EXAMINING THE MYTH: GALILEO AS SCIENTIFIC MARTYR

Dr. David H. Calhoun
Associate Professor of Philosophy, Gonzaga University

Why did the Church treat Galileo in the way it did? Does this indicate general opposition to scientific research, or the assertions of faith against scientific reason?

The astronomer and mathematician Galileo Galilei (1564-1642) is rightly renowned for his scientific achievements, particularly in astronomy and mechanics. His design improvements to the telescope turned a novel curiosity into a serious scientific tool, which he himself used to make systematic and detailed observations of the moon, Venus, Sun, and other heavenly bodies, including the moons of Jupiter, which were the basis for a significant part of his early scientific reputation. In a different field, Galileo's innovations in inclined ramps, which allowed precise measurements of the speed and acceleration of falling bodies, provided the basis for new approaches to the study of physical motion.

Yet Galileo's scientific significance pales in comparison to his popular characterization as a heroic and revolutionary scientific martyr who stood up to the declining power of the Roman Catholic Church defiantly to declare the autonomy of scientific inquiry from theological dogma. According to this oft-told story, Galileo took up the cause of heliocentrism, which had somehow evaded formal Church condemnation since publication of Copernicus' *On the Revolutions of the Heavenly Spheres* (1543), and defended that view against the entrenched geocentric (earth-centered) and geostatic (stationary earth) theory articulated by the classical astronomer Ptolemy and integrated into official Christian Church dogma. While Galileo was for some time a geocentrist, his telescopic observations eventually convinced him of the truth of heliocentrism; after about 1610, in private and public conversations, in his teaching, and finally in his influential book *The Dialogues on the Two Chief World Systems* (1632), Galileo risked his scientific reputation and personal safety to articulate and defend Copernicanism. For taking this brave step, Galileo was in 1633 called before the Inquisition and forced to recant his heliocentric views under threat of torture--indeed, some accounts affirm that he was tortured as part of the proceedings.

The Jesuit-educated critic of Christianity Voltaire summed up the significance of the case: "the great Galileo, at the age of fourscore, groaned away his days in the dungeons of the Inquisition, because he had demonstrated by irrefutable proofs the motion of the earth." Versions of this story appear in many in-

fluential accounts of the role of science in history by authors such as Edward Gibbon, John William Draper, and Andrew Dickson White, and works of art and drama, such as Bertolt Brecht's *Galileo*. Versions of this story are as common as the story that Columbus first discovered the sphericity of the earth. Importantly, the Galileo stories are no less fanciful than the Columbus story (hint: almost all educated people from antiquity forward, including during the Medieval era, knew that the earth was a sphere)..

It's important to know a bit of background to the story. Galileo began to regard the Copernican view as compelling in about 1610, as his telescopic observations accumulated evidence at odds with aspects of Ptolemaic cosmology. Consequently, he wrote several works defending the reasonability of heliocentrism, including two public "letters" in which he addressed the apparent conflict between heliocentrism and passages in the Bible that seemed to assert indisputably that the earth was stationary and the heavens, and the sun in particular, in motion. In the most important of these works, the *Letter to Christina* (1615), addressed to the Tuscan grand duchess, Galileo argued for a very reasonable biblical hermeneutical principle: that the Bible should be read straightforwardly except in cases when such a straightforward reading was ruled out by compelling independent evidence. Should the evidence for heliocentrism and geokinesis become sufficiently strong, therefore, passages such as Psalm 104:5 or Joshua 10:11-13, which describe the earth as immobile and the sun as in motion, should not be read as *false*, but understood as phrased in the common-sense non-scientific language of ordinary human experience.

