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Chapter Two

Copernicus and his Revolution

2.1 Robert S. Westman, *Proof, poetics, and patronage**

[...]

Copernicus the clerical humanist

De revolutionibus is consciously addressed to an ecclesiastical audience. The preface is cast in the idiom of church patronage and reform: hardly surprising when we recall that Copernicus spent his entire career as a church functionary, collecting rents from the peasantry, shoring up military defenses against the Teutonic knights, tending to the health needs of his chapter, and so forth. Of course, he had obtained his own office as canon in the usual manner through which church positions and properties were distributed during the late Renaissance: namely, through family connections. Throughout the sixteenth and seventeenth centuries, nepotism in the church was an important vehicle of upward social mobility. Those sacred offices known as ecclesiastical benefices always had incomes associated with them and were often acquired as a reward for service. Such benefices might or might not involve the care of souls and, in any event, because of the manner in which they were received, tended to be viewed primarily as income and only incidentally as sacred offices. Copernicus did not hold a benefice but received income from church property in absentia after his uncle, the bishop of Varmia, appointed him scholaster (instructor) at the Church of the Holy Cross in Breslau (Wrocław). Such nepotistic associations certainly suggest that, had he wished to, Copernicus might have moved eventually into the position held by his uncle and that he might

* Robert S. Westman, 'Proof, poetics, and patronage: Copernicus's preface to *De revolutionibus*', in D. Lindberg and R. Westman (eds), *Reappraisals of the Scientific Revolution* (Cambridge: Cambridge University Press, 1990), pp. 175-83, 186-9.

have risen from there into the bureaucracy of papal Rome. As we know, however, he did not choose that path, and there is no evidence that he wrote *De revolutionibus* with such an intention in mind.

If the prefatory material to *De revolutionibus* does not reveal a strategy of office seeking, its language nonetheless raises the broader issue of Copernicus's discursive practices as a humanist and the organization of patronage in early sixteenth-century papal Rome. . . . After the period of the Great Schism, which left Rome, at the beginning of the fifteenth century, an intellectual backwater, the papacy sought to reestablish its cultural and political leadership throughout Europe. Humanist styles and ideals, which first arose as a new way of interpreting civic experience among the notaries and lawyers in the state chancelleries of Milan and Florence and the princely courts of Mantua and Ferrara, proved to be well suited to papal goals. All papal letters and formal documents were drafted in Latin, and it was the humanists, with their philological emphasis on 'getting the texts right' and their emulation of ancient classical forms of expression who became excellent broadcasters for papal policy. They were also valuable resources in the furtherance of papal foreign policy. Clerical humanists who staffed the papal and cardinalate households made superb ambassadors to hostile, secular courts, where they could present the papal court 'as a cultural force equal to, if not greater than, any secular court'. To be sure, not all the popes were equally supportive of humanism, but under the pontificate of Nicholas V (1447–1455), humanism made major inroads into the Roman bureaucracy. An admirer of Florentine humanism, Pope Nicholas was a great lover of books. He founded the Vatican Library, encouraged translations of Greek classical and patristic masterpieces (among them a substantial quantity of mathematical texts), provided humanists with numerous posts in the Curia, and elevated Nicholas of Cusa to the cardinalate; in short, he established a pattern of reciprocity whereby humanists would spread the glory of their papal patron in return for economic security in the church bureaucracy.

By the end of the fifteenth century, humanists had made Neo-Latin poetry into the favored vocabulary of upper-class Roman society. Such poetry might express praise of the patron during his lifetime or at his funeral; it might satirize his enemies; together with the oration, it was the fashionable genre at formal ceremonies, such as the dedication of a new building; it was a common feature in letters written by humanists or humanist popes; and it was often the language in which hopes for church reform were expressed. Popes and cardinals reveled in verse, and humanists willingly produced reams of it. Exquisite attention to proper Ciceronian style, and translations of Greek philosophical or moral writers, became the cultural badges of ambitious young humanist clerics.

Against this all too brief account, Copernicus's classical learning and humanist church contacts take on new and heightened meaning. Twenty-four different classical authors are cited in Copernicus's writings. Annotated

philological works and a well-thumbed Greek dictionary, published in 1499, still survive with the remnants of his library in Uppsala. And it was this somewhat inadequate dictionary that he used when he published his very first book in 1509, a translation of a Greek work – in English, *Ethical, Rustic, and Love Letters* – by an obscure seventh-century Byzantine poet, Theophylactus Simocatta. In the dedication to his uncle, Copernicus reveals an Erasmian appreciation of the use of proverbs: 'Every reader may pluck what pleases him most in these letters, like an assortment of flowers in a garden. Yet Theophylactus disposed so much of value in all of them that they seem to be not letters but rather laws and rules for the conduct of human life.' Although the love letters seemed to Canon Copernicus to 'portend licentiousness', he defended their ethical value: 'Just as physicians usually moderate the bitterness of drugs by sweetening them to make them more palatable to patients, so these love letters have in like manner been rectified, with the result that they ought to receive the label "moral" no less.' . . .

