another ingredient to this phenomenon. As we noted above, the Analemma shows that the sun travels farther in the lower loop

[1090] Quoted from *Der Himmel auf Erden*, Meier, cited in *Das wahre Weltbild*, p. 145. In orbital motion, an elliptical orbit is understood as the product of three elements: (1) the semi-major axis, which gives the size of the orbit; (2) the eccentricity, which gives the shape of the orbit (between 0 for a circle and 1 for an infinite parabola); and (3) the mean anomaly, which is an angle growing at a steady rate up to 360º for each orbit. The actual position, however, is given by the *true anomaly*, which is given in polar coordinates.

[1091] On the occasion of the three hundredth anniversary of Kepler's death. Published in the Frankfurter Zeitung, Germany, November 9, 1930, Albert Einstein, *Ideas and Opinions*, New York, Crown Publishers, 1954, Wing Books, 1984, p. 263.

of the figure-eight than it does at the top loop. There are two reasons why this is so. The first is that the sun is traveling on the ecliptic plane that is oscillating side-to-side over a span of 46 degrees in the course of one year. But it is not only oscillating with a side-to-side motion but with a circular motion, just like the plane of a spinning gyroscope that starts out with a 23.5º tilt (provided we keep the gyroscope spinning). To get a good mental picture of how this occurs, one can view the planet Saturn over the course of its orbit around the sun. Saturn's rings will represent the plane of the ecliptic while Saturn itself represents the Earth. Over the course of its 29.5-year orbit, Saturn's equatorial plane will oscillate side-to-side 54 degrees, or 27 degrees above and beneath its center of mass. As it does so the plane will also precess, which will appear in telescope photographs showing the rings moving front-to-back as well as side-to-side, just as in gyroscopic motion. If one were to attach a long pencil to the rings and have it draw on a background behind Saturn, one would see the characteristic Analemma.



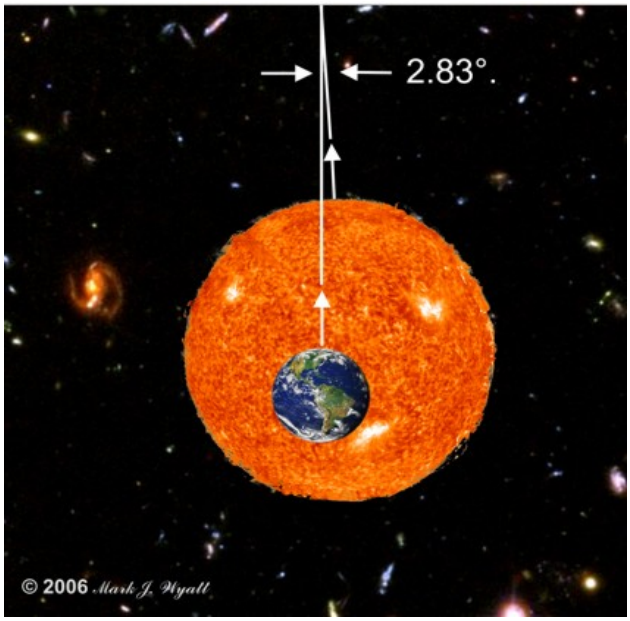
These Analemmas, however, are made without the ellipses of the Keplerian system. The reason is that the sun will orbit the Earth in an asynchronous manner, accelerating and decelerating at periodic points in the orbit. In all, there are two accelerations and two decelerations, evenly divided over the orbit. Using the face of a clock to create the image, from 12-3 the sun is accelerating; from 3-6 it is decelerating; from 6-9 it is accelerating; and from 9-12 it is decelerating, following the typical sine curve. As the sun makes these varying movements in gyroscopic fashion, the Cardanic function will produce the characteristic elongated lower loop of the Analemma.

