

# *McMullin, Galileo, and Scripture*

with Ernan McMullin, "Galileo's Theological Venture"; and George V. Coyne, SJ, "Science Meets Biblical Exegesis in the Galileo Affair"

## GALILEO'S THEOLOGICAL VENTURE

by *Ernan McMullin*

*Abstract.* In this essay, I will lay out first in some detail the exegetical principles implicit in Augustine's treatment of an early apparent conflict between Scripture and the findings of "sense or reason." Then I will analyze Galileo's two major discussions of the issue, first in his *Letter to Castelli*, and then in his *Letter to the Grand Duchess*, touching on Foscarini's ill-fated *Letter* in between. I will turn then to an internal tension that many commentators have perceived within the exegetic principles that Galileo deploys in meeting the theological challenge to Copernicanism. The tension was, broadly speaking, between two rather different strategies for dealing with that challenge. According to the more radical choice, the strategy would be to deny the relevance of Scripture to our knowledge of the natural world. The more conservative strategy would be to allow that the authority of divine revelation extended to passages in Scripture describing features of the natural world but also to admit that where this description clashed with something that could be demonstrated through "sense or reason," an alternative to the literal, everyday, meaning of the Scripture passage should be sought. This latter proviso would imply that even in this, the most conservative, approach, theology is not being given absolute priority over natural philosophy.

*Keywords:* Augustine; Copernicus; Galileo Galilei; heliocentrism; *Letter to the Grand Duchess Christina*

---

In 1613, as the fame of Galileo's astronomical discoveries spread, Galileo for the first time faced the real possibility that the Church would, on theological grounds, oppose the Copernican alignment of earth and sun

Ernan McMullin (1924–2011) held the John Cardinal O'Hara Chair of Philosophy, and was director of the program in history and philosophy of science at the University of Notre Dame, South Bend, IN, USA. The text is reproduced from Ernan McMullin, *The Church and Galileo* (Studies in Science and the Humanities from the Reilly Center for Science, Technology, and Values). Notre Dame, IN: University of Notre Dame Press, 2005, 88–116. Beginnings of pages in the original are indicated with the page number between / and /. Copyright University of Notre Dame Press. Reprinted with permission.

that the new discoveries seemed to confirm. In a worried letter to his friend Benedetto Castelli, he marshaled some more or less commonsense considerations that he thought should deter the Church authorities from acting precipitately in regard to the new cosmology. The letter later came into the hands of the theologians of the Holy Office in Rome, so they would have been aware of the arguments it contained against banning the Copernican earth/sun theses. But ban them they did in early 1616. His arguments had obviously not deterred them from making more fateful a decision than they could ever at the time have imagined.<sup>1</sup>

As the debate in Rome over the theological acceptability of the new ideas grew ever more intense in 1614 and early 1615, Galileo set himself down to a more serious attempt at exegesis. His critics had already made it known that, in line with the decrees of the recently concluded Council of Trent, they were emphasizing the authority of the fathers of the Church, who, according to the critics, were unanimous in holding the earth to be at rest in the center of the world with the sun and planets circling it, as a number of texts in the earlier books of the Bible clearly took for granted. So Galileo, probably alerted by some theologian friends to the possibility of finding support for his case in the fathers themselves, turned to the composition of a more considered essay that would lay out the case in a manner that would, he /89/ hoped, convince the Roman theologians to draw back from what he regarded as a disastrous mistake on the Church's part.

Formally titled as a letter to the dowager Grand Duchess Christina of Lorraine, mother of his patron and former pupil Cosimo II de Medici, the document (so far as we can tell) never came to the notice of the Roman authorities in the crucial months leading up to the decision to ban the Copernican innovation on the grounds of its being "contrary to Scripture." So the arguments it so ably advances did not directly affect the discussions of the Holy Office and its consultors. Nevertheless, its interest to us is great because, together with the letter to Castelli, it presents the case that the Roman *periti* (theological experts) could have considered before taking the action they did. For the exegetical principles that Galileo proposed were not entirely novel. Each of them found a specific precedent in the writings of the fathers, most notably in a work that the Roman theologians should have known (and that at least one of them did know well). That was the commentary on *Genesis*, the *De Genesi ad litteram*, of St. Augustine. In assessing the responsibility of the Holy Office for the objective error it made in 1616, the case that Galileo makes in opposition thus takes on a singular importance.

In this essay, I will lay out first in some detail the exegetical principles implicit in Augustine's treatment of an early version of an apparent conflict between Scripture and the findings of "sense or reason." Then I will analyze Galileo's two major discussions of the issue, first in his *Letter to Castelli*,

and then, much more significantly, in his *Letter to the Grand Duchess*, touching on Foscarini's ill-fated *Letter* in between. I will turn then to an internal tension that many commentators have perceived within the exegetic principles that Galileo deploys in meeting the theological challenge to Copernicanism. The tension was, broadly speaking, between two rather different strategies for dealing with that challenge.

According to one, the more radical choice, the strategy would be to deny the relevance of Scripture to our knowledge of the natural world, especially to issues in astronomy, and to emphasize, besides, the likelihood in the context of astronomical phenomena that the authors of Scripture would have accommodated their language to the understanding of their hearers. The alternative, more conservative, strategy would be to allow that the authority of divine revelation extended to passages in Scripture describing features of the natural world but also to admit that where this description clashed with something that could be demonstrated through "sense or reason," an alternative to the literal, everyday, meaning of the Scripture passage should be sought.<sup>2</sup> This latter proviso would imply that even in this, the most conservative, approach, theology is not being given absolute priority over natural philosophy. *Only* when the content of the disputed doctrine is itself a matter of faith and the issue is not one of interpreting Scripture passages that, in principle, could yield alternative interpretations is such priority asserted. /90/

#### AUGUSTINE: READING THE *DE GENESI AD LITTERAM*

First, then, to Augustine. The young Augustine went through two conversions, the first from the traditional Christianity of his childhood to the fashionable Manichaeism that had some time before swept through the Mediterranean world, and the second back to Christianity again, now professed as a reflective and confident choice. The Manichaeans mocked the Christian Scriptures as primitive and incoherent and offered an entirely different account of cosmic and human origins. The Creator pictured in Genesis they saw as impossibly anthropomorphic, and the notion of creation itself left no room for the great struggle between the rival forces of Good and Evil that they saw everywhere in evidence around them.

Augustine, as a Manichaean, would have known the force of their criticisms of Genesis. Not surprisingly, then, the task of responding to them was one of the first he took on as a Christian convert, even before he was ordained priest. The task, he discovered, was not going to be easy. Indeed, it was one to which he returned again and again throughout the course of his immensely productive life. The focus would be the Book of Genesis, the principal target of the Manichaean attack. How was it to be understood? In particular, could it be taken in a literal historical sense, or ought it to be read in some more figurative way? His first attempt to answer

this question, crucial to the Manichaean challenge, was his *De Genesi contra Manichaeos libri duo* (A commentary on Genesis against the Manichaeans in two books), c. 388 A.D. He later remarked about this youthful work that as he attempted to find a credible literal interpretation of the first chapters of Genesis describing the Creation, he found the task nearly impossible.<sup>3</sup> A few years later, he tried again but gave up, leaving the work incomplete, though he decided to preserve the manuscript; this was the *De Genesi ad litteram imperfectus liber* (The literal meaning of Genesis: An unfinished book). Again in books 12 and 13 of his *Confessions* (397–401 A.D.), he attempted to provide both a literal and an allegorical interpretation for the first chapter of Genesis.

At this point, however, he evidently decided that he was now ready for the full-scale work that was clearly called for. The *De Genesi ad litteram* (The literal meaning of Genesis) would take him 14 years (401–415 A.D.) and was one of his major works. He was still not entirely satisfied, however, remarking that in his effort to find the “proper historical sense” of the enigmatic chapters, he had found more questions than answers, “and of the answers found, not many have been established for certain.”<sup>4</sup> He returned to the topic one last time in his great *City of God*. This long effort, extending through much of his life, must have convinced him, if convincing was needed, that the discovery of the literal meaning of Scripture could be an exceedingly difficult matter and that this difficulty would be heightened where there was an apparent conflict between this literal sense and some finding of “sense or reason,” as the Manichaeans claimed regarding many passages in the Creation chapters of Genesis. /91/

I have used the expression “literal meaning” above as though it was unproblematic. But, unfortunately, that is far from the case. When we use that phrase today, it is usually to contrast the “literal” meaning of some expression with a metaphorical one. But interpreting a text *ad litteram* (according to the letter) meant something much broader in Augustine’s day; indeed, exegetes have been at pains to point out that Augustine himself used the phrase in different ways in different contexts, ranging from a usage not unlike the modern one, especially in his earlier works on Genesis, to “a highly sophisticated interpretation that is quite metaphysical and not what we would ordinarily call the literal sense” in the *De Genesi ad litteram*.<sup>5</sup>

John Taylor takes Augustine to mean primarily by “literal” the sense intended by the author, which could well be metaphorical. (One would also need to specify whether God or the human author is in question.) Its primary sense for Augustine may well have been the negative one, meaning simply “not allegorical.” In the case of historical narrative (and Augustine, unlike the neo-Platonists of his day, was quite firm in holding that the Genesis story of Creation *could* be given a broadly historical interpretation), the sense of “literal” that comes closest to his usage might be “conveying the historical fact, telling us what actually happened.” What

complicates matters, of course, is that the language in which God's action in creating the world is described cannot possibly, in the nature of the case, be literal in the modern sense of that term.<sup>6</sup> So we have to be content with a "literal meaning of Genesis" that aims to be "literal-historical" but makes no effort to be literal in the usual sense. In this essay, I will use the term in its contemporary, more limited sense.

