On blackboard:
Scripture, Science.
Copernicus, 1543 (with diagram).

What can we learn about interpreting scripture from the Galileo affair? This is a story everyone has heard of, about which there are many widespread misconceptions, and about which Christians should be well-informed.

Let's imagine we are a group of Cardinals called by the Inquisition (Congregation of the Index) for consultation on the theological issues raised by Galileo. On the basis of our report, the Index will issue its decree.
[This letter is fiction, of course, but it is based on the actual events and on documents in the Vatican archives.]

Put yourselves in the position of these theologians: we have received their education and know all that they know about the world. (But we know nothing that occurred after Feb 20, 1616.)

Apian's cosmic section:
The Aristotelian cosmos was built on common sense:
natural motions of the elements, the movements of the stars and Sun, the face of the Moon.

Its congruence with theology was striking: heaven literally spatial, above us and incorruptible; the sphere of mortality, death and corruption below (and hell in a defined place also).

These verses provided a flash point, but the real obstacle to the new science was the profound synthesis of science, Scripture, and tradition. Most people were unable to untangle these three authorities and consider the Scriptural questions apart from their cosmological convictions.

To this point, the verses establish the stability of the Earth. Now we turn to scriptural proofs of the motion of the Sun.

For the rest of the story see last paragraph of p. 10.

# HOLY CONGREGATION OF THE INDEX
## URGENT BUSINESS | CONFIDENTIAL

Cardinals of the Holy Congregation
Vatican City

February 20, 1616

Most Illustrious Lord Cardinals,

Events of recent months have not caught you unawares, and I am sure that you appreciate the urgency of our situation. With heretics on all sides undermining the Holy Faith with rash and novel ideas, there now comes news that within Tuscany itself the Florentine mathematician Galileo Galilei has been teaching and defending a new system of the world which entails these two propositions:

1. The Earth moves in the heavens; and
2. The Sun is motionless in the center of the world.

These propositions are obviously foolish and absurd according to natural science. Nevertheless, seeing as Galileo continues to defend them, we must join together in the Holy Office to assess whether these propositions are:

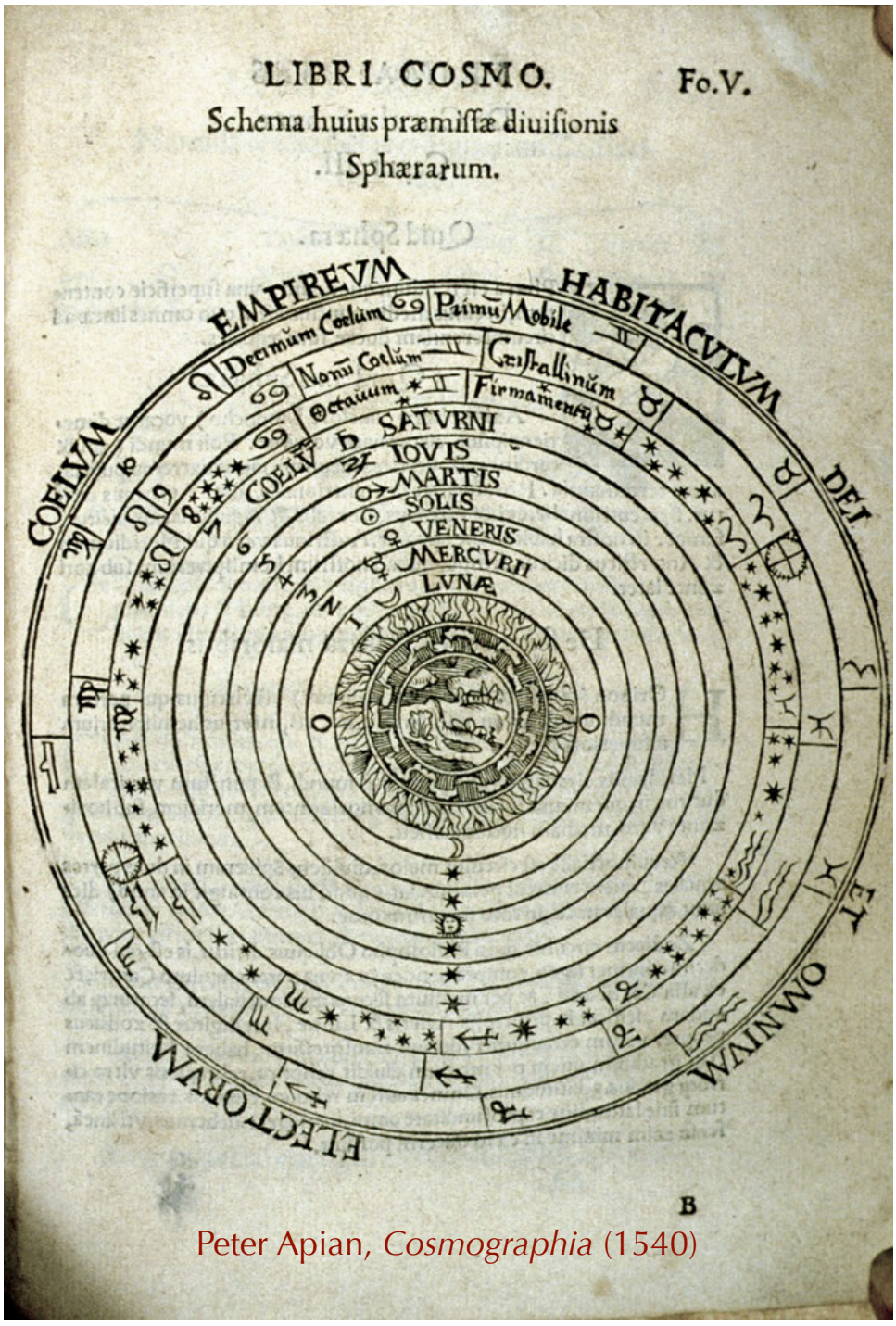
1. Formally heretical; or
2. Erroneous in the faith

They will be formally heretical if they explicitly contradict the sense of Holy Scripture in many places, according to the literal meanings of the words. Or we may conclude a lesser charge, that these propositions are merely erroneous in the faith, contradicting the common interpretation and understanding of the Holy Fathers and the doctors of theology.