In addition to the sun's annual precession, there is another precession that it creates, although this one is over the course of 26,000 years. As we noted earlier, the sun is revolving daily with the rest of the universe in a clockwise direction around the Earth each day. But the sun is also moving in a counter-clockwise motion against the clockwise motion of the universe. Because of the sun's asymmetrical gyration in its orbit, will cause the orbit to advance 50 arc seconds beyond the starting point of the annual revolution, and this will cause the sun's orbit to precess ever so slightly against the uniformly rotating universe. Over the course of 26,000 years, the sun will come back to the beginning of its precession cycle. Whereas the heliocentric system attributes the 26,000-year cycle to the precessional movement of the Earth's axis, which is said to be generated by the bulge in the Earth's equatorial plane (even though satellite photographs of the Earth do not show an equatorial bulge), geocentric cosmology attributes this precession to a miniscule time difference in the movement of the sun against the firmament. Consequently, this 26,000-year precession will cause the **Analemma to shift** to the east each year by 50 arc seconds against the background of the stars.

The next issue to be investigated concerns the force that is causing the sun and the planets to accelerate and decelerate at precise periodic points in their orbits. Before we answer this question, we should note that the same question should be asked of those who advocate the Keplerian model of ellipses, that is, according to Kepler's second law, what, precisely, causes the planets to trace out equal areas in the same time period? A Keplerian would answer this challenge by appealing to the "force of gravity" and the "force of momentum," showing us by mathematical equations how these two principles work in tandem. But in reality these mathematical equations neither tell us what moves the planet in its designated orbit, nor the cause of gravity or

momentum. The equations merely measure the respective forces. Moreover, in not knowing the cause of the forces, the Keplerian cannot even be sure that the orbits of the planets are ellipses. The ellipse is merely his most convenient mathematical model, but it is certainly not the only possible model. Hildegard's system is very unique because she tells us the physical cause of every movement in the system, and it is then our job to apply the mathematics to what we know is the reality, rather than, as Kepler did, create a mathematics for something he did not know was the reality.

We noted previously that in Hildegard's system the planets are propelled around the sun through a system of cosmic eddy currents, which have varying strengths depending on the planet in view. Now we will add a second dimension to the movement of these currents. The currents will periodically accelerate or decelerate because, as Posch says, "the center of gravity of the cyclonic counter-rotation lies in the solar mass, whereas its point of rotation is the Earth."[1092] He further explains that the rotation of the universe is centered on the north-south axis of the Earth, but that the counter-rotation of the sun intersects the north-south axis at an angle of 23.5 degrees. This creates a "rectified current" between the sun and the Earth, which results in an acceleration of the sun, and likewise for the inner planets as opposed to the outer planets. Since there are two opposing currents: (a) the current causing the universe to rotate around the Earth, and (b) the current causing the sun to move against the rotation of the universe; and since these currents pivot off a fixed Earth, there will arise differences in current pressure that will cause periodic acceleration of anything outside the Earth. Calculating the rate of acceleration is rather simple. Using the sine curve we can determine the measure by which any planet will deviate from uniform speed.[1093]



Another factor in these movements is the tilt of the sun. According to Posch's calculations, the sun is at a constant **axial tilt of 2.83º** eastern longitude vis-à-vis the vertical of the ecliptic plane. (In the Copernican theory the sun is tilted at 7.25º but this value does not make any appreciable difference in the movement of the planets). On January 5, as it would be viewed from Earth, the sun's axis is perpendicular to its equator and it has the lowest speed in its orbit. Normally we would think that these changes would begin to occur at the winter solstice on December 21-22, but because of the sun's axial tilt, it is the case that the gyroscopic effect, which in turn produces its angular momentum, gives the sun about an extra two weeks before it reaches its lowest ebb. Once it reaches the lowest speed on January 5, it will immediately begin to accelerate. This acceleration will last until about March 6, and then it will begin to decelerate until about July 7. At this point the sun's axis is once again perpendicular to its equator (as it was on January 5), but this time the axis is tilted 2.83º toward Earth instead of away from it. On July 7 the sun will again accelerate until September 8 and then decelerate until January 5. Incidentally, these fluctuations in speed of the sun in Hildegard's system would equate to the eccentricity of the Earth's orbit in the Copernican system. Quoting Posch's calculations in detail, we read:

[1092] *Das wahre Weltbild*, p. 149. His German reads: "Der Grund liegt darin, weil der Schwerpunkt der zyklonförmigen Gegendrehung in der Sonnenmasse liegt, während ihr Drehpunkt die Erde ist."