Long before Augustine's day, two schools had formed regarding the proper interpretive approach to Scripture. The school of Alexandria, whose most notable members were Origen, Clement, and Cyril, favored a highly allegorical interpretation of the Old Testament, seeing it as prefiguring the New. The allegorical meaning was not the intended meaning of the human author, nor was it what the first readers would have seen in the text. Rather, it was the meaning intended by God for later readers, who would grasp in this way the deeper coherence of the story of human salvation. The school of Antioch (John Chrysostom, Theodore of Mopsuestia, Theodoret of Cyr), less influential, preferred a more literal and historical reading, avoiding the imaginative flights of the Alexandrians.

Augustine was thoroughly familiar with this rich literature. In general, he took the middle ground, seeking first the literal or "proper" sense and then, where appropriate, an allegorical (or figurative or prophetic) sense. In the *De Genesi ad litteram*, Augustine's imagination soars as he reads the six days of the Creation narrative not as days in the ordinary sense (how could they be, since, as the Manichaeans had objected, the sun was not made until the fourth "day"?) but as progressions in angelic knowledge of the Creation.

This interpretation of the text, he insists, is still a "literal," not an allegorical, one. Even though it differs from our ordinary understanding of the term "day," it is /92/ a "truer," deeper sense, of which our ordinary sense is an echo (*LMG*, 1.4.28). He acknowledges, however, that others may find a different meaning here, and he encourages the search. Indeed, he remarks, he may himself still hit on another, and more plausible, interpretation. Interpretive though it may be, however, this is still for him the "literal" sense, that, which the text tells us actually happened. What prompts the search for alternatives here is that the normal sense of the term "day" cannot be correct. This is the unequivocal testimonial of human reason and the human senses. In the circumstances, another interpretation of the six-day succession must be found.

We are now ready to look more closely at the text of the *De Genesi*. How does Augustine deal with apparent conflicts of this sort between the findings of sense and reason and the literal reading (in *our* sense of that term: i.e., where the component words are taken in their normal usage) of particular scriptural texts? Since he nowhere provides a systematic answer to this question, we have to examine those passages in his commentary where he is dealing with this issue and see what we can infer about the

principles that seem to guide him in each case. We may in this way be able to formulate a set of hermeneutic guidelines covering apparent conflicts while keeping in mind that we are imposing system on a context to which it is foreign. Augustine sets down these maxims usually without supporting argument, as though they would be obvious to his readers.

First, he takes for granted throughout the work that both Scripture and human reason are sources of truth; both come from God. They cannot, therefore, truly conflict. If they appear to, this can only be because one or the other has been misunderstood or its claim to truth overstated. This might be called:

*The Principle of Consistency* (PC): The proper meaning of Scripture cannot be in true conflict with the findings of human sense or reason.<sup>7</sup>

When an apparent conflict arises, what one should ask, then, is how secure the claim on the side of the senses or the reason really is:

But someone may ask, “Is not Scripture opposed to those who hold that the heavens are spherical, when it says [of God] ‘who stretches out the heavens like a skin?’” Let it be opposed indeed, if what they say is false. The truth is rather in what God reveals than in what groping men surmise [humana infirmitas conicit]. But if they are able to establish their doctrine with proofs that cannot be denied [si forte illud talibus illi documentis probare potuerint, ut dubitari inde non debeat], we must show that this statement of Scripture about the skin is not opposed to the truth of their conclusions. (*LMG*, 2.9.21)

“Proofs that cannot be denied”—a demanding condition. And Augustine repeats it, for good measure: the scriptural passages about the shape of the heavens (stretched /93/ out like a skin; suspended like a vault) must be shown “not to contradict the theories that may be supported by true evidence, by which heaven is said to be curved on all sides in the shape of a sphere, *provided only that this is proved*” (*LMG*, 2.9.21, emphasis mine). He is not entirely convinced that the spherical shape has been proved—“it may be only a man-made theory” (*LMG*, 2.9.22)—but he evidently thinks that it comes close enough that another interpretation of the stretched skin should be sought. And it should not be allegorical, else a “literal-minded interpreter” will remind him that a variant *literal* interpretation should also be forthcoming (*LMG*, 2.9.22). And indeed one is: Why should the skin not be stretched in a *spherical* shape? After all, he says, with just a trace of complacency, “[A] leather bottle and an inflated ball are both made of skin” (*LMG*, 2.9.22).

Augustine has enough confidence in human reason, then, to allow him to require, as a constraint on scriptural interpretation,

*The Principle of Priority of Demonstration* (PPD): When there is a conflict between a proven truth about the physical world and a particular reading of Scripture, an alternative reading should be sought.

His general approach in the *De Genesi* is to retort to the Manichaean critics of Scripture that whatever they “could demonstrate about the nature of things by means of reliable evidence [quidquid ipsi de natura rerum veracibus documentis demonstrare potuerint], we shall show that it is not contrary to our Scripture” (*LMG*, 1.21.24).<sup>8</sup> He adds a caveat, however. If the Manichaens “produce from their books” something that is (definitely) contrary to the Catholic faith,<sup>9</sup> “we shall either by some means or other show, or else without a shadow of doubt believe, that it is absolutely false.”<sup>10</sup>

His long struggle with the Genesis text had brought home to him how obscure the text of Scripture could be. It was this that allowed him to propose the priority of demonstrated truths in the natural order; given the multiplicity of alternative possible “literal” interpretations of at least some biblical texts, PPD simply helps the reader to narrow the field of permissible interpretations when searching for the genuine “literal” one, the one that conveys the historical truth. But Augustine reminds his readers that the priority given to philosophical/scientific demonstration is limited by a more general principle, one no longer directed to the context of exegesis only:

*The Principle of Priority of Faith (PPF):* An apparent demonstration on the side of philosophy of something that is contrary to a doctrine of the faith must be set aside.

The absolute priority given to doctrines of the faith became a central issue in medieval theology: Did it extend, for example, to specific theological formulations of /94/ those doctrines, even if these had not been declared to be *de fide*? The relevance of PPF to our inquiry here is that Augustine proposes it as a bound on PPD. Where a conflict appears between the literal reading of Scripture and an apparently demonstrated finding on the side of philosophy, this latter ought to be denied any weight in the exegesis of the disputed passage if it is known to be contrary to a doctrine of the faith.

Augustine frequently resorts to another principle, more explicitly exegetical, in his Scripture commentaries: “Sacred Scripture in its customary style is speaking within the limitations of human language in addressing men of limited understanding, while at the same time teaching a lesson to be understood by the reader who is able” (*LMG*, 5.6.19). Or again, “We must hold to the pronouncement of St. Paul [I Corinthians, 15:41] that . . . ‘star differs from star in glory [brightness].’ But, of course, one may reply, without attacking St. Paul, ‘they differ in glory to the eyes of men on earth’” (*LMG*, 2.16.33).<sup>11</sup> Long before Augustine, theologians had been at pains to point out that the authors of Scripture had to accommodate their expressions to their prospective audience. Sometimes this would be because of the inadequacy of human language to convey their message, as when they described God in anthropomorphic terms. At other times, as here, it might be because of the limitations of human ways of knowing. Both

sorts of accommodation could be important in interpreting the Genesis narrative of the Creation. Hence:

*The Principle of Accommodation (PA)*: The choice of language in the scriptural writings is necessarily accommodated to the capacities of the intended audience.

Several times in his commentary on Genesis, when Augustine encounters moderately technical issues regarding the makeup of the natural world, he betrays some impatience. This is not what they should be looking for in the Scriptures he reminds his readers. Regarding the shape of the heavens, for example, the writers of Scripture gave it no special attention:

Such subjects are of no profit to those who seek beatitude, and what is worse, they take up precious time that ought to be given to what is spiritually beneficial. What concern is it of mine whether heaven is like a sphere and the earth is enclosed by it and suspended in the middle of the universe, or whether heaven, like a disk above the earth, covers it on one side? . . . I must say briefly that in the matter of the shape of the heaven, the sacred writers knew the truth but the Spirit of God, who spoke through them, did not wish to teach men such things as would be of no avail for their salvation. (*LMG*, 2.9.20)

Augustine is irritated with those who seek detailed knowledge of the natural world in Scripture: “There is a great deal of subtle and learned inquiry into these /95/ 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 salvation” (*LMG*, 2.10.23). There are hints here at least, of a quite strong principle bearing on the relevance of Scripture to natural knowledge:

*The Principle of Scriptural Limitation (PSL)*: Since the primary concern of Scripture is with human salvation, we should not look to Scripture for knowledge of the natural world.

Augustine is admonishing his readers that the issue of salvation far outweighs the mere desire for natural knowledge. Conveying such knowledge was simply not part of what the Spirit of God who spoke through the writers intended. Does this mean that Scripture carries no weight at all with regard to the knowledge of nature? That would certainly seem to be the import of what he has to say about the question of the shape of the heavens. But elsewhere he sometimes explicitly appeals to Scripture in support of a claim about the natural world, even in one case where this claim runs counter to our commonsense view.

