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Copernicus, Heliocentricity, and the Catholic Church: What Really Happened

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Abstract

The history of the Copernicus controversy is reviewed, noting that it is far more complex than is often presented in the press or the popular literature. Copernicus's main problem was not the church but that the case for the heliocentric model lacked scientific evidence, and the Ptolemy model was then widely accepted. For this reason, much resistance existed to the heliocentric model from both the scientific and religious establishments. Actually, a significant source of Copernicus's support was from the church. This case is another example of the secular establishment oversimplifying, as well as occasionally distorting, history. The goal of this paper is to provide some light on this important historical event.

Introduction

In discussions of our solar system and its origin, the Catholic Church's putative historical opposition to a heliocentric solar system (i.e., the belief that the earth and planets revolve around the sun) and support of the geocentric (earth-centered solar system) is often used in an attempt to document the harmful influence of Christianity on scientific progress. Typical is a claim by astronomer David Levy, who wrote that when Nicolas Copernicus proposed his heliocentric model, "Not surprisingly, it met with great hostility from the church, which held that God had created a universe with the earth at its heart" (Levy, 1994, p. 20).

Ganeri, et al., went further, claiming that when Copernicus documented his idea in his 1543 book, the "problem was, the Church stated that God had put the Earth at the center of the Universe. You could be put to death for saying the Earth went round the Sun." They added, "Few scientists were brave enough to say that they agreed with Copernicus' finding that the Earth went round the Sun. The Italian astronomer Galileo was [brave enough]—and was put on trial for his ideas in 1634" (Ganeri, et al., 2007, p. 116).

Author Richard G. Bozarth added that Christianity seriously impeded "the progress of science" and the best-known example is the church's "fight against the Copernican heliocentric theory" (Bozarth, 1992, p. 52). An editorial in *Omni* magazine claimed that "once a religion becomes politically powerful, it suppresses all 'heretical' teachings. Galileo was silenced by the Roman Catholic Church. ... Robert A. Heinlein predicted three decades ago that the United States would be ruled by a religious dictatorship in the twenty-first century" (Bova, 1981, p. 6).

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Obviously, Heinlein's prediction was way off. In fact, the opposite is true. The Copernican affair may not only be one of the most quoted claims in the long history of "persecution" of science by religion, but it is also one of the most misunderstood events in history. It is also widely believed that the eventual acceptance of the heliocentric position was one of the many triumphs of science over religion (Repcheck, 2007, p. 11). This view, immortalized by Andrew White, president of Cornell University in the late 1800s, has been uncritically and widely repeated by academics, politicians, and the media ever since (White, 1896; Harris, 1973). This is true despite the fact that both White's thesis and book have now been thoroughly refuted by many scholars (Brooke, 1991).

It has even been falsely claimed, or implied, that those persons who supported Copernicus's heliocentric model invariably got into trouble with the church. An example is the claim by Charles Darwin's great-great grandson, Matthew Chapman, in his book about the Scopes trial, where he states that for

> supporting Copernican theory in the mid-1600s, Galileo was tried by the Roman Catholic church and put under house arrest for the last eight years of his life. He was not 'pardoned' until 1988 when Pope John Paul II finally conceded that the church had made a 'mistake'. *1988!* Over three centuries to concede a scientific point that every man of reason had accepted two hundred years before. (Chapman, 2000, pp. 136–137).

As we will document, "every man of reason" did not accept heliocentrism in Copernicus's day or until sometime after; actually the situation was quite the opposite. The fact is, in Galileo's day "no one had yet come up with a convincing proof that earth really flew around the Sun at great speed, as Copernicus' proposal required" (Moy, 2001, p. 44).

From the twenty-first-century secular, scientific, and materialistic perspective, and in view of the atheism that is often intertwined with science today, it is easy to dismiss this seventeenth-century controversy as incontrovertible evidence of the church's antipathy to the results of scientific research that conflicted with religious dogma. In fact, Seeger concludes it is "merely an instance of the perpetual clash between an individual's freedom of thought and society's establishment of authority" (Seeger, 1981, p. 168).