You will no doubt wish to consider in your deliberations numerous passages from sacred Scripture which affirm the stability of the Earth and the mobility of the Sun:

> Psalm 93:1. The LORD reigns, He is clothed with majesty; The LORD has clothed and girded Himself with strength; Indeed, the Earth is firmly established, it will not be moved.
>
> Psalm 104:5. He set the Earth on its foundations; it can never be moved.
>
> Ecclesiastes 1:4-5. Generations come and generations go, but the Earth stands forever. The Sun rises and the Sun sets, and hurries back to where it rises.
>
> Ps 19:4-6. In the heavens he has pitched a tent for the Sun, 5 which is like a bridegroom coming forth from his pavilion, like a champion rejoicing to run his course. 6 It rises at one end of the heavens and makes its circuit to the other; nothing is hidden from its heat.
>
> Joshua 10:12-13. On the day the LORD gave the Amorites over to Israel, Joshua said to the LORD in the presence of Israel: "O Sun, stand still over Gibeon, O Moon, over the Valley of Aijalon." 13 So the Sun stood still, and the Moon stopped, till the nation avenged itself on its enemies, as it is written in the Book of Jashar. The Sun stopped in the middle of the sky and delayed going down about a full day.
>
> Isaiah 38:7. "This shall be the sign to you from the LORD, that the LORD will do this thing that He has spoken: 8 "Behold, I will cause the shadow on the stairway, which has gone down with the Sun on the stairway of Ahaz, to go back ten steps." So the Sun's shadow went back ten steps on the stairway on which it had gone down. (cf. 2 Chronicles 32)

Other important questions of interpretation include the locations of heaven and hell. Please draw up your conclusions in a report, and affix your signatures and titles. Deliver the report in person to the Holy Office for a Report of the Father Theologians at 3 p.m. sharp on 24 February 1616. At that time we shall determine the fate of the said Galileo. Take care to uphold the Faith and exercise the duties that have been bestowed upon you in your holy calling. And, of course, until the decree shall be issued by the Holy Office as a result of our deliberations at that meeting, treat this matter with the utmost confidentiality.




Peter Apian, *Cosmographia* (1540)

On board: Scripture, Science. Not a discussion of biblical interpretation in general, just of interpretation of those Scriptures relevant to nature and science. To discuss how to interpret the Bible generally we would emphasize many other themes, such as context, perspicuity, interpreting Scripture by Scripture, the centrality of Christ, etc.

The Bible makes the main points of faith clear. Where it is less clear, there should be charity. We shouldn't major on the minors. We should expect differences of opinion on minor matters. Science = minor.

Analogy of faith – analogous to the general principle that Scripture interprets Scripture. That clear, didactic passages should be used to interpret more obscure ones. Scripture is everywhere equally authoritative, but not everywhere equally clear. The same principle applies to general/special revelation. Steno.

And vice versa, so long as the Scriptures are indubitably clear.

An ancient principle. E.g., John Chrysostom (c. 400), 4th homily on Genesis: notice the "extent of the considerateness of the language to accommodate human limitations."

Idiom example (look up): Does Ps 58:4 prove that snakes have ears that enable them to hear the music played by charmers? No, it's just adopting contemporary idiom. If we use Ps 58:4 to teach the biology of snake anatomy & behavior, we are misinterpreting the passage's accommodation to idiom, bringing our own questions to the text that are foreign to its intended meaning (eisegesis).

Anthropocentrism example: Does God the Father have a right hand? Or other human characteristics... Ps 78:65 depicts God as a drunken man (look up)! Calvin on this verse: "The figure of a drunken man may seem somewhat harsh, but the propriety of using it will appear, when we consider that it is employed in accommodation to the stupidity of the people. Had they been of a pure and clear understanding, God would not have transformed himself, and assumed a character foreign to his own."

# AUGUSTINE ON INTERPRETING THE BIBLE AND SCIENCE


Commentaries on Genesis, particularly "hexamera" or commentaries on the six days of creation, became an important genre of scientific writing through the middle ages and into the 17th century. Augustine himself wrote five different commentaries on the six days: in the *Confessions*, the *City of God*, in a longer work entitled *The Literal Meaning of Genesis*, and two other shorter works. For this reason, we may use Augustine as an example of how Christian theologians were able to engage in open-ended scientific explorations without being bound to particular interpretations of the biblical text. Let's explore just four principles of literal biblical interpretation espoused by Augustine:

**1. Principle of Multiple Interpretations**

Augustine sanctioned natural explanations of biblical events and passages so long as one allowed for the existence of multiple competing hypotheses instead of tying the biblical account to only one physical interpretation:

> "In matters that are obscure and far beyond our vision, even in such as we may find treated in Holy Scripture, different interpretations are sometimes possible without prejudice to the faith we have received. In such a case, we should not rush in headlong and so firmly take our stand on one side that, if further progress in the search of truth justly undermines this position, we too fall with it. That would be to battle not for the teaching of Holy Scripture but for our own, wishing its teaching to conform to ours, whereas we ought to wish ours to conform to that of Sacred Scripture." *Literal Meaning of Genesis*, Bk. I, ch. 18; 1:41; cf. Bk. I, ch. 19; 1:41-42.

Augustine consistently offered physical interpretations provisionally, and suggested alternative possibilities whenever possible.

**2. Principle of the Unity of Truth**

Augustine assumed a unity of truth, whether learned from Scripture or from nature. This means that both Scripture and nature are of equal authority, and must be interpreted so that they are in agreement. Where the Bible states propositions of possible relevance to natural science, these must be interpreted consistently with natural knowledge. Because the two books of nature and Scripture share the same divine author, they may not be read with conflicting interpretations. Augustine cautioned that when defending a possible interpretation

> "we should always observe that restraint that is proper to a devout and serious person and on an obscure question entertain no rash belief. Otherwise, if the evidence later reveals the explanation, we are likely to despise it because of our attachment to our error, even though this explanation may not be in any way opposed to the sacred writings...." *Literal Meaning of Genesis*, Bk. II, ch. 18; 1:73.