The Manichaeans were especially critical of the Genesis account of the placing of the waters both below and above the firmament, “and God called the firmament heaven” (Genesis 1: 6–8). Surely the natural place of water was *below* the heavens, they argued. Here, Augustine stands fast, however, insisting on the truth of the Scripture passage, quite literally interpreted. It



is not enough, he remarks, to respond by saying that God could, by way of miracle, place waters wherever he wished (*LMG*, 2.1.2). The issue is about the *natural* place of water, and the Genesis text plainly says that water has a natural place both above and below the heavens. After some discussion, he relays an ingenious (if highly speculative) suggestion. The farthest planet, Saturn, has the longest path to run, and rapid motion causes heat. Yet Saturn is also said to be the coldest star. "Some of our scholars," he says, conclude that Saturn must be cooled by waters in the form of ice, far above the firmament. "But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it exists in that place. *The authority of Scripture in this matter is greater than all human ingenuity*" (*LMG*, 2.5.9, emphasis mine).

Is it because the Genesis text is so plain that Augustine is adamant in maintaining the normal sense of the expression, "above the heavens (sky)"? There is almost a warrant here for a *Principle of Clear Sense* (PCS), which would say that if the sense of Scripture is clear and unambiguous, with no hint of accommodation, one should defend it at all costs, on the assumption, more or less symmetrical with PPD, that in such a case there would have to be some other way of construing the apparently conflicting claim of natural knowledge. Yet in the following passage he /96/ goes on to discuss a very similar text in Psalms 135: 6: "(God) established the earth above the waters." It seems almost as plain as the earlier text, yet Augustine treats it quite differently. Here, he gives the secular claim priority and allows himself to fall back on a figurative meaning. This Scripture passage should not, he warns, be used "against these people who engage in learned discussions about the weights of the elements. They are not bound by the authority of our Bible, and, ignorant of the sense of these words, they will more readily scorn our sacred books than disavow the knowledge they have *acquired by unassailable arguments or proved by the evidence of experience*" (*LMG*, 2.1.4, emphasis mine). Plain though the sense of the Scripture passage may be, PPD is invoked on the other side and is not to be gainsaid. For someone who might still insist on a literal interpretation of the Scripture passage, he has this to offer: Are there not "promontories that tower over the water" of the seas (*LMG*, 2.1.4)?

Augustine evidently cannot be counted on as an unqualified advocate of PSL. The Scriptures bear at least some relevance to natural knowledge for him; what PSL may amount to in that case may be no more than an admonition not to turn the Scriptures away from their main purpose by construing them as a cosmological text. To complicate matters further, there is at least a trace of another principle in his thinking that would be quite inconsistent with PSL. His frequent emphasis on the importance of *demonstration* in conflict issues of this sort might seem to imply that in the absence of demonstration on the side of sense or reason, the literal interpretation of the disputed passage should stand. In a passage quoted

earlier he remarks that if the conflicting secular claim is false, “the truth is rather in what God reveals than in what groping men surmise.” So the literal sense *would* constitute revelation on God’s part in such a case and would carry authority accordingly. Surmise on the opposing side would carry no weight; only demonstration would, and in its absence (Augustine seems to imply) the Scripture text should be understood as conveying genuine knowledge of nature.

This would suggest something like the following:

*The Principle of Priority of Scripture* (PPS): Where there is an apparent conflict between a Scripture passage and an assertion about the natural world grounded on sense or reason, if that assertion falls short of proof, the Scripture passage should be taken in its normal literal sense to convey natural knowledge.

It should be emphasized that this is no more than a hint in the text. PPS would be inconsistent with PSL if the latter were to be understood strictly. But even if PPS were left aside entirely, PSL, understood strictly, would make PPD entirely redundant. There would be hardly any point in continually emphasizing the importance of *demonstrating* the counterclaim from sense or reason if the Scriptures were not relevant to natural knowledge in the first place. /97/

I have emphasized the tensions between the two sets of principles here, PA/PSL on one side, PPD/PPS on the other, not to accuse Augustine of inconsistency in what were obviously only tentative strategies on his part, but because of the consequences of tensions of this sort when Augustine’s texts later reappear from Galileo’s pen.

Even the most casual reader of the *De Genesi* could hardly miss another principle, this time a second-order one, not a hermeneutic maxim guiding interpretation directly like the others above, one that contributes further to the tension within the implicit guidelines that Augustine is leaving to posterity. In the passage just quoted, he warns Christian readers of the Bible against advancing an interpretation that has not been adequately thought through lest it should lead non-Christians who know better to “scorn our sacred books.” He returns to this theme over and over:

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 a stand on one side that, if further progress in the search for truth [diligentius discussa veritas] 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 Holy Scripture. (*LMG*, 1.18.37)

Such imprudent readers ought to keep in mind two imperative reasons for caution. First, the matters dealt with in Scripture are far beyond

our vision, and the text is, in consequence, often open to multiple interpretations. And from the side of natural knowledge, there is also a sobering possibility that further progress in the search for truth may establish a position that would undermine an incautious earlier claim to interpret Scripture in a contrary sense. Again: “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 truth later appear [quod postea veritas patefecerit], 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” (*LMG*, 2.18.38).<sup>12</sup>

“If the truth later appear . . .”: Augustine shows himself aware that knowledge progresses, so that prudence in interpreting difficult passages in Scripture is needful where the possibility of such advance in knowledge is real. Hence:

*The Principle of Prudence (PP)*: When trying to discern the meaning of a difficult scriptural passage, one should keep in mind that different interpretations of the text may be possible and that, in consequence, one should not rush into premature commitment to one of these, especially since further progress in the search for truth may later undermine this interpretation. /98/

In his youth, Augustine turned away from the Christian community in part because its adherents in North Africa appeared naive and ill informed about the high culture of the day to his already highly educated taste. Now, once again a Christian, he is warning his fellow Christians against giving precisely this impression by proposing ill-founded interpretations of Scripture on issues in natural science where such interpretations could suffer easy refutation, thus bringing the Scriptures themselves into discredit:

Usually, even a non-Christian knows something about the earth, the heavens, and the other elements of this world, about the motion and orbit of the stars and even their sizes and relative positions, about the predictable eclipses of the sun and moon, the cycles of the years and the seasons, about the kinds of animals, shrubs, stones, and so forth, and this knowledge he holds to as being certain from reason and experience. 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 shame is not so much that an ignorant individual is derided, but that people outside the household of the faith think our sacred writers held such opinions, and, to the great loss of those for whose salvation we toil, the writers of our Scripture are criticized and rejected as unlearned men. If they find a Christian mistaken in a field which they themselves know well and hear him maintaining foolish opinions about our books, how are they going to believe those books in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven, when they think their pages are full of falsehoods on facts which they themselves have learnt from experience and the light of reason? (*LMG*, 1.19.41)<sup>13</sup>

Augustine speaks here with a degree of passion. This was a matter on which he evidently felt very strongly. He had encountered this sort of dogmatizing and had seen its consequences. When the Scriptures bear on issues where natural science (astronomy, the most developed natural science of his day, is his prime example) also claims competence, his urgent advice to Christian interpreters of Scripture is to go very cautiously.<sup>14</sup> At least, he says, be aware of the relevant knowledge of nature that is claimed to be “certain from reason and experience” (echoes here of PPD). And never lose sight of the harm that can be done to the Christian community by an imprudent handling of the sacred text.

The task of the exegete in Augustine’s day was far less constrained than it would later become. The predominance of the allegorical mode of interpretation in the Alexandrine school, as well as the latitude allowed to “literal” interpretation, meant /99/ that the widest variety of meanings could be, and were, attributed to even the most straightforward-seeming text. The *De Genesi ad litteram*, besides, dealt with one of the most interpretatively difficult parts of the Bible, the account of the Creation. It is, after all, the only segment of the Old Testament “histories” for which there were no human witnesses. It treats of the creative action of a Being whose agency lies far outside the range of human comprehension. Accommodating such a narrative to the limitations of human ways of knowing inevitably means that the narrative will lend itself to a multiplicity of interpretations and will test exegetical norms to the utmost. Can the principles that Augustine formulated in response to this challenge be transferred from the majestic context of the Creation to that of straightforward remarks about the motion of the sun and the immobility of the earth? Galileo certainly hoped so.

#### GALILEO: THE LETTER TO CASTELLI

My narrative is going to shift now from the fifth to the seventeenth century, to 1613 A.D., to be precise. Copernicus’s great work, the *De revolutionibus orbium coelestium*, was already 70 years old. But it had only been a few years before that the new telescopic evidence of the satellites of Jupiter, the ever-changing sunspots, and the phases of Venus had brought Copernican ideas of the earth’s motion and the sun’s rest to the broad public and had begun to give them a credibility among astronomers that they had heretofore lacked. Aristotelian philosophers were the most directly affected by the new discoveries: the evidence of Venus’s phases was sufficient of itself to show that the Aristotelian system of concentric spheres was untenable. But it was not long before theologians, themselves Aristotelian in sympathy, also sounded the alarm, summoning (as Galileo put it) the “terrible weapon” of Scripture to their cause.<sup>15</sup>

Galileo, at the center of the growing storm, realized very quickly that the theological threat to the Copernican ideas had to be countered if his own proposed development of these ideas was to prosper. From his perspective, he had really no other option. By now he was convinced of the merits of the heliocentric system, and he feared that the Church of which he was a loyal member risked making a terrible error unless someone could persuade its official representatives that the Copernican theses posed no challenge to Scripture after all. Never one to doubt his own powers of persuasion, even in an arena until that point entirely foreign to him; he turned his energies to the task.