A Short History of the Heliocentric Revolution

The reactions of sixteenth-century Europeans to the heliocentric theory can be understood only by evaluating the entire Copernican-Galileo situation in its historical context (Kesten, 1945). Throughout history, most civilizations believed the earth was located at the physical center of the universe and existed primarily for our benefit. The stars guided us at night and revealed information about our lives. The moon helped to light up our night. The sun warmed us and lighted our way during daylight, and the rain clouds were created to water our crops.

The geocentric worldview—that the sun, planets, and stars all circled the earth—was accepted by most of humanity until the sixteenth century. In Copernicus's day, moving from the earth outward, the moon was believed to be the first heavenly body, next was Mercury, followed by Venus, and, last, was the sun and mars, all traveling in perfect circles around the earth. Farthest out were the fixed stars that were attached to a celestial sphere, which was the outer extent of the universe. Beyond this was nothing but empty space (Singh, 2004).

For generations, the common people took this view for granted because it fit into a simplistic, straightforward view of the earth-sun relationship. It was also believed for most of human history that the entire physical heavens consisted of only about 6,000 stars, all of which were very much alike, and a few planets (meaning "wanderers," based on their movement in contrast to stars). The stars were arranged into constellations, which the ancients saw as having meaning beyond their simple arrangement (Berry, 1961). Aside from this, the ancients knew very little about the heavens, believing many things that today we recognize as nonsense. The fact recognized today that the earth is but a "speck," whizzing around the sun at 66,600 mph in our solar system, which is but a "dot" in the Milky Way galaxy, stands in vivid contrast to the worldview of ancient mankind.

Few scientists since Aristotle challenged geocentrism, and since Augustine few churchmen had questioned the theory until Copernicus. It was also the established scientific view, defended by the eminent astronomer Claudius Ptolemy (c. AD 85–165) who wrote the highly respected astronomical scientific text titled *Almagest*, which was based on his research and extensive scientific observations (Repcheck, 2007, p. 13). Ptolemy was a "scholar of prodigious talent—incredibly ingenious and prolific … the most significant [of his many works] being the *Almagest*, which surveyed everything then known about the universe" (Repcheck, 2007, p. 13). His scientific authority was unquestioned for over 1500 years.

It seemed obvious to anyone who had the blessing of vision that the sun rises and sets and that the earth is stationary (Bentley, 1966). Since it was axiomatic that the sun moves around the earth, it was argued that anyone who denied this obvious fact was not only wrong, but also ignorant, or even crazy. Even today using the expression "the sun rises in the east and sets in the west" implies geocentrism.

Seventeenth-century scientists and nonscientists alike argued that if the

earth moved around the sun, the wind would constantly blow at a uniform speed and intensity and would eventually blow away the earth's atmosphere (Draper, 1957). If the earth moves, why do we not feel its movement as we feel the wind when riding a horse? The ancients were unaware that the earth is blanketed by an atmosphere that moves with the earth and used their experience of traveling on horses against the atmosphere to conclude that they should, likewise, feel the wind as they rode on an earth traveling in space.

Also, if the earth were traveling around the sun, what prevented everything from flying off the earth, and what prevented the earth itself from falling into the sun due to its enormous gravity? Since the ancients had no understanding of centripetal force or gravity, the new heliocentric idea was viewed as blatantly foolish to most everyone, even the most learned men of the time (Walsh, 1911). The earth's place in the center of the physical and psychological universe was a belief taken for granted for centuries (Gingerich, 1993). No significant reason existed to view the universe in any other way until Nicholas Copernicus (1473–1543) published his thesis *On the Revolution of the Heavenly Bodies* in 1543.