Galileo quoted Augustine when he explained that Scripture never errs, but its interpreters do.

**3. Principle of Accommodation**

Accommodation means that the language of the Bible was written to communicate what is necessary for salvation in a way that could be understood by ordinary people without expert knowledge. There are several ways that Scriptures are accommodated to common human understanding, including the use of idiom appropriated from the target culture (but stripped of any idolatrous connotations), the use of anthropomorphic descriptions of God, and the principle of phenomenalism (discussed next).

Augustine taught that the language of Scripture was accommodated to the understanding of ordinary readers and therefore not well-suited to teach the theories of natural science. Concerned that some might jeopardize the credibility of Scripture by misconstruing its physical statements, Augustine warned that "in the matter of the shape of heaven the sacred writers knew the truth, but that the Spirit of God, who spoke through them, did not wish to teach men these facts that would be of no avail for their salvation." *Literal Meaning of Genesis*, Bk. II, ch. 9; 1:59.

Accommodation has been a part of traditional theological vocabulary, but perhaps it is not the best word to choose today, because most people when hearing "accommodation" think of "compromise," which is not its traditional meaning in theology. There is no dilution of truth; rather, accommodation refers to the kind of language employed in order to communicate truth and make it intelligible to the widest possible audience.

In Cicero and ancient rhetorical manuals, "accommodare" meant to adapt one's language to be better understood by an intended audience for a specific purpose.

In parenting, how do we accommodate our speech to small children in order to communicate the truth in a way they can understand?

The same is true for how God speaks to us, for we are children in many ways.

The Holy Spirit would rather speak childishly than unintelligibly to the humble and unlearned.

Avoid books with titles like "The Bible Code."

The principle of phenomenalism is a specific application of the principle of the perspicuity of Scripture.

Example of Weather.
Psalm 147:15-18: "He sends his command to the earth; his word runs swiftly. He spreads the snow like wool and scatters the frost like ashes. He hurls down his hail like pebbles. Who can withstand his icy blast? He sends his word and melts them; he stirs up his breezes, and the waters flow." This does not discourage the attempt to study meteorology, but it has no relevance for evaluating competing theories of how storms work.

Do they address the weight of science? Yes, #1 and #2.

Do they instill discipline and restraint in interpreting the scientific implications of specific scriptural passages? Yes, #3 and #4.

What accommodation does *not* mean: In the 20th century some writers began to use the word "accommodation" to imply that Scripture may contain falsehoods mistakenly accepted by its original hearers; this is not the traditional meaning of this principle. Rather, the principle of accommodation does not suggest that physical statements in Scripture are false, but that their language is not scientific or technical. As Isaac Newton expressed it, Scripture is "neither philosophical nor feigned," that is, neither scientific nor false. There is a third option, and that is that Scripture is accommodated to human understanding in a way that remains true while being couched in colloquial language that is well-suited for addressing the human need of salvation.

**4. Principle of Phenomenalism**

The word *phenomena* means "appearances," how nature appears to our senses, in contrast to *theories*, which are explanations involving hidden causes. The principle of "phenomenalism" is one kind of accommodation. According to the principle of phenomenalism, the original writers of Scripture accommodated their physical statements to the capacities of ordinary people by simply describing sensible phenomena as they would appear to any observer. Therefore physical references in Scripture should be interpreted whenever possible as entailing only those things that are immediately obvious to the senses. The principle of phenomenalism means that the writers adapted Scripture to refer to obvious phenomena in a common-sense manner, and avoided entangling themselves in distracting debates by alluding to hidden causes or bits of secret knowledge that would only confuse the general reader in any culture.

Example 1: Two Great Lights
**Genesis 1:16** refers to the creation of the "two great lights -- the greater light to govern the day and the lesser light to govern the night. He also made the stars." Does this teach that the Moon is larger than the stars, since the stars are not among the "great lights"? On the basis of the science of the time, Augustine suspected that the stars were indeed small enough to be set in diurnal rotation by the rays of the Sun, but nevertheless he insisted that this verse teaches nothing about the Moon's actual size and therefore should not be read as a confirmation of contemporaneous scientific theories. Rather, adopting a disciplined principle of phenomenalism, Augustine affirmed that it only referred to the relative appearance of the Moon and stars to the eye. Through phenomenalism, the biblical writers sidestepped scientific issues that would entangle biblical interpretation in needless controversies. *Literal Meaning of Genesis*, Bk 2, ch. 16, 1:69-71.

Example 2: Shape of the Earth
Does the alternation of day and night in **Genesis 1** contradict the sphericity of the Earth? The question arose because the hypothesis of a spherical Earth requires that day and night do not in fact alternate in a strict sense, but exist opposite each other on the globe continuously and simultaneously. Augustine denied that the language of Scripture was relevant for the shape of the Earth because the alternating day and night were described from the perspective of an observer at a specific location on the surface of the globe. Therefore Scripture has no relevance to discussion of the shape of the Earth. (By the way, this commentary is one of the clearest places where Augustine affirmed the sphericity of the globe as taught by the science of his day.) *Literal Meaning of Genesis*, Bk 1, ch. 12, 1:33.

Shape of the Earth video: http://kerrysloft.com (search for "Shape of the Earth")

Phenomenalist descriptions reflect how things appear to the human eye, with no implications for how they might be explained according to their hidden causes. Thus phenomenalist interpretations of the literal meaning of physical statements in Scripture render them of little or no use in assessing theoretical explanations in natural science. The providence or action of God is the only explanation the language of phenomenalism needs.

**5. Review: A later example of these principles of biblical interpretation:**

"Since this theory can be seen to be false by solid arguments, it should not be maintained that it is the sense of this Scriptural text [*unity of truth*]. Take into account, rather, that Moses was speaking to ignorant people and out of condescension to their simpleness [*accommodation*] presented to them only those things that are immediately obvious to the senses [*phenomenalism*]."