His first try was in a letter to his former student Benedetto Castelli, a Benedictine who had succeeded Galileo at the University of Pisa and who had already encountered scriptural objections to the Copernican proposal at a meal in the Medici /100/ palace, with the dowager Grand Duchess, Christina of Lorraine, not only present but actively engaged. The dispute clearly worried Galileo. The Medici family were his patrons; were *they* to be persuaded by the theological opposition to the Copernican theses, he could face a very difficult choice. So in a short, hastily composed, letter to Castelli he set out “to examine some general questions about the use of Holy Scripture in disputes involving physical conclusions.” His approach is a commonsense one. He quotes no theological authorities. His first point is that the Scriptures have to “accommodate the incapacity of ordinary people” (PA) and in so doing depart from the literal meaning of passages that would, for example, attribute hands and eyes to God. It follows, he says, that “in disputes about natural phenomena, [Scripture] should be reserved to the last place.” Though both Scripture and nature derive ultimately from God, Scripture is necessarily open to multiple interpretations, whereas “nature is inexorable and immutable” and is in no way bound to accommodate human understanding.”<sup>16</sup> Thus “[w]hatever sensory experience places before our eyes or necessary demonstrations prove to us concerning natural effects should not be called into question on account of Scriptural passages whose words appear to have a different meaning, since not every statement of Holy Scripture is bound to obligations as severely as is each effect of nature.”<sup>17</sup>

This is PPD in a stronger form than Augustine gave it. It is obvious, he goes on, that two truths can never contradict one another (PC), so [t]he task of wise interpreters is to strive to find the true meanings of Scriptural passages that would agree with those physical conclusions of which we are already certain and sure from clear sensory experience or from necessary demonstrations.”<sup>18</sup> Even though Scripture is inspired, its interpreters are not. Thus:

It would be prudent not to allow anyone to oblige Scriptural passages to have to maintain the truth of any physical conclusions whose contrary could ever be

proved to us by the senses and demonstrative and necessary reasons. Who wants to fix a limit for the human mind? Who wants to assert that everything which is knowable in the world is already known? Because of this, it would be most advisable not to add anything beyond necessity to the articles concerning salvation and the definition of the Faith.<sup>19</sup>

Where Augustine, in counseling prudence, laid most stress on the potential danger to the Church that incautious interpreters of Scripture could cause, Galileo emphasizes two other motives for his version of PP, both of them also mentioned by Augustine: the undoubted fallibility of scriptural interpreters and the possibility that a claim to natural knowledge may prove true at a later time, even if at present it cannot be demonstrated. This latter was a far more pressing consideration for Galileo than it would have been for Augustine or for anyone in the later Aristotelian /101/ tradition. He had already seen at first hand how observational discoveries could alter the status of even the most venerable cosmological claims. The combination of PPD and this version of PP would imply that where natural knowledge is concerned, interpreters of Scripture should always hold back, whether the claim to natural knowledge is demonstrated or not. And Galileo adds one further argument in support of this far-reaching conclusion: "The authority of Holy Writ has merely the aim of persuading men of those articles and propositions which are necessary for their salvation and surpass all human reason, and so could not become credible through some other science or other means except the mouth of the Holy Spirit itself."<sup>20</sup>

This is PSL in the strongest possible form. The Scriptures are limited to doctrines that bear on human salvation; the sciences of nature lie outside their scope: "I do not think it necessary to believe that the same God who has furnished us with senses, language, and intellect would want to bypass their use and give us by other means the information we can obtain with them. This applies especially to those sciences about which one can read only very small phrases and scattered conclusions in the Scripture, as is particularly the case for astronomy."<sup>21</sup> Galileo leaves the reader in no doubt about his position. One should not expect to find natural knowledge (astronomical knowledge, in particular) in Scripture.

Galileo is confident at this point that he has made his case. Where knowledge of nature is concerned, "the one who supports the true side will be able to provide a thousand experiments and a thousand necessary demonstrations for his side, whereas the other person can have nothing but sophisms, paralogism, and fallacies."<sup>22</sup> Those who call on the Scriptures in this context are implicitly conceding that they are unable to make their case by appropriately physical arguments. Galileo ends the letter with an ingenious *ad hominem* argument, which has puzzled some of his commentators who have not realized that he is arguing *ad hominem*. He starts: let us concede to our opponents that the words of the disputed text

in Joshua about the sun's motion *are* to be taken literally. He then goes on to show that if one does this, the text can be shown to be incompatible with the Aristotelian world-system that these same opponents profess. To stop the apparent motion of the sun in the sky in the Aristotelian scheme, God would have to stop, not the sun's own proper motion, but the whole system of celestial spheres. So the Aristotelian *cannot* take the text literally.

Then Galileo cannot resist adding a further gloss that is a little *too* clever. His telescopic observations make it appear that the sun is rotating on its own axis. What if the sun's rotation is causally responsible for the motion of the planets? In that case, stopping the sun *would* have the desired effect of stilling the sun in the terrestrial sky. So Galileo's would be the system that in that case could abide by the literal meaning. Of course, this is incompatible with what he has just argued about the irrelevance of Scripture to matters physical. But I suspect he intended this postscript as an extension of the *ad hominem* argument: if you insist on literal interpretation here, /102/ he was saying to the Aristotelians, I will come out ahead. Moral: Better not insist! He assures Castelli that they have nothing to fear "as long as we are allowed to speak and to be heard by competent persons who are not excessively upset by their own emotions and interests."<sup>23</sup>

This is frank talk, not exactly likely to commend Galileo's case to a reader of more conservative theological sympathies. Interestingly, when a hostile critic later forwarded a copy of the letter to the Holy Office in Rome, the assessor appointed to evaluate it found no fault with its overall argument, or with the hermeneutic principles it advanced, or even with its rather dismissive tone where theological criticism of the Copernican system was concerned, but only with a couple of phrases that "sound bad," though he added that this might be just a matter of poor word choice.<sup>24</sup> What will have struck the reader by now is the similarity between Galileo's and Augustine's responses to the conflict issue. At this point, Galileo is reacting more or less intuitively, formulating what appear to him to be commonsense principles of interpretation and in each case offering some supportive argument. He proposes versions of PC, PA, PSL, PPD, PP, just as Augustine did.

Where a difference between them appears is with regard to the weight to be given to Scripture in the event that the claim to natural knowledge is *not* demonstrated. Augustine seems to allow priority to Scripture in such a case (PPS), at least if the meaning of the Scripture passage is plain and PA is not involved. And although, as we have seen, he appears at one point to sanction a version of PSL in the matter of the shape of the heavens, he himself has recourse to Genesis when discussing some general features of the physical world. Thus he would hardly have given PSL the scope that Galileo here does.

There is no reason to think that Galileo was aware of Augustine's discussion of the "conflict" issue at the time he wrote to Castelli in December 1613. The strong resemblance between their views seems due, rather, to the fact that here were two highly intelligent men reacting spontaneously to a very similar set of issues. And the difference between them might be traced to Augustine's quite natural emphasis, as a theologian, on the revealed character of Scripture and Galileo's equally natural conviction regarding the sufficiency of the human powers of sense and reason in coming to know the order of nature.

#### FOSCARINI TO THE DEFENSE OF COPERNICANISM

In the months that followed, Galileo was reminded over and over of the gathering opposition in Rome to the Copernican claims. A letter from a friend in Rome, Monsignor Piero Dini, let him know that the leading Roman theologian of the day, Cardinal Robert Bellarmine of the Society of Jesus, believed that the Copernican affair /103/ could immediately be settled by recalling that Copernicus himself made no claims regarding the real motions of earth and sun; mathematical astronomy in his eyes was no more than a practical device useful for prediction, calendar making, and the like. Galileo strenuously disagreed with this claim, pointing out to Dini that it misrepresented Copernicus (assuming too readily that the foreword appended to the *De revolutionibus* had indeed been Copernicus's own work) and that it also misrepresented the real intent of Copernican astronomy, which was to declare the "true structure" of the world.<sup>25</sup>

In the same month, however, an established Carmelite theologian and philosopher, Paolo Antonio Foscarini, published a short work in the form of a letter to the general of the Carmelite order whose aim was to defend the "clearly probable" Copernican system from theological attack. The exegetical principles on which he relies, PA, PSL, PP, and PPD, are the same as those we have already encountered in the *Letter to Castelli* though there is no reason to suppose that Foscarini had seen Galileo's letter. Their close resemblance testifies to their being what one might call the commonsense, and less tradition-bound, response to apparent conflict between Scripture, literally taken, and the testimony of "sense or reason."