Although Copernicus was the person first widely credited with the scientific development of the modern heliocentric theory (Leith, 1973), several clergymen-scientists proposed theories of a geokinetic worldview long before Copernicus. One example was the French priest and scientist John Burdan (c. 1300–1358). Another example is Nicole Oresme (1320–1382), who effectively refuted many of the proofs for geocentrism (Hannam, 2009, pp. 186–190). No evidence exists that these heliocentric theorists faced problems from the church (Hannam, 2009, pp. 181–210). Copernicus's work is also judged today as marking the beginning of the modern scientific revolution. Copernicus was a priest, a student of canon law, and later, a professor of astronomy. His research on the sun, moon, and planets eventually culminated in his 1543 work *On the Revolution of the Heavenly Bodies*, wherein he proposed two radical changes to our conception of the structure of our solar system (Nash, 1929).

Copernicus's Claims

Copernicus's first claim was heliocentrism, meaning the sun was in the physical center of our universe. His second was geokineticism, specifically referring to the earth's diurnal motion around its axis and its annual motion circling around the sun. These two ideas were in direct contradiction to the scientifically orthodox Ptolemaic-Aristotelian geocentric cosmos, which placed the earth at the exact center of the solar system and was geostatic, meaning that the earth did not move (Principe, 2006, p. 70) and that the sun, and all of the then-known planets, moved around a stationary earth.

Copernicus had been working on this idea for about 30 years. Finally, in 1514, Copernicus wrote a short summary of his conclusions titled *Commentaniolus* (little commentary), which he circulated widely. In this work Copernicus called the geocentric-heliocentric issue "this very difficult and almost insoluble problem" (Freely, 2012, p. 224). As a result of his short work, he established his reputation as an astronomer to the extent that, in 1515, Pope Leo X invited him to journey to Rome to help work on the calendar reform project that was then a pressing issue. Copernicus declined because he felt that the existing measurements for a year's length were not yet accurate enough to complete a new calendar.

The Opposition's Claims Are False

Claims that "Copernicus … famously refused to publish his revolutionary work until he was on his deathbed, for fear of ecclesiastical repercussions" are clearly false (Kaufman, 2011, p. 179). In fact, Copernicus actually published his ideas in response to "the nagging of several fellow churchmen" (Principe, 2006, p. 71).

Copernicus also received much support from the church and its popes, especially Clement VII (Hagen, 1908). Cardinal Schönberg and Protestant clergyman Andreas Osiander both helped Copernicus to publish his revolutionary work (Koestler, 1959). They even arranged for its printing, and the work was dedicated, with permission, to Pope Paul III (Hoyle, 1973). Some religious opposition did exist, but the main concern, as we will explain, was scientific:

> Copernicus … hesitated for decades before publishing his only scientific work, *On the Revolutions of the Celestial Spheres*, perhaps because he knew it would stir religious fury as well as scientific opposition. Legend has it that he was handed the first copy of his masterpiece on his deathbed, on May 24, 1543, although by that point he may have been too weak to recognize it. (Dolnick, 2011, p. 98)

At this early date, the *opposition was primarily from the academic community*. Gingerich (1981) notes that Copernicus's book was highly regarded in Lutheran circles and extensively studied throughout their university system. Fear of exposing himself to the ridicule of common people was a major reason why Copernicus's work was not published until shortly before he died. The reason most opposed the theory was because it proposed a radically new view of the universe that contradicted the commonsense worldview of most common people. Copernicus was then a canon of the cathedral in Krakow, Poland, largely an administrative position. Once Copernicus's theories were published, his theory at first found little acceptance for many reasons (Principe, 2006, p. 71).

Opposition by Leading Astronomical Scientists

A major reason for Copernicus's rejection by scientists was the absence of evidence and that "scientists are highly resistant to new scientific ideas." In addition, the most celebrated astronomer of the day, Tycho Brahe, strongly opposed Copernicus's ideas for his entire life and had mustered several powerful, scientific arguments to support his opposition (Brooks, 2012, p. 95). It was not just Copernicus who had these problems, but "Isaac Newton and Friedrich Gauss … both waited twenty years for recognition and acceptance of their radical ideas. A full thirty-five years passed before Newton's own university was willing to teach his work (Brooks, 2012, p. 169). Brooks added that, although scientists today "hold up Copernicus as a researcher who was obviously right, his golden idea—that the earth goes round the Sun—was widely rejected by his scientific peers" (Brooks, 2012, p. 169).