[1093] Posch adds that in changing from an elliptical to a sinusoidal acceleration, one must include the necessary conversion factors. Putting the data in dBASE4, he gives the parameters as: k = 360/365.2422 = constant angular speed of the sun; n = 1 = trip meter (in loop per day + 1); exz = eccentricity (starting with a zero value on January 5th); x1 = DtoR(n×k) = average daily increase in radian measure where D to R is degrees to radiant; × = multiplication. The resulting equation is: y = DtoR (exz) × sin (x1) × 180/π.

The acceleration of the sun starts, in each case, after the winter solstice around January 5th and after the summer solstice around July 7 and lasts a quarter of a year each time. The angular momentum, accordingly, amounts to 2/4. Canceled down, this corresponds to the well-known value ½, *i.e.*, 0.5. If we calculate using an angular momentum of ½, we get a yearly period. But if we are more correct and make it 2/4, as it corresponds to reality, then we get the desired semi-annual period. To make it easier, we simply cut the circle (360º) and the circular number (π) in half, whereby we receive the appropriate value of the periodic acceleration (in the Copernican system = eccentricity); Exz = eccentricity • 180/ (π / 2).[1094]

Because the new method yields the acceleration factor (xl) from the daily increase (days × 0.98º), there follows from it the conversion of the elliptical eccentricity (exz) from the residual of the central equation (c) in a daily fraction. To obtain exact values for our starting position (earth/sun), we need to consider the residual speed of the 'run-down phase' as residual acceleration.

Only in this manner are the digits after the decimal point of the beginning value sufficiently exact. Thus, the formula for our docking maneuver must be:

Daily increase x1 = n × 0.985647
Acceleration y = exz × sin(x1)
Daily fraction n = (c/exz) / 0.985467

The n-value contains the daily fraction. Thus we are able to continue calculating seamlessly on a Hildegardian basis with +1 for each following day. The result is astonishingly precise. Of course the ecliptical coordinates still need to be converted to the hourly circle, and the nutation and aberration still need to be factored in. The numbers agree almost exactly to the second with the official astronomical specifications of the celestial yearbook.[1095]
The basis of calculation is a precessional computation that progresses purely mechanically, without including the nutation or aberration.

I took the *true length* of the sun on December 25th as the starting position. The daily value is sufficient for a first approximation. For an exact calculation, it would also be necessary here to determine [ascertain] the daily fraction at the time of the passage of the meridian (if equation of time = 0.000…). All the rest is obtained by the trigonometric functions of the x and y axes, as the formula in the box shows.
Thereby I have proven once more that celestial mechanics is indeed derivable from two counter-rotating circular movements! This process further supplies us with an important indication for the accuracy of the Hildegardian worldview. Why? Because the periodic acceleration phases of the sun begin at exactly the point in time after which its axis passes the zero point. They begin several days after the winter solstice, around January 5th each time, and several days after the summer solstice, around July 7. On these two days, the additional

- angular momentum = zero
- position of the axis = zero

The phase shift of the angular momentum at the winter and summer solstice results from the constant inclination of the sun's axis of about 2.83 degrees.

In this manner the Creator solved the overcoming of the dead point at the turning point in an elegant way. He slightly displaced the sun's axis from the vertical position, whereby the axis lags behind. This leads to its angular momentum not yet having reached the zero value when arriving at its turning point. Thereby the sun overcomes the turning

[1094] *Das Wahre Weltbild*, p. 153.

[1095] *Das Wahre Weltbild*, p. 154.

point with its remaining speed without much effort.

If the sun's axis stood exactly perpendicular to the ecliptic, its angular momentum at the turning point would be zero, and to overcome the dead point additional energy would be necessary. This energy would be supplied at the expense of the sun's orbital speed, which is not, however, according to the mind of the Creator.