Thomas Aquinas, *Summa Theologiae*, Ia. 68, 3; vol. 10, p. 85.

**6. Do these principles enable us to reinterpret the verses cited above, in the Letter to the Cardinals, so that they need not contradict a moving Earth and a central Sun?**

Although the relations between the history of science and biblical interpretation are complex, these four principles (multiple possible interpretations, unity of truth, accommodation, phenomenalism), and important variations in when and how they were applied, provided more versatile resources for future scientists to adapt literal interpretations of Scripture to new physical interpretations than is often recognized.

# CALVIN, NEWTON & OTHER WRITERS

These principles were not obscure, but were routinely discussed and appreciated, both by theologians and by natural scientists from the church fathers to the Galileo affair.

Accommodation

Phenomenalism

Calvin emphasized the principle of accommodation as a general description of God's relation to us in both creation and redemption.

For example, the Incarnation itself is the supreme instance of accommodation: "it is evident that we cannot believe in God except through Christ, in whom God in a manner makes himself little, that he might accommodate himself to our comprehension...."

Think of this past year's Christmas season; Isn't it wonderful that God made the work of redemption a joyous story that any child can understand?

Accommodation.

Calvin's definition of accommodation:
"Now the mode of accommodation is for him to represent himself to us not as he is in himself [which is unknowable] but as he seems to us."

Phenomenalism

Accommodation

Phenomenalism

Each quotation illustrates at least one of the following principles of interpreting biblical statements of relevance to natural science: **Multiple Interpretations, Unity of Truth, Accommodation, Phenomenalism**. Which principles are most evident in each case?

1. "This is my explanation, unless someone can propose an interpretation that is clearer and more in keeping with the text." Augustine, *Literal Meaning of Genesis*, Bk. V, ch. 5; 1:155-156.

2. "But Moses makes a distinction and calls the Sun and the Moon the larger lights. The fact that astronomers debate the size of these bodies really has nothing to do with this passage.... for the astronomers are the experts from whom it is most convenient to get what may be discussed about these subjects...." Martin Luther, *Commentary on Genesis*

3. "The Holy Spirit had no intention to teach astronomy; and in proposing instruction meant to be common to the simplest and most uneducated person, he made use by Moses and the other prophets of the popular language, that none might shelter himself under the pretext of obscurity." Jean Calvin, *Commentary on Genesis* (also in following quotes)

4. "This is a certain principle, that nothing is here treated of but the visible form of the world. He who would learn astronomy, and other recondite arts, let him go elsewhere. Here the Spirit of God would teach all men without exception..." "It must be remembered, that Moses does not speak with philosophical acuteness on hidden mysteries, but relates those things which are everywhere observed, even by the uncultivated, and which are in common use." "It is well again to repeat what I have said before, that it is not here scientifically discussed, how great the Sun is in heaven, and how great, or how little, is the Moon... For Moses here addresses himself to our senses... For as it became a theologian, he had respect to us rather than to the stars. Nor, in truth, was Moses ignorant of the fact, that the Moon had not sufficient brightness to enlighten the Earth, unless it borrowed from the Sun; but he deemed it enough to declare what we all may plainly perceive, that the Moon is a dispenser of light to us. That it is, as the astronomers assert, an opaque body, I allow to be true... " Calvin

5. "Moses makes two great lights; but astronomers prove, by conclusive reasons, that Saturn, which on account of its great distance appears least of all, is actually greater than the Moon. Here lies the difference: Moses wrote in a popular style of things which, without instruction, all ordinary persons, endued with common sense, are able to understand; but astronomers investigate with great labor whatever the sagacity of the human mind can comprehend... The Spirit of God here opens a common school for all..." Calvin

6. "In treating of Moses' doctrine, one must take diligent care to completely avoid holding and saying positively and categorically anything which contradicts the decisive observations and reasons of natural science or other disciplines; in fact, since all truths always agree with one another, the truth of Holy Scripture cannot be contrary to the true reasons and observations of human doctrines." Pererius, *On Genesis*, quoted by Galileo, *Letter to the Grand Duchess Christina* (1615).

7. "The distinctions of the various days by the light of the heavens, as described in Sacred Scripture, ought not to be understood absolutely as in itself and as in nature, but only in respect to the Earth and to us who inhabit it, and thus in respect to us. Hence there is nothing new or unusual in saying that Sacred Scripture speaks of things in respect to us, in relation only to us, and according to appearances, and not according to things themselves and according to nature." Paolo Antonio Foscarini, letter in defense of Galileo, trans. Richard Blackwell, *Galileo, Bellarmine and the Bible* (Notre Dame, 1991).

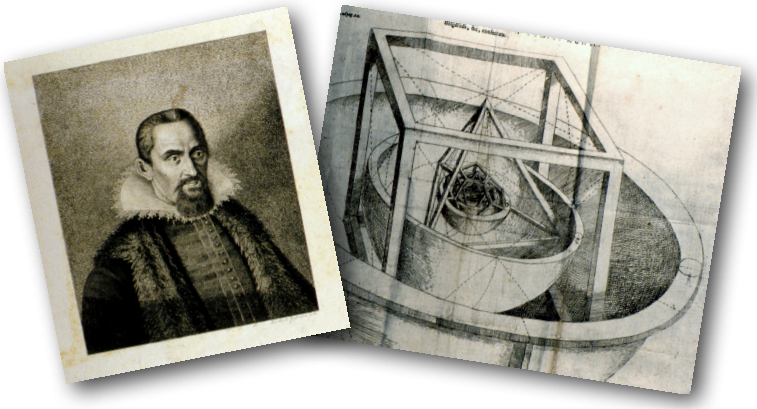
8. "Truth cannot be an enemy to Truth, God is not divided against himself." Thomas Burnet, *Theory of the Earth* (1684), p. 16.