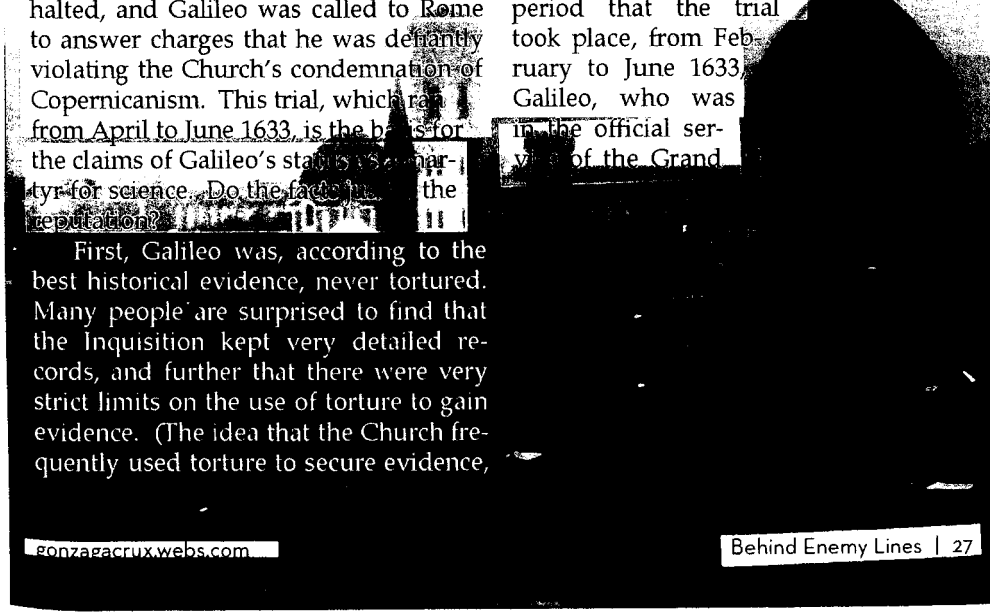
To press the positive case for the reasonability of heliocentrism, Galileo voluntarily visited Rome in 1616, as the Congregation of the Index was considering whether to declare heliocentrism inconsistent with Christian doctrine. Galileo's arguments were not successful, however, and Copernicanism was declared heretical (though plans were laid for publishing a "corrected" edition of Copernicus' book *On the Revolutions of the Heavenly Spheres*, in which the theory would be presented as a mathematical model instead of an actual account of cosmology). During his visit, Galileo had an important meeting with Cardinal Robert Bellarmine, the head of the Holy Office. Galileo and Bellarmine apparently agreed on the critical question of scriptural interpretation, that only strong independent evidence should overturn straightforward readings of the scripture. Since, at the time, there was no such compelling evidence for heliocentrism, Bellarmine insisted that Galileo agree not to hold, teach, or defend Copernicanism. According to a document in the files of Holy Office, Galileo acceded to this instruction.

GALILEO IS NOT A REPRESENTATIVE OF SCIENCE AGAINST FAITH, BUT A MODEL FOR THE INTEGRATION OF FAITH AND SCIENCE.

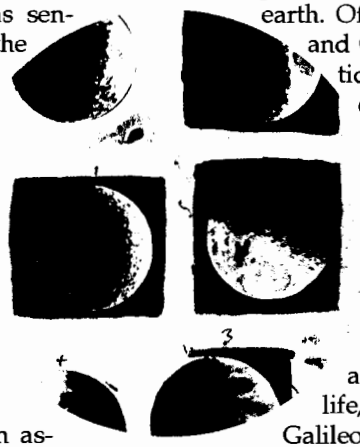
However, in the following years, as Galileo began to accumulate what he took to be further evidence for heliocentrism, he began to think the evidence sufficient to treat geocentric statements in the scripture as mere concessions to unlearned common sense, as he had argued in the Letter to Christina. He was encouraged by the elevation of a fellow Florentine to the papacy in 1623, when Matteo Barbarini became Pope Urban VIII. Galileo dedicated an astronomy book to Urban VIII, and had several audiences with him that encouraged him to feel free to move ahead with further research and writing on Copernicanism. The result was his *Dialogues on the Two Chief World Systems*, which was completed in 1630 and finally approved by the local Florentine censor for publication in 1632. Instead of finding his work triumphantly received, however, publication was almost immediately halted, and Galileo was called to Rome to answer charges that he was defiantly violating the Church's condemnation of Copernicanism. This trial, which ran from April to June 1633, is the basis for the claims of Galileo's status as martyr for science. Do the facts support the reputation?

First, Galileo was, according to the best historical evidence, never tortured. Many people are surprised to find that the Inquisition kept very detailed records, and further that there were very strict limits on the use of torture to gain evidence. (The idea that the Church frequently used torture to secure evidence, and that any evidence they collected was therefore unreliable, is another myth, but it will have to await another occasion for refutation.) There is some evidence that as part of a formal process Galileo might have been shown the instruments of torture, and the record specifically states that Galileo was to be *threatened* with torture, but his age, quasi-clerical status, and physical condition after his interrogation all provide very compelling evidence that he suffered no actual torture. Despite Galileo's general ill health, as a man of nearly 70 years of age, there is no evidence that he suffered any lingering aftereffects of his treatment at the hands of the Inquisition.

Second, Galileo was never detained in a dungeon, and very likely was never imprisoned, if by "imprisoned" one means what the term normally means: being deprived of one's liberty by confinement in a jail cell. During the four-month period that the trial took place, from February to June 1633, Galileo, who was in the official service of the Grand



Duke of Tuscany, Cosimo II de Medici, was allowed to stay at the residence of the Tuscan ambassador to Rome. During part of the proceedings, he was housed in the personal apartments of the Inquisition prosecutor. For the entire span of the trial, there are only a few days that the record is unclear about where Galileo was housed. Perhaps he was housed in a prison cell for a few of these days, but such treatment would hardly amount to Voltaire's "groaning in the dungeons." It is true that Galileo was sentenced to house arrest by the Inquisition for the final decade of his life, but Church authorities exhibited flexibility in how they interpreted this. For example, the pope allowed Galileo to visit his friend the archbishop of Siena and stay with him for 5 months on his way back home to Florence.