Foscarini emphasizes and argues in some detail for PA and PSL. Once theologians recognize that the language of Scripture must be that of the "ordinary people" for whom the Scriptures were intended and that it therefore must describe nature "according to the appearances and not according to the reality," the theological difficulties urged against the Copernican system will disappear. Besides, "the Scriptures have no other purpose than the attainment of salvation," so one should not expect to find in them deep knowledge of nature.<sup>26</sup> This combination of PA and PSL



should, as we have already seen, ward off objections to Copernicanism from the side of Scripture without need of any further argument. But Foscarini weakens this straightforward point in two ways. If something is *known* to be contrary to the words of Scripture and thus to divine authority, he says, it should be abandoned even if it seems to have reason and sense on its side.<sup>27</sup> What he may mean here is that if the disputed issue is known to be a matter of faith, there must be a flaw on the opposed side of reason or sense. Or one might regard this, in the opening pages of the *Letter*, as a prudential bow to Church authority before the actual argument of the *Letter* is introduced.<sup>28</sup>

A more troublesome difficulty in interpreting Foscarini's message lies in the goal he evidently sets himself of accommodating Scripture to the Copernican world-system. This involves him in a lengthy (and, it must be admitted, somewhat contorted) attempt to show that the "stability" of the earth and the "motion" of the sun of which Scripture speaks can be interpreted in ways other than the more obvious everyday sense in order to make them harmonize with the Copernican insights, even harmonize with them in figurative ways more fruitfully than ever did the now /104/ "disintegrated" philosophy of Aristotle. What he seems to be suggesting here is that there is still a way to understand Scripture as conveying deep truths about nature, even in the disputed earth/sun passages.

This, on the face of it, seems to run counter to his emphatic "God's only intention [in Scripture] is to teach us the true road to eternal life."<sup>29</sup> And it does not easily mesh either with the elaborate (and persuasive) arguments he advances for holding that the wording of the earth/sun passages must be understood as accommodated to the language as well as to the cosmic situation of the hearers. But the tension here (which will recur in Galileo's later *Letter to the Grand Duchess* in a somewhat different form) is revealing: Does he really want to take the bold step of holding that the Scriptures carry no weight at all with regard to the knowledge of nature, and the concomitant that sense and reason carry final authority in that domain, even where demonstration of their case is lacking?<sup>30</sup>

Foscarini's *Letter* evoked a sharp response from an unnamed theologian (probably a consultor of the Holy Office, where his report was filed) who asserted that, among other things, the Copernican doctrine ran contrary to "the common explication of the fathers."<sup>31</sup> Foscarini took up the challenge and in a formal *Defense* turned to the fathers in his support.<sup>32</sup> Quoting a renowned theologian, Melchior Cano, a dominant figure in post-Reformation Catholic theology, he urges that in matters of philosophy the texts of the fathers ought to be accorded only as much weight as their own philosophic arguments carry. The fathers, after all, busy as they were with theological issues, did little more than "say hello at the borderline of philosophy."<sup>33</sup> Furthermore, here quoting Benito Pereira's authoritative *Commentary on Genesis*, the Scriptures are never to be interpreted in such

a way as to set them in contradiction with what reason and sense can on their own account establish. Turning to Augustine's *De Genesi ad litteram*, he recalls the advice given there not to cling too tightly to an interpretation of Scripture with regard to nature that might later be shown to be false in terms of reason and sense, thus leading to mockery of the Scriptures.<sup>34</sup> Since "something new is always being added to the human sciences, one has to be particularly alert not to commit the Church prematurely to a position it may later regret" (PP).<sup>35</sup>

Foscarini sent a copy of both documents to Cardinal Bellarmine sometime in March/April 1615; from him they would have been transmitted to the Holy Office. The theologians of the Holy Office would thus have been made fully aware of Foscarini's arguments, including his appeal to Augustine, for almost a year before the decision was made to ban Copernicanism and with it Foscarini's *Letter*. His appeal to PA/PSL/PP was, in effect, set aside. True, his *Letter* strained Scripture to the extreme to accommodate the Copernican theses, in the sense of showing that the passages might be understood in a Copernican sense. This would not have helped. And his presentation of the exegetical principles themselves was nowhere near as effective as it would become in Galileo's hands. But the fact remains: the Roman theologians had /105/ before them in the *Letter to Castelli* and Foscarini's *Letter* and *Defense* what might seem a fairly strong case for not proceeding against Copernicanism. And they set it aside.

#### COMPOSING THE LETTER TO THE GRAND DUCHESS

No theologian himself, Galileo knew that he needed help if he were to supplement his argument with the authority of the fathers; this seemed to be the kind of evidence on which his critics most seemed to dwell. He probably began to solicit assistance from his many theologian friends in the course of 1614. In January 1615, Castelli wrote from Rome to say that a Barnabite priest of his acquaintance had promised to forward to Galileo some helpful references from Augustine and other fathers of the Church.<sup>36</sup> Galileo must have decided early on that Augustine would be the main witness for the defense. He would have been delighted to discover that every principle he had enunciated on his own in his earlier *Letter* found a precedent in the *De Genesi ad litteram*, a major work from the greatest of the early fathers. He calls on no less than 14 passages from that work, interspersing them with pointed and effective commentary of his own. In addition, he refers to an impressive array of other theological authorities: from the earlier period, Tertullian, Jerome, Dionysius, Peter Lombard, Thomas Aquinas; closer to his own time, Diego de Zuñiga, Paul of Burgos, Alfonso Tostado, Benito Pereira.

How much help would he have had from Foscarini in assembling this list? It all depends on whether he had Foscarini's *Defense* at hand. He did

have a copy of Foscarini's *Letter* sent to him by Federico Cesi in March.<sup>37</sup> But this would not have helped: there is not a single patristic reference in the entire work, an oversight that no doubt counted heavily against the *Letter* in Rome, and one that Foscarini consequently set out to remedy in the *Defense*. Did Galileo see this latter work, with its extensive patristic display? There are arguments on both sides, but there is no direct evidence.

In favor:<sup>38</sup> Foscarini cites the *De Genesi*, but it was probably common coin at this point. Foscarini and Galileo both refer to the fourth of the four "rules" for the interpretation of Scripture with which Pereira prefaces his *Commentary on Genesis*, meant to apply in cases of dispute about the literal sense.<sup>39</sup> They both quote the same paraphrase version of a passage from Augustine, taken evidently from Pereira.<sup>40</sup> And they both cite the same passages from two relatively obscure works of St. Jerome.<sup>41</sup> On the other side, however, though both cite Paul, bishop of Burgos, the passage cited by Foscarini is highly relevant to Galileo's argument (so one would have expected Galileo to include it if he was drawing on the *Defense*), whereas Galileo's own reference to Paul is on a relatively trivial issue. Furthermore, Galileo does not include a number of Foscarini's references, including two helpful ones to works of /106/ Augustine other than the *De Genesi*. And he lists half a dozen authorities who do not appear in Foscarini's work.<sup>42</sup>

In the end, it is difficult to decide whether Galileo did have the Foscarini *Defense* available as guide, fortified with assistance from other quarters, or whether a common store of citations from the widest variety of sources, some of them quite obscure, was emerging, testifying to the diligent labor of unnamed theologians possibly dating back, in part at least, to sixteenth-century exegetic controversies. We do not know: What we do know is that Galileo made brilliant use of the theological witnesses he had available, most (or very possibly all) of which had been supplied to him. Above all, it was the witness of Augustine that counted, given Augustine's prestige among the theologians of the day. As already noted, except for his more radical version of PSL, there was nothing novel, strictly speaking, in the case Galileo was making: there was little there that could not find direct warrant in Augustine's text. This was above all what Galileo wanted to establish.

The *Letter* itself is nowhere mentioned in the Roman documents of 1615–1616. In fact, the first reference to it in any remaining Roman source comes as late as Inchofer's report on the *Dialogo* in 1633, where Inchofer notes that "if I am not deceived [it has] passed through the hands of quite a few."<sup>43</sup> In a letter to Dini on February 16, 1615, Galileo mentions the "very long essay" he is composing but goes on: "I have not yet polished it so as to send you a copy."<sup>44</sup> Dini responds on March 7 that he has mentioned the essay to Bellarmine, who said he would "gladly" look at it but remarked, "[T]his is not something to jump into."<sup>45</sup> Almost certainly Bellarmine did not see it, prior to the Holy Office discussions in 1616 at

least; had he done so, he would certainly have added it to the Holy Office file from 1616.

On June 20, Cesi wrote Galileo from Rome that until Foscarini finished the longer work that he was proposing (one that never did, in fact, make its appearance), “[t]he necessary caution will be to remain silent here, by not dealing any more with this [Copernican] opinion, and elsewhere also to treat it very little so as not to awaken in the meantime the passions of the most powerful Aristotelians.”<sup>46</sup> By this time, the *Letter* was probably in finished form, but Galileo, now warned, very likely decided (somewhat uncharacteristically!) that caution was the better part of valor and restricted circulation to a few trusted friends only. Though the *Letter* almost certainly played no direct part in the Holy Office discussion in 1616, its relevance to our understanding of how that discussion *might* have gone is considerable.