A logical corollary of the sun's circular movement is its constant distance to the Earth, of course. If the theoretical solar diameter is produced in celestial yearbooks because people are calculating using Kepler's laws, then one can confidently discard these numbers. The sun always has the same diameter because its distance to the Earth is constant throughout the entire year.

1) dm = DtoR (2.83) true inclination of the sun's axis (in radian measure).
2) b = DtoR (n × k-beg) number of days × 0.98 degrees: true length Dec. 25.
3) es = obliquity of the ecliptic.
4) soX = ATAN (cos(b) × tan(es)) × 180/π is the ecliptical precessional motion.
5) soY = ATAN (cos(b) × tan(dm)) × 180/π is the rotational axis of the sun.
6) soZ = round (soX + soY,1) are the X + Y = position angle of the sun.[1096]

Posch then cites a source showing corroboration with his findings.

One year after my mathematical studies I read in Raum & Zeit Spezial 7 [Space & Time Special 7] a discourse about calculating planetary orbits. Therein the mathematician J. Huber proves that the revolutions of the planets can also be interpreted as a vortex. The entire study appeared in *Mathematische Physikalische Korrespondenz* (no. 144, Institut Dr. Unger, CH-4149 Dornach). We confine ourselves only to the conclusions of the mathematical results, which lead to the following statements:

It is obvious that Einstein's field theory of planetary orbits leads to the same results as Newton's mass theory…that is, the acceleration of gravity is equated with a centripetal acceleration of an orbit. The planetary system, in its action, is comparable to a huge vortex, whose center is located in the central body. Presupposing stable relations, imagine this vortex as divided into individual concentric stream tubes.

If we now keep in mind that the speed of light c, according to $gM = c^2r$, increases as the radius decreases, we can imagine, according to the Bernoulli equation:

$$c^{2/2} + p/p = \text{constant}$$

that, in the same sense, the inner pressure in the stream tubes decreases vis-à-vis the center. This pressure gradient, which points from the inside to the outside, effects a centripetal force on a planet, which corresponds to gravitational force.

It may be interesting in addition to envision the relations of a solid-state vortex, *e.g.*, a rotating disc. Also imagine this vortex to be divided into individual circular discs and take into account that here the speed c with an increasing radius remains a pressure gradient to the outside. As is generally known, this [speed] results in centrifugal forces, which affect every voxel of the disc.

Wherever the centripetal speed gradient of the planetary vortex is locally disturbed through a con-glomeration of matter, *e.g.*, in the form of the planet, a centrifugal force joins the centripetal one, and the stationary orbit of the planet is marked by the fact that the effect of both forces keep the equilibrium for each revolution. This

[1096] *Das Wahre Weltbild*, p. 156.

result suggests that gravity should be looked at as an effect of the quantum of the spin of matter. Apparently the direction of the spin is irrelevant for gravity.

It may be of interest to review the condition c^2r = constant numerically for the solar system some time. This is to happen by means of the specifications in *Meyers Handbuch über das Weltall* [Meyer's Handbook on the Universe] (pp. 179/183).[1097]

Remarkably, there is the strongest agreement between the product of the square of the average [mid-] orbital speed and the large half-axis of the planetary orbits, and the product of the gravitational constant and solar mass.

Planet	**$a \times 10^6$km**	**$v^2 \times a$ km/s**	**$=c^2r$**
Mercury	57.9	47.9	1.3284
Venus	108.2	35.0	1.3254
Earth	149.6	29.8	1.3285
Mars	227.9	24.1	1.3236
Jupiter	778.0	13.1	1.3351
Saturn	1427	9.6	1.3151
Uranus	2870	6.8	1.3270
Neptune	4496	5.4	1.3110
Pluto	5946	4.7	1.3134

Mean value [average] = 1.3231

$gM_{So} = 1.3234 \times 10^{26}$ cm^3/sec^2

($c^2 \times 1$ AE = 1.3444)

In accordance with the present figures, it is possible, consequently, to calculate the planets' orbits without making use of the notion of gravity. This is apparently to be ascribed to the interpretation of the planetary system as a vortex. The question is now whether gravitation in general can be explained as a vortex effect.