GALILEO MOON PHASES / WIKIMEDIA COMMONS

Third, Galileo failed in assembling compelling evidence for heliocentric cosmology, much less proving them with Voltaire's "irrefutable truths." His magnum opus on heliocentrism, the *Dialogues on the Two Chief World Systems*, is, as the title indicates, framed as a conversation between friends on the strengths and weaknesses of Ptolemaic geocentrism and Copernican heliocentrism. While Galileo offers a number of arguments against tenets of the Ptolemaic view, such as the notion that the heavens are of a qualitatively different and perfect kind from the sublunar realm, Galileo's arguments in favor of heliocentrism are probabilistic and speculative. Galileo regarded his most compelling argument for heliocentrism to be that the rotation of the earth on its axis along with its orbit around the sun provided the best explanation for the motion of the tides. In making this claim, Galileo rejected the theory of astronomer Johannes Kepler, who linked the tides to the rotational pattern of the moon around the earth. Of course, Kepler was right and Galileo wrong about the tides. So much for Galileo's "irrefutable proofs" of heliocentrism.

Fourth, despite the implication that Galileo was a scientist fighting against the Church, it is worth noting that Galileo regarded himself throughout the trial, and to the end of his life, as a good Catholic. The Galileo case therefore is not an instance of the Catholic Church oppressing someone outside of its proper jurisdiction. It is an internal dispute between Catholics about how to reconcile a scientific theory with the teachings of the Church. Related to this is the point just addressed: the dispute was not between scientific assertions on the one side (Galileo's), and bare theological assertions on the other (by the Church). It had rather to do with the impact of scientific claims on interpretation of the Bible, and therefore with a complex mix of empirical evidence for the scientific theory and theological issues about biblical interpretation. Galileo himself was engaged in a project to show the *compatibility* of scientific discoveries and Christian doctrines. As such, the case demonstrates that Galileo is not a representative of science *against* faith, but a model for the integration of faith and science, as Pope Benedict XVI noted in a homily in 2009.

Galileo was therefore not martyred by the Catholic Church for advocating heliocentrism. Of course, it is still true that Galileo was found guilty of "vehement suspicion of heresy" and forced to recant, and his book barred from publication. It is further true that the Vatican took centuries to acknowledge formally that heliocentrism is the most reasonable cosmological model for the planetary system of which earth is a part, and that admissions of wrongdoing in the Galileo case by Church officials have dribbled out in small doses, including as recently as Benedict's final address as pope to the clergy of Rome on February 14, 2013. Why did the Church treat Galileo in the way it did? Does this indicate general opposition to scientific research, or the assertions of faith against scientific reason?

The short answer is "no." No single institution in the late medieval and early modern periods provided more funding for scientific research, and sponsored the work of so many working scientists, than the Catholic Church. At no time did this project of scientific research exist in a theological vacuum. But in Galileo's time the theological challenges of the Reformation complicated the Church's response to scientific activity. The question of scriptural interpretation, and the related question of who was qualified to interpret scripture, was particularly volatile in this context. And yet central to Galileo's defense of heliocentrism was an argument about scriptural interpretation. Moreover, Galileo further exacerbated the controversy by presenting the views of defenders of the Ptolemaic system, in a book ostensibly offering a neutral review of the competing theories, in the mouth of a rather clumsy and simple-minded interlocutor. For good measure, he named the character *Simplicio*—"simple-minded," as one might translate it—and it did not help that the views so described sounded rather like those of Urban VIII himself. So there is no doubt that the Church's response was defensive. Further, there is some evidence that Galileo's decision to publish the *Dialogues* was regarded as an aggravated offense because of his agreement with Bellarmine in 1616 not to hold, teach, or defend Copernicanism; though there is some historical controversy about exactly what status this "agreement" had and how binding it was on Galileo. In short, the Church erred; but its error was more political-theological than it was anti-scientific. It was a mistake for the Church to interfere with the disciplinary competence of the science of astronomy, the claims of which must be decided by the appropriate sorts of *astronomical* evidence. The Church did not live up to its general standard of support for science in Galileo's case, but the idea that Galileo was persecuted for doing science is untenable. ✚

SOURCES / FURTHER READING for the GALILEO ARTICLE:

William E. Carroll, "Galileo, Science, and the Bible," *Acta Philosophica* 6 (1997):5-37.

Maurice A. Finocchiaro, "Myth 8: That Galileo Was Imprisoned and Tortured for Advocating Copernicanism," in Ronald L. Numbers, ed., *Galileo Goes to Jail and Other Myths about Science and Religion* (Cambridge, MA: Harvard University Press, 2009), 68-78.

Galileo Galilei, *The Essential Galileo*, Maurice A. Finocchiaro, ed. and trans. (Indianapolis, IN: Hackett, 2008).

Rodney Stark, "God's Handiwork: The Religious Origins of Science," Chapter 2 of *For the Glory of God* (Princeton: Princeton University Press, 2003), 121-99.

William A. Wallace, "Galileo's Science and the Trial of 1633," *Wilson Quarterly* (Summer 1983):154-64.