9. "As to Moses, I do not think his description of ye creation either philosophical or feigned, but that he described realities in a language artificially adapted to ye sense of ye vulgar. Thus when he speaks of two great lights, I suppose he means their apparent not real greatness. So when he tells us God placed these lights in ye firmament, he speaks I suppose of their apparent not real place, his business being, not to correct the vulgar notions in matters philosophical, but to adapt a description of the creation as handsomely as he could to ye sense and capacity of ye vulgar. So when he tells us of two great lights and ye stars made ye fourth day, I do not think their creation from beginning to end was done the fourth day nor in any one day of ye creation, nor that Moses mentions their creation, as they were physical bodies in themselves, some of them greater than this Earth, and perhaps habitable worlds, but only as they were lights to this Earth...."
Isaac Newton, letter to Thomas Burnet, reprinted as Appendix VI in David Brewster, *Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton* (Edinburgh, 1855), vol. 2, pp. 447-454; quotation on p. 450.

*Answers:* Multiple Interpretations: 1. Unity of Truth: 2, 4, 5, 6, 8. Accommodation: 2, 3, 4, 5, 7, 9. Phenomenalism: 2, 3, 4, 7, 9.

# JOHANN KEPLER, ASTRONOMIA NOVA (1609)

## EXPLANATION OF THE PRINCIPLE OF PHENOMENALISM



Kepler was not only the most innovative and original astronomer of the scientific revolution, in the opinion of most historians, but also a devout Protestant.

These excerpts from the foreword of his Astronomia nova offered an articulate application of traditional Augustinian and Reformed principles of interpreting Scripture to the Copernican controversies.

Clearly shows how the principle of phenomenalism resolves all objections to a moving Earth and a central Sun that were posed by the verses examined on p. 1 above.

Widely influential.

The only portion of any of Kepler's writings to be translated into English in the 1600's.

Here to limit its length I have deleted portions of the essay, without showing ellipses. To read the entire discussion, see the online url.

[The following excerpts are from *Johannes Kepler's New Astronomy,* trans. William Donohue (Cambridge University Press, 1992); or read it online at http://hos.ou.edu/galleries/.]

There are, however, many more people who are moved by piety to withhold assent form Copernicus, fearing that falsehood might be charged against the Holy Spirit speaking in the Scriptures if we say that the Earth is moved and the Sun stands still. But let them consider that since we acquire most of our information, both in quality and quantity, through the sense of sight, it is impossible for us to abstract our speech from this ocular sense. Thus, many times each day we speak in accordance with the sense of sight, although we are quite certain that the truth of the matter is otherwise. This verse of Virgil furnishes an example: 'We are carried from the port, and the land and cities recede.' Thus, when we emerge form the narrow part of some valley, we say that a great plain is opening itself out before us... Thus, we call the rising and setting of the stars 'ascent' and 'descent,' though at the same time that we say the Sun ascends, others say it descends.

Now the holy Scriptures, too, when treating common things (concerning which it is not their purpose to instruct humanity), speak with humans in the human manner, in order to be understood by them. They make use of what is generally acknowledged, in order to weave in other things more lofty and divine.

Accommodation

No wonder, then, if Scripture also speaks in accordance with human perception when the truth of things is at odds with the senses, whether or not humans are aware of this. Who is unaware that the allusion in **Psalm 19** is poetical? Here, under the image of the Sun, are Sung the spreading of the Gospel and even the sojourn of Christ the Lord in this world on our behalf, and in the singing the Sun is said to emerge from the tabernacle of the horizon like a bridegroom from his marriage bed, exuberant as a strong man for the race. Which Virgil imitates thus: 'Aurora leaving Tithonus's saffron-coloured bed...' (The Hebrew poetry was, of course, earlier.) The psalmodist was aware that the Sun does not go forth from the horizon as from a tabernacle (even though it may appear so to the eyes). On the other hand, he considered the Sun to move for the precise reason that it appears so to the eyes. In either case, he expressed it so because in either case it appeared so to the eyes. He should not be judged to have spoken falsely in either case, for the perception of the eyes also has its truth, well suited to the psalmodist's more hidden aim, the adumbration of the Gospel and also of the Son of God.

Phenomenalism

A third way: truth accommodated is still truth, not error. As Newton said, "neither philosophical nor feigned."

Likewise, **Joshua** makes mention of the valleys against which the Sun and Moon moved, because when he was at the Jordan it appeared so to him. Yet each writer was in perfect control of his meaning. David was describing the magnificence of God made manifest (and Syracides with him), which he expressed so as to exhibit them to the eyes, and possibly also for the sake of a mystical sense spelled out through these visible things. Joshua meant that the Sun should be held back in its place in the middle of the sky for an entire day with respect to the sense of his eyes since for other people during the same interval of time it would remain beneath the Earth.

Accommodation acknowledges the distinction between the form of language used in these two contexts.

But thoughtless persons pay attention only to the verbal contradiction, 'the Sun stood still' versus 'the Earth stood still,' not considering that this contradiction can only arise in an optical and astronomical context, and does not carry over into common usage. Nor are these thoughtless ones willing to see that Joshua was simply praying that the mountains not remove the Sunlight from him, which prayer he expressed in words conforming to the sense of sight, as it would be quite inappropriate to think, at that moment, of astronomy and of visual errors. For if someone had admonished him that the Sun doesn't really move against the valley of Ajalon, but only appears to do so, wouldn't Joshua have exclaimed that he only asked for the day to be lengthened, however that might be done? He would therefore have replied in the same way if anyone had begun to present him with arguments for the Sun's perpetual rest and the Earth's motion.

Now God easily understood from Joshua's words what he meant, and responded by stopping the motion of the Earth, so that the Sun might appear to him to stop. For the gist of Joshua's petition comes to this, that it might appear so to him, whatever the reality might meanwhile be. Indeed, that this appearance should come about was not vain and purposeless, but quite conjoined with the desired effect.

What absolutely all men imagine, the first line of holy Scripture presents. 'In the beginning,' says Moses, 'God created the heaven and the Earth,' because it is these two parts that chiefly present themselves to the sense of sight. It is as though Moses were to say to man, 'This whole worldly edifice that you see, light above and dark and widely spread out below, upon which you are standing and by which you are roofed over, has been created by God.'