[1097] *Das Wahre Weltbild*, p. 157.

Posch makes this note before the author continues:

Thus, based on the present insights, we shall attempt to describe a possible solution to this puzzle. Note: What follows is a mathematical derivation of tangential speeds on a circle. After that it says further:

Applied to the problem at hand, this means that every point of mass which, as hinted at in the mentioned essay, can be understood as the sum of space structure vortexes, exists a potential vortex field, whose axis can occupy any spatial direction. Accordingly, the centripetal force of this vortex field is spherically-symmetrical with the intensity $^1/r^2$, in accordance with the equation of Bernoulli, that is, it is identical with the gravitational force. In other words: The gravitational field can be interpreted generally dynamically as an effect of a space-structure movement, similar to the electrostatic field.[1098]

Keplerian Anomalies

Concluding this section, Posch adds:

And that's exactly what Hildegard says! The result of this mathematical study is entirely in agreement with Hildegard's postulate, according to which the planets move around the sun on the basis of an eddy current. Gravity is a force of the winds. From them flows the potential energy that gives weight to matter and forms and builds gravitational fields. The cyclone impels the planets.

Since in the classical world of Newtonian legalities there is no circular motion that continues on its own, a circular orbit must have a force as its cause. These forces are formulated in Newton's theory of mass, whereas the ingenious gentleman left open where these forces come from.

[1098] *Das Wahre Weltbild*, p. 158

> If, then, the orbiting planets use energy (as our vehicles use fuel), then there arises the question: where do the planets get their impulsion energy? According to the first law of Kepler, the planetary orbit is dependent on the relationship of the potential energy of the planet to its kinetic energy. In other words: the spin is taken from the difference between circle and ellipse, for the sum of potential and kinetic energy is always constant. According to the law of the conservation of angular momentum and energy, the demand for energy is passed back and forth between kinetic and potential energy each time.[1099] In the perihel, E_{kin} has a maximum, E_{pot} a minimum, whereas in the aphel, E_{pot} reaches a peak and E_{kin} a minimum. Strictly speaking, this is not physics but magic, for there is never any mention of energy consumption!
>
> The First and Second Laws of Kepler apparently make our planetary system into a perpetual motion machine, though even this supposition is already prohibited by science. Nevertheless, for thousands of years the planets have been moving around the sun without any weariness and without wearing themselves out. But there is no magic in the skies. Without this cyclone, no planet would revolve around the sun. The energy comes from *it* – and not from the mass – as we have been able to prove mathematically.
>
> Just as a wind turbine only supplies energy if the wind blows constantly, so the energy demand of the universe must be met by a constant supply of energy, *i.e.*, through a continuous blowing of the cosmic winds. Hildegard confirms the constant supply of energy in the universe: "…for the side winds, incessantly, even if mildly, do not stop blowing air" (*Die göttlichen Werke*, 84).
>
> This permanent blowing of the cosmic winds not only makes possible the revolution of the firmament, it also supplies the kinetic energy for the planetary movements, which do not, after all, travel around the sun free of charge. They do not receive their angular momentum reciprocally from the mass, as has been explained hitherto, but through the cyclone. The wind current that flows to it replenishes the constant consumption of energy and keeps the centrifugal and centripetal forces balanced.

Gravitational force must be redefined as vortex force, just as the superrotating disc galaxies show, which cannot be understood either with Newton's or with Einstein's theories of gravity. For the outer regions of the disc galaxies move around their galactic center a lot faster than they could be stabilized with the Newtonian gravitational effect of the inner visible star masses. This behavior can only be explained with vortex systems and their nebula vortex systems. Spiral nebulas in particular, which are very similar to our weather charts, indicate very clearly that there are eddy currents in the universe.[1100]

[1099] *Das Wahre Weltbild*, p. 158.

[1100] *Das Wahre Weltbild*, p. 159.

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