#### GALILEO AS EXEGETE

Now to the exegetical principles themselves that together constitute the case Galileo is making in the *Letter to the Grand Duchess*.<sup>47</sup> He shares with Augustine the presumption that genuine conflict between the two sources of truth is impossible (PC). /107/ He lays particular stress on, and gives a persuasive justification for, the PA, going far beyond Augustine in the detail and variety of his arguments.<sup>48</sup> He counsels prudence (PP) on interpreters of Scripture, making explicit what was only a suggestion in Augustine: abstain from judgment regarding “physical conclusions whose contrary could *ever* be proved to us by the senses and demonstrative and necessary reasons.”<sup>49</sup> And he formulates a much more explicit and far-reaching principle of limitation (PSL) than Augustine’s, crystallizing it in an aphorism credited by him in a marginal note to Cardinal Baronio: “The intention of the Holy Spirit is to teach us how to go to heaven, and not how the heavens go.”<sup>50</sup> The God who has given us senses, language, and intellect would surely not want to bypass these by revealing to us what we could have discovered on our own. So anything reachable on our part, by sense or reason is not something we should turn to Scripture instead to learn. This is surely the voice of a natural philosopher! Besides, he goes on, astronomical matters are mentioned hardly at all in Scripture and only in passing. Had God wished to reveal truths about the natural world in Scripture, surely it would have been done in a more systematic and definitive way. “The Holy Spirit deliberately avoided teaching us such propositions, inasmuch as they are of no relevance to His intention, that is, to our salvation.”<sup>51</sup> This is about as explicit as one could wish.

The combined implication of these three principles for the Copernican issue is clear. The Scriptures are simply irrelevant to deciding such matters as the motion of sun or earth (PSL). Furthermore, even if PSL were to be left aside, the writers of Scripture are clearly accommodating themselves

to our normal modes of speech, to what *appears* to us, when they speak of the sun as in motion or the earth as fixed (PA). Finally, even if both PSL and PA were to be set aside, ordinary prudence would counsel that on an issue where in the future a contrary demonstration could well be found, no dogmatic position should be taken now that at a later time could serve to discredit the Scriptures generally (PP). To the extent that the interpreting of Scripture in this particular context was governed by *this* set of principles, no real conflict could arise regarding the Copernican theses, since Scripture could have no bearing on them. It follows that the quality of the scientific argument in favor of Copernicanism would have been simply irrelevant. It would not have mattered in the least whether Galileo could demonstrate his Copernican claim on scientific grounds; theologians had no right to demand that he should. This is a powerful cumulative argument. And it would have carried particular weight with those who, like Foscarini, had some appreciation for the potential of the new sort of evidence being brought in support of the Copernican cosmology.

Interspersed in Galileo's discussion of these principles is a strong emphasis of a different sort: "the importance of necessary demonstrations in conclusions about natural phenomena."<sup>52</sup> Only demonstration or direct sensory evidence carries weight in natural philosophy. But the weight it carries there must be regarded as altogether compelling. He asks his theologian readers /108/

to examine very diligently the difference between debatable and demonstrative doctrines. Keeping firmly in mind the compelling power of necessary deductions, they should come to see more clearly that it is not within the power of practitioners of demonstrative sciences to change opinion at will, choosing now this, now that one; that there is a great difference between giving orders to a mathematician or a philosopher and giving them to a merchant or a lawyer, and that demonstrated conclusions about natural and celestial phenomena cannot be changed with the same ease as opinions about what is or is not legitimate in a contract.<sup>53</sup>

His Aristotelian conviction about the power of demonstration in natural philosophy shows through in this stark contrast between the findings of the demonstrative sciences (mathematics, philosophy) and what counts as knowledge in trade or law (he wisely leaves the status of theology out of the comparison). He has two points to make. The more general one: "The task of a wise interpreter is to strive to fathom the true meaning of the sacred texts; this will undoubtedly agree with those physical considerations of which we are already certain and sure through clear observations and necessary demonstrations." It is the demonstrated character of natural knowledge that helps the exegete, when sifting among the possible interpretations of a text, to avoid one that would clash with an established demonstration. He goes to quote Pereira: "One must take diligent care to completely avoid holding . . . anything which contradicts the decisive observations and reasons of philosophy; 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.”<sup>54</sup>

The more specific inference to be drawn here is that where the literal (in sense of normal) reading of a scriptural text conflicts with a philosophical demonstration, a different interpretation of the text must be sought: this is the PPD that we already saw in Augustine. Taken by itself, PPD is consistent with the other three principles above: it simply affords a second possible response to a claim of conflict between Scripture and natural philosophy. If the latter has demonstration on its side, there will be no need to call on the further strategies of PA/PSL/PP.

But what if demonstration is lacking in cases of apparent conflict? Several passages in the *Letter* seem to suggest that in that event the literal interpretation should stand and, in context, carry weight as knowledge of nature (PPS). (These are two separate claims.) Galileo scholars have long debated whether the *Letter* ought to be construed.<sup>55</sup> What makes this issue significant is that PPS is clearly inconsistent with PSL and risks tension also with PP. (It could be reconciled with PA provided that an exception from PPS could be allowed where there was clear evidence of accommodation.) What the difference reduces to is whether, in the absence of demonstration on the side of the philosophical/scientific claim, there is a presumption that the (conflicting) literal interpretation of the Scripture passage should be maintained and should be taken to convey proper knowledge of nature. According to PPS, yes; according to PSL, no.

A logical point first. If the disputed issue in natural philosophy cannot be demonstrated, the other set of principles, PSL/PA/PP, is sufficient of itself to exclude any definitive claim to natural knowledge on behalf of the challenged scriptural passage. This is a point Galileo could have made but did not. If his arguments for PSL/PA/PP are accepted, he does not need to produce a demonstration of Copernicanism. Instead, we find passages like the following:

In the learned books of worldly authors are contained some propositions about nature that are truly demonstrated and others that are simply taught. In regard to the former, the task of wise theologians is to show that they are not contrary to Holy Scripture; as for the latter (which are taught but not demonstrated with necessity), if they contain anything contrary to the Holy Writ, then they must be considered indubitably false and must be demonstrated such by every possible means.<sup>56</sup>

The last part of this passage clearly implies that Scripture can contain “propositions about nature,” that in the absence of a counterdemonstration must be held to be true. Might Galileo have had in mind here only doctrines that are part of the faith? This would convert the principle into what in Augustine appeared as PPF. But in context this seems a somewhat contrived interpretation.<sup>57</sup> Another passage runs: “Even in

regard to those propositions which are not articles of faith, the authority of the same Holy Writ should have authority over any human writings, written not with a demonstrative method, but with pure narration or with probable reasons only. This principle should be considered appropriate and necessary inasmuch as divine wisdom surpasses all human judgment and speculation.”<sup>58</sup> Does “written not with a demonstrative method” amount to “not demonstrated” or, rather, to “unscientific”?<sup>59</sup> Whichever interpretation one favors here, it would at least seem safe to infer that Galileo is conceding that the authority of Holy Writ extends to Scripture passages bearing on nature, literally interpreted, when on the conflicting side there are probable reasons or mere “unscientific” claims only. What animates this admission is clearly the theme Galileo has picked up from Augustine: divine wisdom of the sort found in revelation surpasses any (merely speculative?) human judgment. It is significant that this theme nowhere appears in Galileo’s *Letter to Castelli* composed prior to his discovery of the texts in the *De Genesi*.

Two other factors might have contributed to this weakening of PSL in the form he had argued for so vigorously. At the time he composed the *Letter*, he was evidently optimistic about the chances of demonstrating the Copernican claims. He opens the *Letter* with an unqualified assertion: “I hold that the sun is located at the center of the revolutions of the heavenly orbs and does not change place, and that the earth rotates on itself and revolves around it.”<sup>60</sup> If he could really make that case, he could rely on PPD alone to carry his argument.

Another disposing factor might have been the Aristotelian account of knowledge to which Galileo had been introduced in his early teaching career in Pisa and that he never seems to have seriously questioned. The phrase ‘necessary demonstration,’ which occurs over and over in the *Letter*, came naturally to him from his grounding in the *Posterior Analytics*. There is ample evidence in his writings that he had not developed any appreciation for the nuances of hypothetical reasoning such as one finds in, say, Kepler’s *Apologia pro Tychone*.<sup>61</sup> There was really no secure place in his philosophy (any more than in that of the Aristotelians in Rome) for a well-supported theory that nevertheless fell short of actual demonstration. He might, therefore, be less disposed than he otherwise might have been to challenge claims for Scripture in the domain of natural knowledge where the rival philosophic/scientific claim was only “probable,” even though his advocacy of PSL would have indicated otherwise.

Or would it? Here another issue of consistency arises. Many commentators have noted the apparent contradiction between PSL and Galileo’s own practice, both of the exegetic letters and elsewhere, of calling on Scripture himself in seeming support of the Copernican position. At first sight, this would appear to be a real, not just an apparent, contradiction. But is it? Those who argue that Galileo did propose Scripture as a source

of astronomical knowledge rely mainly on the closing sections of the two letters where he treats of the miracle in Joshua of the sun's standing still. He argues that in the Ptolemaic system (if interpreted physically) this would entail an *acceleration* by a factor of 360 of the proper motion of the sun in order to give the appearance of the sun's standing still, whereas in the Copernican view the stilling of the earth's motion needed to bring about the same appearance could be achieved by halting the rotation of the sun (which he speculatively proposes as the cause of the earth's motion). Thus the Copernican could more easily retain the literal interpretation of Joshua that could the Ptolemaic.