Suppose someone were to assert, from **Psalm 24**, that the Earth is founded upon rivers, in order to support the novel and absurd philosophical conclusion that the Earth floats upon rivers. Would it not be correct to say to him that he should regard the Holy Spirit as a divine messenger, and refrain from wantonly dragging Him into physics class? For in that passage the psalmodist intends nothing but what men already know and experience daily, namely, that the land, raised on high after the separation of the waters, has great rivers flowing through it and seas surrounding it. Not surprisingly, the same figure of speech is adopted in another passage, where the Israelites sing that they were seated upon the waters of Babylon, that is by the riverside, or on the banks of the Euphrates and Tigris.

If this be easily accepted, why can it not also be accepted that in other passages usually cited in opposition to the Earth's motion we should likewise turn our eyes from physics to the aims of Scripture?

A generation passes away (says **Ecclesiastes**), and a generation comes, but the Earth stands forever. Does it seem here as if Solomon wanted to argue with the astronomers? No; rather, he wanted to warn men of their own mutability, while the Earth, home of the human race, remains always the same, the motion of the Sun perpetually returns to the same place, the wind blows in a circle and returns to its starting point, rivers flow from their sources into the sea, and from the sea return to the sources, and finally, as these then perish, others are born. Life's tale is ever the same; there is nothing new under the Sun.

Accommodation

Phenomenalism

You do not hear any physical dogma here. The message is a moral one, concerning something self-evident and seen by all eyes but seldom pondered. Solomon therefore urges us to ponder. Who is unaware that the Earth is always the same? Who does not see the Sun return daily to its place of rising, rivers perennially flowing towards the sea, the winds returning in regular alternation, and men succeeding one another? But who really considers that the same drama of life is always being played, only with different characters, and that not a single thing in human affairs is new? So Solomon, by mentioning what is evident to all, warns of that which almost everyone wrongly neglects.

It is said, however, that **Psalm 104**, in its entirety, is a physical discussion, since the whole of it is concerned with physical matters. And in it, God is said to have 'founded the Earth upon its stability, that it not be laid low unto the ages of ages.' But in fact, nothing could be farther from the psalmodist's intention than speculation about physical causes. For the whole thing is an exultation upon the greatness of God, who made all these things: the author has composed a hymn to God the creator, in which he treats the world in order, as it appears to the eyes.

If you consider carefully, you will see that it is a commentary upon the six days of creation in Genesis. For in the latter, the first three days are given to the separation of the regions: first, the region of light from the exterior darkness; second, the waters from the waters by the interposition of an extended region; and third, the land from the seas, where the Earth is clothed with plants and shrubs. The last three days, on the other hand, are devoted to the filling of the regions so distinguished: the fourth, of the heavens; the fifth, of the seas and the air; and the sixth, of the land. And in this psalm there are likewise the same number of distinct parts, analogous to the works of the six days. In the second verse, he enfolds the Creator with the vestment of light, first of created things, and the work of the first day. The second part begins with the third verse, and concerns the waters above the heavens, the extended region of the heavens, and atmospheric phenomena that the psalmodist ascribes to the waters above the heavens, namely, clouds, winds, tornadoes, and lightning. The third part begins with the sixth verse, and celebrates the Earth as

the foundation of the things being considered. The psalmodist relates everything to the Earth and to the things that live on it, because, in the judgement of sight, the chief parts of the world are two: Heaven and Earth. He therefore considers that from so many ages now the Earth has neither sunk nor cracked apart nor tumbled down, yet no one has certain knowledge of what it is founded upon.

Purpose of Scripture not to teach hidden scientific causes. (Accommodation)

He does not wish to teach things of which men are ignorant, but to recall to mind something they neglect, namely, God's greatness and potency in a creation of such magnitude, so solid and stable. If an astronomer teaches that the Earth is carried through the heavens, he is not spurning what the psalmodist says here, nor does he contradict human experience. For it is still true that the land, the work of God the architect, has not toppled as our buildings usually do, consumed by age and rot; that it has not slumped to one side; that the dwelling places of living things have not been set in disarray; that the mountains and coasts have stood firm, unmoved against the blast of wind and wave, as they were from the beginning. And then the psalmodist adds a beautiful sketch of the separation of the waters by the continents, and adorns his account by adding springs and the amenities that springs and crags provide for bird and beast. He also does not fail to mention the adorning of the Earth's surface, included by Moses among the works of the third day, although the psalmodist derives it from its prior cause, namely a humidification arising in the heavens, and embellishes his account by bringing to mind the benefits accruing from that adornment for the nurture and pleasure of humans and for the lairs of the beasts.

The fourth part begins with verse 20, and celebrates the work of the fourth day, the Sun and the Moon, but chiefly the benefit that the division of times brings to humans and other living things. It is this benefit that is his subject matter: it is clear that he is not writing as an astronomer here. If he were, he would not fail to mention the five planets, than whose motion nothing is more admirable, nothing more beautiful, and nothing a better witness to the Creator's wisdom, for those who take note of it.

The fifth part, in verse 26, concerns the work of the fifth day, where he fills the sea with fish and ornaments it with sea voyages. The sixth is added, though obscurely, in verse 28, and concerns the animals living on land, created on the sixth day. At the end, in conclusion, he declares the general goodness of God in sustaining all things and creating new things. So everything the psalmodist said of the world relates to living things. He tells nothing that is not generally acknowledged, because his purpose was to praise things that are known, not to seek out the unknown. It was his wish to invite men to consider the benefits accruing to them from each of these works of the six days.

Accommodation

I, too, implore my reader, when he departs from the temple and enters astronomical studies, not to forget the divine goodness conferred upon men, to the consideration of which the psalmodist chiefly invites. I hope that, with me, he will praise and celebrate the Creator's wisdom and greatness, which I unfold for him in the more perspicacious explanation of the world's form, the investigation of causes, and the detection of errors of vision. Let him not only extol the Creator's divine beneficence in His concern for the well-being of all living things, expressed in the firmness and stability of the Earth, but also acknowledge His wisdom expressed in its motion, at once so well hidden and so admirable.