Ironically, the Catholic Church's response probably encouraged many people who otherwise would not have examined the heliocentric view, resulting in many scientists' eventual acceptance. Although the heliocentric revolution had begun with Copernicus, most universities still taught geocentricity years after Galileo died (Spielberg and Anderson, 1987). In fact, when Harvard was founded in 1636, the faculty was committed to the Ptolemaic theory.

The facts reviewed here are widely known among science historians. Dolnick writes that the scientific objections to heliocentrism "were enormous. If Copernicus was right, the earth was speeding along a gigantic racetrack at tens of thousands of miles an hour, and none of the passengers suffered so much as a mussed hair. The fastest that *any* traveler had ever moved was roughly twenty miles an hour, on horseback" (Dolnick, 2011, pp. 98–99). These arguments were not made by the church but by

> the most esteemed scholars, not from yokels. They knew, on both scientific and philosophical grounds, that the Earth does not move. … Aristotle had argued that the Earth rests in place because it occupies its natural home, the center of the universe, just as an ordinary object on the ground stays in *its* place unless something comes along and dislodges it. (Dolnick, 2011, pp. 98–99)

Furthermore, scholars pointed to the countless

> observations that all led to the same conclusion. We can be sure the Earth stands still, one eminent philosopher explained, "for at the slightest jar of the Earth, we would see cities and fortresses, town and mountains thrown down." But we don't see cities toppled, the skeptics noted, nor do we see any other evidence that we live on a hurtling platform. If we're racing along, why can we pour a drink into a glass without worrying that the glass will have moved hundreds of yards out of range by the time the drink reaches it? If we climb to the roof and drop a coin, why does it land directly below where we let it go and not miles away? (Dolnick, 2011, pp. 98–99)

The church invariably gets all the blame and science none, even though most of the blame falls on science. This is nothing less than deliberate anti-Christian propaganda.

In developing his model, Copernicus essentially rejected 2,000 years of coherent astronomical theory. A major reason his theory was rejected was because it subverted the fundamental principles of physics as illustrated by the everyday observation that when all heavy bodies are dropped, they are pulled toward the earth by the force of gravity. Aristotle had placed the earth at the center of the cosmos because, he reasoned, it was the heaviest substance he knew of, and, therefore, anything we drop falls toward this heavy center.

The common people wondered, if Copernicus's idea that the earth was suspended a large distance away from the sun's center was correct, why do heavy bodies still fall toward the earth? Why don't they fall upward toward the sun if the sun is at the center of our solar system? Another problem with Copernicus's theory included its prediction of stellar parallax, and stellar parallax was actually detected only in the nineteenth century (Principe, 2006, p. 71).

It is also important to remember that most people in the ancient world were not very concerned whether or not the sun was at the center of the solar system because, in Copernicus's day, the main goal of astronomy was not determining the position of heavenly bodies but rather to determining where the planets would be in the near future in order to make accurate astrological predictions.

The Influence of Others on Copernicus's Work

Copernicus also likely learned much from at least one of the leading astronomers of his era, Johannes Regiomontanus (1436–1476), who "wrote four books that became valued standard works well into Copernicus' time and beyond: The *Epitome of Ptolemy's Almagest*, *On Triangles of Every Kind*, The *Tables of Directions*, and The *Ephemerides*" (Repcheck, 2007, p. 24). Regiomontanus was a leading astronomer and a graduate of the University of Leipzig for both his BS and MS degrees (Freely, 2012, p. 211).