As already noted, however, this argument is quite explicitly presented in the *ad hominem* form of a classical rhetorical strategy. It assumes, without conceding, a premise relied on by the opponent and shows that the contradictory of what the opponent seeks to establish will then, in fact, follow. The argument-form is completed by showing that one's own position *is* consistent with the opponent's premise. This technique was standard in the scholastic "disputations that occupied so prominent a place in the system of education of the day, and Galileo makes it clear that this is the technique he is employing ("Let us then assume and concede to the opponent that the words of the sacred text should be taken precisely in their literal meanings").<sup>62</sup> In no way does this commit Galileo to his opponent's premise. /111/

What Galileo does allow, and indeed emphasize, is that philosophical/scientific knowledge can be used to clarify ambiguities in the scriptural texts—such ambiguities for example, as the command in Joshua that the sun should stand still "in the midst of the heavens." In this way, one can discover what the "literal" (in the sense of intended) meaning of the Scripture text may well be. But, of course, this is not to say that one could turn to the literal/normal reading of the text in the first place to support the Copernican position. Insofar as this way of reconciling the text with the Copernican view could be called "support," it would have to be understood as support of an altogether indirect sort that was quite consistent with PSL.

In a letter to Dini, written while the *Letter to the Grand Duchess* was still at a draft stage,<sup>63</sup> Galileo does indeed dally with the idea that Scripture provides a warrant of sorts for his own highly speculative theory of a "caloric spirit" that emanates from the sun and moves the cosmos as a whole. He emphasizes over and over the tentative character of his hypothesis, imploring Dini not to let others know of it. Significantly, it finds no place in the *Letter to the Grand Duchess*. Not too much weight should be placed on this venture of his. There is some reason to believe that he shared the common view of the time that the writers of Scripture did know deeper truths about nature, which is why he would be tempted by speculative trial balloons like the one he launches in the Dini letter. But this leaves PSL



more or less intact. In his *Letter to Castelli* he had written that it was simply “disorderly” to call on Scripture “in disputes about natural phenomena that did not directly involve the faith.”<sup>64</sup> On the substance of this warning, it seems doubtful that he ever changed his mind.

What we must remember in all this discussion of possible inconsistencies is that what we have in the two exegetic letters is an opportunistic collection of rhetorical strategies, not a formal axiomatic system. Can one really require complete consistency in such a context? Galileo was searching for arguments that would *work* with his readers. Whether the arguments would fit together as a single integrated whole was probably not of immediate concern to him. He could, for example, concede PPS to those who were disposed to emphasize the revealed character of the Scripture as a whole, but he could hope that his well-turned case for PP would deter them from committing themselves to a premature and potentially disastrous decision. The tension between the principles he sprinkles throughout the *Letter to the Grand Duchess* as ways to defuse the challenge to Copernicanism is worth the extended attention devoted to it here not so much because it implies a logical failure on Galileo’s part but for what it tells us about the exegetic strategies potentially available at the time for dealing with the sort of crisis that was in the making in Rome.

It has sometimes been suggested that Galileo’s supposed use of Scripture to bolster his Copernican claims was what brought down the wrath of the Holy Office on his head. There is no evidence of this in the record. We know the charges that Caccini alleged against him in the denunciation to the Holy Office that set off the inquiry. We know what Galileo was in the end enjoined to cease doing. In all of this, /112/ there is no hint of the charge that he was using Scripture to *support* Copernicanism; the charge was specifically that he was defending the latter, which was (it was decided) false on philosophic grounds and, more to the point, clearly contrary to Scripture. The further charge of his employing Scripture to make his own case for Copernicanism is nowhere mentioned.<sup>65</sup>

Galileo’s theological venture failed in its immediate goals. It did not have to fail, but from the beginning its chances of success were small. Its great merit for us here is that it persuasively presents what lay within the limits of the theologically possible at that time in dealing with the Copernican controversy. It helps us to reconstruct some, at least, of the elements of the discussions that must (should?) have gone on among the consultors and cardinal-members of the Holy Office in February 1616, as well as to assess the outcome they arrived at. Elsewhere I will turn to that broader story.<sup>66</sup> The complexities we have encountered here in our efforts to trace the origins and the rhetorical strategies of Galileo’s powerful brief forth Copernican defense are essential to an understanding of that larger story.

## NOTES

1. For an account of the complex of circumstances affecting the Holy Office decree of 1616, see Ernan McMullin, "The Church's Ban on Copernicanism, 1616," in *The Church and Galileo*, ed. Ernan McMullin, Notre Dame: University of Notre Dame Press., 2005, 150–190.
2. This essay takes off from an earlier piece, Ernan McMullin, "From Augustine to Galileo," *Modern Schoolman* 76 (1999): 169–94. It also draws in part on my more detailed study "Galileo on Science and Scripture," in *The Cambridge Companion to Galileo*, ed. Peter Machamer (Cambridge: Cambridge University Press, 1998), 271–347. It represents, however, a revision in some respects of both those earlier studies.
3. Augustine, *De Genesi ad litteram* (The literal meaning of Genesis) (hereafter cited parenthetically in the text by book, chapter, and section, as *LMG*), trans. John H. Taylor (New York: Newman Press, 1982), 8.2.5.
4. Augustine, *Retractationes*, 2.50 (text in Appendix I to the Taylor translation of *LMG*).
5. Roland Teske, introduction to *St. Augustine on Genesis*, a translation of Augustine's earlier two incomplete commentaries on Genesis (Washington, DC: Catholic University of America Press, 1991), 17–18.
6. See John J. O'Meara, "Augustine, Literal and Scientific: His Interpretation of *Genesis* on Creation," in *Understanding Augustine* (Dublin: Four Courts, 1997), 113. It is remarkable, as O'Meara points out, how very little attention has been paid to the Genesis commentaries of Augustine by contemporary exegetes. For Taylor's comment, see *LMG*, 10.
7. The labels and consequently the abbreviations I attach here to Augustine's exegetic principles are in some cases not the same as those I used earlier in McMullin, "Galileo on Science."
8. The translation here is my own.
9. The actual phrase is "something contrary to Scripture, that is [id est], contrary to the Catholic faith." Augustine has introduced a new consideration here, after all the talk of readings that are "contrary to Scripture." I take it that the second phrase, "contrary to the Catholic faith," where the issue of multiple interpretation should not arise, is the one to be emphasized in this context.
10. O'Meara draws attention to a variant reading here: "[W]e should either indicate a solution [showing that the conflict is only apparent] or believe without hesitation that it is false" ("Augustine, Literal and Scientific," 115).
11. This, as we shall see, was the only one of the passages cited here from Augustine that Galileo missed—significantly perhaps, as we shall see, since this text, above all the others would have supported his argument that the movement of the sun and the immobility of the earth are only what appears "to the eyes of men on earth."
12. Translation of the Latin phrase above is mine.
13. This eloquent passage has recently been cited to some effect by theological critics of "creation science," an account of origins inspired by a literalist reading of Genesis that sets aside much of modern evolutionary and geological science.
14. O'Meara believes it likely that Augustine was acquainted with some of the manuals of astronomy of his day: "What is to be noted is the impression the exactitude of secular science made upon him: its certain findings had to be accepted." O'Meara, "Augustine, Literal and Scientific," 117.
15. See Galileo's *Letter to Castelli* in *Le opere di Galileo Galilei* (hereafter *OGG*), ed. Antonio Favaro (1890–1909; reprint, Florence: Giunti Barbèra, 1968), 5:285; translation in Maurice Finocchiaro, ed., *The Galileo Affair: A Documentary History* (hereafter *GA*) (Berkeley: University of California Press, 1989), 52.
16. Galileo, *Letter to Castelli*, *OGG*, 5:284; *GA*, 51.
17. *OGG*, 5: 283; *GA*, 50.
18. *OGG*, 5: 283; *GA*, 50; translation slightly modified.
19. *OGG*, 5: 283–84; *GA*, 51 (emphasis mine).
20. *OGG*, 5: 283–84; *GA*, 51.
21. *OGG*, 5: 283–84; *GA*, 51.

22. *OGG*, 5: 285; *GA*, 52. More than once in his writings, Galileo makes claims of this sort, as if controversy in natural science were a black-and-white affair where only the “true side” had valid arguments in its support.

23. *OGG*, 5: 285; *GA*, 52.

24. For the text of the consultants’ report, see Sergio Pagano and Antonio G. Luciani, eds., *I documenti del processo di Galileo Galilei* (Vatican City: Pontifical Academy of Sciences, 1984), 68–69; translation in *GA*, 135–36. Were the offending phrases in the original? Galileo scholars disagree. The majority have followed Favaro in supposing that they were deliberately added by the hostile person (the Dominican Niccolò Lorini is the most likely candidate) who sent a copy of the letter to the Holy Office. We also have a “correct” copy of the letter in which these phrases are missing; it was forwarded by Galileo to Piero Dini to be communicated to the Roman authorities, indicating that he suspected the first copy to have been adulterated (*OGG*, 5: 291–94; *GA*, 55–58). Mauro Pesce argues, more plausibly to my mind, that the first copy was correct and that Galileo, hearing that the letter was being scrutinized in Rome, decided to send an amended version omitting the offending phrases but leaving the substance of his argument untouched. He remarks to Dini that the original had been written “with a fast pen.” Mauro Pesce, “Le redazioni originali della *Lettera Copernicana* di G. Galilei a B. Castelli,” *Filologia e Critica* 17 (1992): 394–417; Annibale Fantoli, *Galileo: For Copernicanism and for the Church*, 2nd ed., ed. and trans. George V. Coyne (Vatican City: Vatican Observatory Publications, 1996), 177.