But whoever is too stupid to understand astronomical science, or too weak to believe Copernicus without affecting his faith, I would advise him that, having dismissed astronomical studies and having damned whatever philosophical opinions he pleases, he mind his own business and betake himself home to scratch in his own dirt patch, abandoning this wandering about the world. He should raise his eyes (his only means of vision) to this visible heaven and with his whole heart burst forth in giving thanks and praising God the Creator. He can be sure that he worships God no less than the astronomer, to whom God has granted the more penetrating vision of the mind's eye, and an ability and desire to celebrate his God above those things he has discovered.

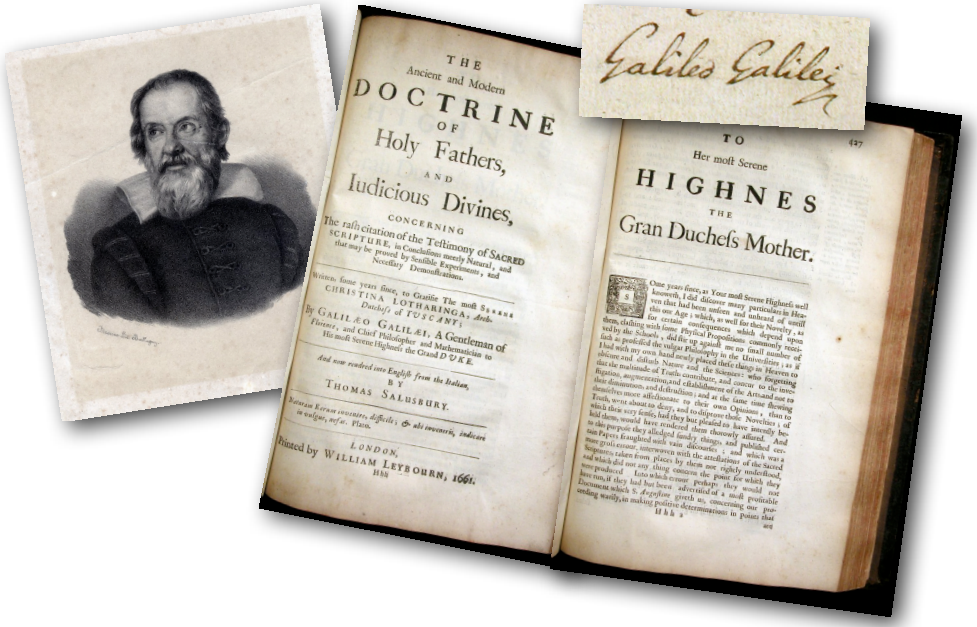
Lest we cause others to stumble.

At this point, a modest (though not too modest) commendation to the learned should be made on behalf of Brahe's opinion of the form of the world, since in a way it follows a middle path. On the one hand, it frees the astronomers as much as possible from the useless apparatus of so many epicycles and, with Copernicus, it includes the causes of motion, unknown to Ptolemy, giving some place to physical theory in accepting the Sun as the centre of the planetary system. And on the other hand, it serves the mob of literalists and eliminates the motion of the Earth, so hard to believe, although many difficulties are thereby insinuated into the theories of the planets in astronomical discussions and demonstrations, and the physics of the heavens is no less disturbed.

So much for the authority of holy Scripture. As for the opinions of the pious on these matters of nature, I have just one thing to say: while in theology it is authority that carries the most weight, in philosophy it is reason. Therefore, Lactantius is pious, who, though admitting the roundness, denied the antipodes, and the Inquisition nowadays is pious, which, though allowing the Earth's smallness, denies its motion. To me, however, the truth is more pious still, and (with all due respect for the Doctors of the Church) I prove philosophically not only that the Earth is round, not only that it is inhabited all the way around at the antipodes, not only that it is contemptibly small, but also that it is carried along among the stars.

Unity of truth

# GALILEO, LETTER TO THE GRAND DUCHESS CHRISTINA (1615)




From his early years as a university professor in Venice, Galileo had courted the patronage of the young Grand Duke of Tuscany, Cosimo Medici II. Cosimo was wealthy enough to be able to bring Galileo to his own court at Florence, and to relieve him of teaching and other tiresome and distracting duties. Later Galileo heard that Cosimo's mother, the Grand Duchess Christina, had become troubled by apparent conflicts between Copernicanism and the Bible. Galileo responded with his masterful letter of 1615, a thorough statement of his views on the relations between science and religion. Galileo's "Letter to the Grand Duchess Christina" (hereafter LGDC) is translated in Maurice A. Finocchiaro, ed., *The Galileo Affair: A Documentary History* (Berkeley: University of California Press, 1989), or read it online at http://hos.ou.edu/galleries/.

Background video on the life and works of Galileo: http://kerrysloft.com (search for Galileo)

Galileo agreed that read rightly, Scripture and Science will never conflict (there is a unity of truth). That which is obscure (figurative language) should be explained by that which is clear (mathematical demonstrations). Galileo affirmed that "the Holy Scripture can never lie or err, and that its declarations are absolutely and inviolably true." He continued, however, that "though the Scriptures cannot err, nevertheless some of its interpreters and expositors can sometimes err in various ways." Contrary to myth, Galileo was not a rationalist scientist opposed to religious faith, but ultimately a loyal member of the Catholic Church who did not want to see the Church make a mistake in rashly discounting Copernicanism. Galileo was hostile neither to Christianity nor to Scripture; he rather felt himself personally called to prevent Roman Catholicism from committing itself on scientific matters, and thus putting itself in a position where demonstrated scientific results might undermine the Church's over-extended authority. Had he been less devout he could have returned to Venice, a republic which had repudiated the Pope's authority and was offering him asylum.

Galileo defended Copernicanism by arguing that the language of the Bible was irrelevant to the motion of the Earth or the immobility of the Sun. To show the traditional basis of his approach, Galileo cited Augustine throughout.