Copernicus's first disciple was Georg Joachim Rheticus, a mathematics prodigy from Wittenberg (Danielson, 2006). Rheticus worked for three years with his master, Copernicus. Rheticus faced opposition from his university, as did Copernicus. When Rheticus returned to the University of Wittenberg in early October after studying under Copernicus, the opposition to heliocentrism

> continued to dominate those who in less troubled times might have

> given the Copernican message the attention it deserved. In the absence of decisive empirical evidence, and unsupported by any mathematical proof confirming the heliocentric theory, Rheticus' enthusiasm seemed, in the strictest sense, impertinent. No one was about to accept a counterintuitive notion like that of a moving earth merely on the word of an idiosyncratic, long-truant twenty-seven-year-old. (Danielson, 2006, p. 91)

As a result, Rheticus's hopes for "a sympathetic reception of Copernican ideas were dashed, and so was his dream of getting a seventh consecutive semester off so that he could carry on to Nuremberg and begin publication of *The Revolutions* without delay. Instead, faced with an overeager faculty member bent on pursuing unsettling ideas, Wittenberg put him to work in administration" (Danielson, 2006, p. 91).

Significance of the Copernican Case for Science Today

Religion has no monopoly on intolerance. Intolerance is a characteristic of imperfect humans and a trait that all of us must work assiduously to overcome. Isaac Asimov concluded that if a

> heretic is himself a scientist and depends on some organized scientific pursuit for his living or for his renown, things can be made hard for him. He can be deprived of government grants, of prestige—filled appointments, [and] of access to the learned journals. (Asimov, 1977, p. 7).

Reports of terminations and other problems in academia based on minority beliefs now abound in the literature, forcing one to ask, "Have things changed much since Galileo?" The answer is, probably not very much. Harvard's Owen Gingerich concluded that "scientific censorship, remains in our world today, and it may well be far more effective and insidious than in the seventeenth century" during the time of Copernicus (Gingerich, 1981, p. 60). Sir Fred Hoyle, in an introduction to one of his books, concluded that the popular belief that the opposition to revolutionary ideas is a thing of the past is false:

> Human societies, it is claimed, have progressed beyond the stage when such outrages could happen again. In this book we show that the Copernican Revolution is far from over, and that society has not improved since the sixteenth century in any important respect. If anything the situation may have got worse, with the successes of the Industrial Revolution conferring upon human beings a degree of arrogance not seen before. (Hoyle, 1973, p. 1)

Today, more than ever before, we must insure that ideas in science are silenced *only* by empirical evidence that comes from experimentation and replication (Redondi, 1987; Langford, 1992). Since at its core origins science is history, and not directly based on empirical laboratory science, speculation is necessarily involved. It is unfortunate for science that there is not much more tolerance in this, the twenty-first century, than in Copernicus's day.

Conclusions

Our knowledge about science, even before the turn of the last century, was miniscule compared to what is known today. Although many of the basics taught at the high school level were known then, nonetheless, the word "revolution" is for good reason used to describe science progress today, all of which clearly renders Paley's watchmaker hypothesis infinitely more viable in our age than ever before in history. And, unfortunately, much misinformation exists about the relationship between science and Christian reactions to science.

The erroneous claim that the Christian church at one time "killed people who believed that the earth revolved around the sun" (Blinick, 2014, p. 10) is a prime example of a gross misrepresentation of history. University of Wisconsin science historian Ronald Numbers in a PBS interview on his research about Galileo stated that not only is there "no reason to believe that Galileo at any point faced the threat of death," but there also "was never any indication in the court records of death being a possible penalty, and no other scientists were put to death for their scientific views" (Numbers, 2006, pp. 2–3).

It is significant that the Scriptures do not specifically teach the ancient but incorrect view of the heavens; rather, they teach a view that allows for all of the discoveries discussed in the last few centuries to fit, without problems, into a biblical worldview. Even though we now have more evidence for design (and thus a Creator), ironically fewer scientists than ever before believe in God. Some scientists seem to learn more and more about less and less until they know almost everything about nothing of real importance. Unbelief among scientists, particularly those involved with academia, has much more to do with educational indoctrination than with the facts of science. The facts of science open both wonder and minds to the glory of the created universe.

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