25. Dini to Galileo, Mar. 7, 161J, *OGG*, 12: 151–52; *GA*, 58; Galileo to Dini, Mar. 23, 1615, *OGG*, 5: 299–300; *GA*, 60.

26. Paolo Antonio Foscarini, *Lettera sopra l’opinione de’ Pittagorici e del Copernico*, translation in Richard J. Blackwell, *Galileo, Bellarmine, and the Bible* (hereafter *GBB*) (Notre Dame: University of Notre Dame Press, 1991), 223, 228, 232–33.

27. *GBB*, 220.

28. Blackwell concludes that there is an “unresolved tension” here, displaying “two critically different views of the relation between revelation and natural knowledge,” but suggests that allowing primacy to demonstration on the side of reason or sense (PPD) is the “dominant view in the *Letter* generally” (*GBB*, 92–93).

29. *GBB*, 233. Perhaps one might say that although this would lie outside the *explicit* aim of Scripture, there could be truths about nature buried in Scripture all the same.

30. A further point alleged by some commentators is that Foscarini proposes Scripture as an independent support for Copernicanism; some suggest further that this may have what, in particular, irked the Roman authorities who banned his book. In fact his *Letter* nowhere does this: his aim is clearly to remove a powerful objection rather than to make a positive case for Copernicus. What he wants to establish is that, among many possible interpretations, there is a way to interpret the disputed earth/sun passages that makes them consistent, at least, with the Copernican view. From this one cannot go on to infer that these passages can be used to support the Copernican theses directly. The ambiguities of interpretation forbid turning the inference around. But one can see how an unfriendly reader in 1615–1616 might suppose that showing the Copernican earth/sun claims to be a *possible* reading of Scripture was, in effect using Scripture to make the Copernican case.

31. For a translation, see *GBB*, Appendix VIIA, 253–54.

32. For a translation, and a note on the different versions of the *Defense*, see *GBB*, Appendix VIIB, 100.

33. *GBB*, 256. A nice turn of phrase!

34. *GBB*, 261. Foscarini may have taken this reference to Augustine from Pereira directly. The two passages he quotes are exactly those found in Benito Pereira’s *Commentariorum et disputationum in Genesim, tomi quatuor* (Rome: Ferrari, 1591–95) 1.1.8, and in the Pereira paraphrase of Augustine, 1.21. Had he actually read the *De Genesi*, he surely would have made more extensive use of it.

35. There is an unsigned letter to Galileo, very probably from Foscarini, written apparently sometime later in 1615, where the writer lays out ambitious plans for a large work comparing the two world-systems and arguing for the Copernican one (*OGG*, 12:215–20). Scripture would be called on where it would lend itself to a possible Copernican interpretation. But on issues “which do not transcend natural limits and depend entirely on the senses,” one should follow the testimony of “reasoning or factual evidence,” even where this runs contrary to long-standing

traditions that depend on “the outward appearance of the words [of Scripture]” (216–17). See Irving Kelter, “Paolo Foscarini’s Letter to Galileo: The Search for Proofs of the Earth’s Motion,” *Modern Schoolman* 70 (1992): 31–44.

36. *OGG*, 12: 126–27; see Fantoli, *Galileo*, 247–48.

37. Cesi to Galileo, Mar. 7, 1615; *OGG*, 12:150.

38. Bruno Basile makes the case for a strong influence of the Foscarini documents on Galileo’s writing in “Galileo e il teologo ‘copernicano,’ Paolo Antonio Foscarini,” *Rivista di Letteratura Italiana* 1 (1983): 63–96.

39. *OGG*, 5:320; *GA*, 96. For Foscarini, *Defense*, see *GBB*, 259. Galileo quotes only from a single page of Pereira’s work; he may well have been given a copy of that page alone.

40. *OGG*, 5: 327; *GA*, 101. For Foscarini, *Defense*, see *GBB* 259.

41. *OGG*, 5: 333; *GA*, 107. For Foscarini, *Defense*, see *GBB* 260.

42. A minor point: Galileo refers one of the passages cited from Jerome to the latter’s commentary on Matthew 13; Foscarini makes it Matthew 4. Neither, as it happens, is correct.

43. *OGG*, 12: 349; *GA*, 263. See Fantoli, *Galileo*, 253 n. 43.

44. *OGG*, 5: 292; *GA*, 56.

45. *OGG*, 5: 151; *GA*, 59.

46. *OGG*, 12: 190; *GBB*, 109.

47. There is an abundant literature on these principles and a measure of disagreement as to how they should be defined and how exactly they relate to one another. See, for example, Fantoli, *Galileo*, 189–208; *GBB*, 75–85; William E. Carroll, “Galileo and the Interpretation of the Bible,” *Science and Education* 8 (1999): 151–87; Mauro Pesce, “L’interpretazione della Bibbia nella Lettera di Galileo a Cristina di Lorena e la sua ricezione: Storia di una difficoltà nel distinguere ciò che è religiose da ciò che non lo è,” *Annali di Storia dell’Esegesi* 4 (1987): 239–84, and “Momenti della ricezione dell’ermeneutica biblica galileiana e della Lettera a Cristina nel XVII secolo,” in *Annali di Storia dell’Esegesi* 8 (1991): 55–104. [reference corrected]

48. He could easily have been directed also to references to PA in medieval sources, notably in Thomas Aquinas, who frequently has recourse to the principle, but he is content with the strong authority of Augustine. See, for example, *Summa Theologia*, I, q. 98.a.3; Nicole d’Oresme, *Le livre du ciel et du monde*, eds. A. D. Menut and A. J. Denomy (Madison: University of Wisconsin Press, 1968), 530.

49. Galileo, *Letter to the Grand Duchess*, *OGG*, 5:320; *GA*, 96 (emphasis mine).

50. *OGG*, 5: 319; *GA*, 96.

51. *OGG*, 5: 319; *GA*, 95.

52. *OGG*, 5: 319; *GA*, 95.

53. *OGG*, 5: 326; *GA*, 101.

54. *OGG*, 5: 320; *GA*, 96.

55. Claiming an inconsistency of one form or another would be, for example, Jerome J. Langford, *Galileo, Science and the Church* (New York: Desclee, 1966), 72–74; *GBB*, 78–82; Michael Sharratt, *Galileo: Decisive Innovator* (Oxford: Blackwell, 1994), 123–26; and several of my own essays, most recently McMullin, “Galileo on Science.” Denying inconsistency would be, for example, Fantoli, *Galileo*, 195–205; Maurice Finocchiaro, “The Methodological Background to Galileo’s Trial,” in *Reinterpreting Galileo*, ed. William Wallace (Washington, DC: Catholic University of America Press, 1986), 266.

56. *OGG*, 5: 327; *GA*, 101–02.

57. See McMullin, “Galileo on Science,” esp. n. 118, for more detail.

58. *OGG*, 5: 317; *GA*, 94. Translation of the phrase “Scritte non con metoda dimostrativo” modified as suggested by Fantoli, *Galileo*, 250.

59. The latter is Fantoli’s choice, the former mine. The principle that Fantoli sees as central to the *Letter* is the principle of the autonomy of scientific research (PASR), which would not be violated if his reading of the ambiguous phrase above were to be adopted (Fantoli, *Galileo*, 198–200). That Galileo was favoring a principle of that general sort seems right, although he does concede that it must yield on matters of faith (PPF). PASR and PSL are not equivalent on such issues, for example, as whether stars are animate, which Galileo (unlike Aristotle) sets outside the bounds of natural philosophy. He allows that “where human reason cannot reach and where consequently one cannot have a science but only opinion and faith, it is appropriate to conform absolutely to the literal meaning of Scripture” (*OGG* 5: 330; *GA*, 104). This would

conform with PASR but could violate PSL, depending on some decisions about the exact scope of PSL which in turn would depend on the choice of arguments on which PSL was taken to rest.

60. *OGG* 5: 311; *GA*, 88.

61. See Ernan McMullin, "The Conception of Science in Galileo's Work," in *New Perspectives on Galileo*, eds. Robert Butts and Joseph Pitt (Dordrecht: D. Reidel, 1978), 209–27.

62. *OGG* 5: 285–86; *GA*, 52.

63. Galileo to Dini, Mar. 23, 1615; *OGG*, 5:297–305; *GA*, 60–67.

64. *OGG*, 5:285; *GA*, 52.

65. In a recent essay, Maurice Finocchiaro traces a fascinating tale of an apocryphal letter attributed to Galileo in the 1780s, aimed at showing that he was condemned for using Scripture to support his Copernican theses. This was then used to show that it was for his "bad theology" that Galileo was (rightly) condemned by the Church. And this claim kept surfacing over and over in the century that followed. Finocchiaro's own view (similar to that defended above) is that Galileo "preached and practiced the opposite principle, that Scripture should not be used to support physical propositions." See Maurice Finocchiaro, "Galileo as a 'Bad Theologian': A Formative Myth about Galileo's Trial," *Studies in the History and Philosophy of Science* 33 (2002): 753–91.

66. [Sentence modified and note added to this republication; the original text referred to a later chapter in the same book.] Ernan McMullin, "The Church's Ban on Copernicanism, 1616." In *The Church and Galileo*, ed. Ernan McMullin, Notre Dame: University of Notre Dame Press, 2005, 150–90.