The principle of accommodation is evident in the following quotation, which concludes with an affirmation of the unity of truth:

- "...for one would have to attribute to God feet, hands, eyes and bodily sensations, as well as human feelings like anger, contrition, and hatred, and such conditions as the forgetfulness of things past and the ignorance of future ones. Since these propositions dictated by the Holy Spirit were expressed by the sacred writers in such a way as to accommodate the capacities

of the very unrefined and undisciplined masses, for those who deserve to rise above the common people it is therefore necessary that wise interpreters formulate the true meaning and indicate the specific reasons why it is expressed by such words. This doctrine is so commonplace and so definite among all theologians that it would be superfluous to present any testimony for it. From this I think one can very reasonably deduce that, whenever the same Holy Scripture has seen fit to assert any physical conclusion (especially on matters that are abstruse and difficult to understand), it has followed the same rule, in order not to sow confusion into the minds of the common people and make them more obstinate against dogmas involving higher mysteries.... Therefore in disputes about natural phenomena one must begin not with the authority of scriptural passages but with sensory experience and necessary demonstrations. For the Holy Scripture and nature derive equally from the Godhead, the former as the dictation of the Holy Spirit and the latter as the most obedient executrix of God's orders...." LGDC

In other words, the language of Scripture is true but also accommodated to common human understanding. The language of nature (e.g., mathematics) is not accommodated, and therefore it is not commonly understood.

Galileo suggested that theologians actually undermined the authority of Scripture by equating the authority of their interpretations with that of Scripture itself:

- "They showed greater affection for their own opinions than for the true ones; thus they proceeded to deny and to try to nullify those novelties, about which the senses themselves could have rendered them certain, if they had wanted to look at those novelties carefully. To this end they... published some writings full of useless discussions and sprinkled with quotations from the Holy Scripture, taken from passages which they do not properly understand and which they inappropriately adduce. This was a very serious error, and they might not have fallen into it had they paid attention to St. Augustine's very useful advice concerning how to proceed with care in reaching definite decisions about matters which are obscure and difficult to understand by means of reason alone. For, speaking also about a particular physical conclusion pertaining to heavenly bodies, he writes this: 'Now then, always practicing a pious and serious moderation, we ought not to believe anything lightly about an obscure subject, lest we reject (out of love for our error) something which later may be truly shown not to be in any way contrary to the holy books of either the Old or New Testament.'" Galileo, LGDC

After extensive quotations from Augustine, Galileo noted the catchy phrase of Cardinal Baronius: "The intention of the Holy Ghost is to teach us how to go to heaven, not how the heavens go."

But in the midst of the controversy Galileo could not resist the temptation to beat those who approached the Bible as a "scientific textbook" at their own game. Toward the end of the letter to Christina, Galileo took up the story recorded in Joshua 10 where the Sun stood still in the sky. Pluckily, Galileo demonstrated that the Ptolemaic system itself could not account for the Scriptural language of this event, for the ceasing of the proper motion of the Sun according to the traditional view would actually shorten the day rather than lengthen it. The theologians had not learned even their own astronomy, after all. Turning their interpretation on its head, Galileo showed that this chapter in fact agreed exquisitely with the Copernican view, for Joshua had commanded the Sun to stand still in the *middle* (that is, the center) of the heavens!

It was a hollow victory, as events were to show. And by adopting a "scientific textbook" hermeneutic, Galileo himself gave the theologians grounds on which to oppose him. We may still profit by remembering Galileo's lesson, and so accommodate the sense of Scripture to immediate perception or common usage, taking care that we do not claim a superfluous meaning for a Biblical passage. For in that case we would both distract ourselves from the intended meaning of the text and substitute the authority of our own interpretation for the Word of God.

While professional theologians at the time were not impressed by a mathematician trying his hand at amateur interpretation, Galileo actually did biblical interpretation better than the theologians did physics. Pope John Paul II used Galilean language to affirm similar hermeneutical principles in 1992. However, John Paul II did not follow Galileo so far as to imply that Scripture could be used to prove Copernicanism, the weakest and most provocative part of Galileo's letter.

Meanwhile, Inquisition proceedings continued. On February 24th, eleven consultants met in the Vatican to consider two propositions: that the Sun is the center of the world; and that the Earth is not at the center of the world, nor motionless. Both propositions, these theologians agreed, were foolish and absurd according to science. Moreover, they concluded, according to the Faith the first is heretical and the second is, at least erroneous. However, the consultants' views were not official or binding. Cardinal Orsini, Cardinal Caetani and Cardinal Bellarmine, among others, did not wish to create a public spectacle at the expense of the Grand Duke's mathematician. Cardinal Maffeo Barbarini defended Galileo's Letter to the Grand Duchess Christina before Pope Paul V, and as a result the decree actually issued by the Congregation of the Index stopped short of censuring Galileo or prohibiting any of his works. Nor did it declare Copernicanism "heretical" or "erroneous in the Faith." But the *De revolutionibus* of Copernicus would be added to the *Index of Prohibited Books* until it could be corrected.

On board:
Scripture
Science
*Tradition

Explain role of Council of Trent in blocking the application of the four principles to the case of Galileo.

Trent: Authority of precedent, and previous interpretations of Scripture, equated to authority of Scripture itself.

Counter-Reformation: polemical context that was not present earlier, when Copernicus first published his work, but by 1600 had hardened positions, polarized discussion, and created an atmosphere of fear and distrust. Circling of the wagons. Copernicanism was mixed up with (and became associated with) Protestantism as an unwanted novelty.

Catholics involved in the Galileo affair had all the resources they needed for interpreting Scripture as allowing the Earth to be in motion, but they tragically erred because of the weight of long theological tradition, and because of their confidence in their synthesis of common sense science and the Bible. The same was true of many Reformed Christians as well as Catholics (e.g., John Owen, Francis Turretin).

But there was nothing necessary or inevitable about the Galileo affair. It easily could have been avoided.