On the Revolutions

The Commentariolus was only intended as an introduction to Copernicus's ideas, and he wrote "the mathematical demonstrations intended for my larger work should be omitted for brevity's sake…" (MW 82). In a sense it was an announcement of the greater work that Copernicus had begun. The Commentariolus was never published during Copernicus's lifetime, but he sent manuscript copies to various astronomers and philosophers. He received some discouragement because the heliocentric system seemed to disagree with the Bible, but mostly he was encouraged. Although Copernicus's involvement with official attempts to reform the calendar was limited to a no longer extant letter, that endeavor made a new, serious astronomical theory welcome. Fear of the reaction of ecclesiastical authorities was probably the least of the reasons why he delayed publishing his book.[7] The most important reasons for the delay was that the larger work required both astronomical observations and intricate mathematical proofs. His administrative duties certainly interfered with both the research and the writing. He was unable to make the regular observations that he needed and Frombork, which was often fogged in, was not a good place for those observations. Moreover, as Gingerich (1993, 37) pointed out,

[Copernicus] was far from the major international centers of printing that could profitably handle a book as large and technical as De revolutionibus. On the other [hand], his manuscript was still full of numerical inconsistencies, and he knew very well that he had not taken complete advantage of the opportunities that the heliocentric viewpoint offered…Furthermore, Copernicus was far from academic centers, thereby lacking the stimulation of technically trained colleagues with whom he could discuss his work.

The manuscript of On the Revolutions was basically complete when Rheticus came to visit him in 1539. The work comprised six books. The first book, the best known, discussed what came to be known as the Copernican theory and what is Copernicus's most important contribution to astronomy, the heliocentric universe (although in Copernicus's model, the sun is not truly in the center). Book 1 set out the order of the heavenly bodies about the sun: "[The sphere of the fixed stars] is followed by the first of the planets, Saturn, which completes its circuit in 30 years. After Saturn, Jupiter accomplishes its revolution in 12 years. The Mars revolves in 2 years. The annual revolution takes the series' fourth place, which contains the earth…together with the lunar sphere as an epicycle. In the fifth place Venus returns in 9 months. Lastly, the sixth place is held by Mercury, which revolves in a period of 80 days" (Revolutions, 21–22). This established a relationship between the order of the planets and their periods, and it made a

unified system. This may be the most important argument in favor of the heliocentric model as Copernicus described it.[8] It was far superior to Ptolemy's model, which had the planets revolving around the earth so that the sun, Mercury, and Venus all had the same annual revolution. In book 1 Copernicus also insisted that the movements of all bodies must be circular and uniform, and noted that the reason they may appear nonuniform to us is "either that their circles have poles different [from the earth's] or that the earth is not at the center of the circles on which they revolve" (Revolutions, 11). Particularly notable for Copernicus was that in Ptolemy's model the sun, the moon, and the five planets seemed ironically to have different motions from the other heavenly bodies and it made more sense for the small earth to move than the immense heavens. But the fact that Copernicus turned the earth into a planet did not cause him to reject Aristotelian physics, for he maintained that "land and water together press upon a single center of gravity; that the earth has no other center of magnitude; that, since earth is heavier, its gaps are filled with water…" (Revolutions, 10). As Aristotle had asserted, the earth was the center toward which the physical elements gravitate. This was a problem for Copernicus's model, because if the earth was no longer the center, why should elements gravitate toward it?

The second book of On the Revolutions elaborated the concepts in the first book; book 3 dealt with the precession of the equinoxes and solar theory; book 4 dealt with the moon's motions; book 5 dealt with the planetary longitude and book 6 with latitude.[9] Copernicus depended very much on Ptolemy's observations, and there was little new in his mathematics. He was most successful in his work on planetary longitude, which, as Swerdlow and Neugebauer (77) commented, was "Copernicus's most admirable, and most demanding, accomplishment…It was above all the decision to derive new elements for the planets that delayed for nearly half a lifetime Copernicus's continuation of his work – nearly twenty years devoted to observation and then several more to the most tedious kind of computation – and the result was recognized by his contemporaries as the equal of Ptolemy's accomplishment, which was surely the highest praise for an astronomer." Surprisingly, given that the elimination of the equant was so important in theCommentariolus, Copernicus did not mention it in book 1, but he sought to replace it with an epicyclet throughout On the Revolutions. Nevertheless, he did write in book 5 when describing the motion of Mercury:

…the ancients allowed the epicycle to move uniformly only around the equant's center. This procedure was in gross conflict with the true center [of the epicycle's motion], its relative [distances], and the prior centers of both [other circles]…However, in order that this last planet

too may be rescued from the affronts and pretenses of its detractors, and that its uniform motion, no less than that of the other aforementioned planets, may be revealed in relation to the earth's motion, I shall attribute to it too, [as the circle mounted] on its eccentric, an eccentric instead of the epicycle accepted in antiquity (Revolutions, 278–79).

Kaynak: https://plato.stanford.edu/entries/copernicus/#AstrIdeaWrit