Meanwhile, Copernicus's reputation spread to Rome through other humanist channels. It was Pope Clement VII's secretary, a humanist and orientalist named Johann Albrecht Widmanstetter (1506–1577), who first learned of Copernicus's cosmological theory and explained it to the pope, in the Vatican gardens in 1533, before two cardinals, a bishop, and the pope's physician. In return, the pope presented Widmanstetter with a Greek manuscript containing several scientific treatises. Two years later Widmanstetter moved into the service of a recently promoted Dominican cardinal, Nicholas Schönberg (1472–1537), and after the latter's death Widmanstetter became secretary to the succeeding pope. In November 1536, Schönberg wrote to Copernicus, urging him to send a copy of his manuscript to Rome and even offering to provide as amanuensis the representative of the Varmian chapter in Rome, Theodoric of Reden. Copernicus, who well understood the proper epistolary order for seeking approval and protection in pre-Tridentine Rome, could easily have interpreted Schönberg's letter as a sign of eventual papal approbation; at the very least, it indicated support in the highest curial circles. Thus, when Copernicus placed Schönberg's letter in *De revolutionibus* immediately after the title page and just before the preface to the pope, he was allowing the Dominican Cardinal Schönberg to provide the first description of his 'new account of the World': 'In it you teach that the earth moves; that the sun occupies the lowest, and thus the middle, place in the universe.' Hence, Andreas Osiander's famous unsigned letter 'To the Reader Concerning the Hypotheses of this Work' which, without Copernicus's permission, was placed first in the publication, interfered as much with the author's methodological aims as with his intended strategy for seeking the pope's patronage.

Strategies of persuasion

Turn now to the preface itself. Who was the pope to whom the work was dedicated, and what was Copernicus's strategy of presentation? The pope

to whom Copernicus's theory had once been described in the Vatican gardens was dead; so was Copernicus's advocate, Cardinal Schönberg. The new pope was now Paul III (1534–1549), the former Cardinal Alessandro Farnese – once a student at the University of Pisa, a poet, well schooled in Greek; as a pope, renowned for his wide learning and love of astrology. Among his institutional accomplishments, he founded the Roman Inquisition and called into session the Council of Trent. Farnese came from a wealthy, noble family and could afford to pay his servants with his own money rather than strictly from ecclesiastical revenues. Indeed, according to a census of cardinals' households prepared in 1526–1527, Farnese's household contained three hundred six persons. Not surprisingly, he was the frequent object of pleas for patronage. Twice, in 1529 and in 1532, Luca Gàurico (1475–1558), a Neapolitan astronomer and author of numerous prognostications, predicted that Alessandro Farnese would become pope. Gàurico soon found himself a regular dinner companion of the cardinal. In 1543, Gàurico presided at an astrological ceremony for the laying of the cornerstone in the Farnese wing of the Vatican Palace. Gàurico calculated the exact hour and zodiacal sign, assisted by Vincenzo Campanacci, a Bolognese astrologer, who 'found the proper time on the astrolabe and announced it in a loud voice'. Three years later Gàurico was rewarded with a bishopric. It is revealing of Copernicus's strategy that he chose not to make predictions about the pope's health, longevity, or political future, nor did he advise him when to make journeys. One may speculate that he kept silent on such astrological matters in order not to create the slightest possibility of offending the pope and, perhaps, to associate himself politically with those humanist elements within the church opposed, on various moral and physical grounds, to divinatory practices.

In appealing for patronal support, Copernicus reveals a rigorous knowledge of common epistolographical and rhetorical resources, such as understatement of his own achievements and exaggerated modesty: all characteristic strategies in a *captatio benevolentiae* designed to capture an audience's attention and good will. The preface utilizes a variety of rhetorical figures – among which irony, confession, and antithesis are most prominent – in order to create a sense of tension and contrast between Copernicus's theory and the cosmologies he hopes to replace. Without breaking his argument, Copernicus displays his rhetorical agility in moving back and forth between opposing themes. One notices the following contraries: coherence and incoherence, order and confusion, praise and ridicule, common sense and absurdity, beauty and monstrosity, novelty and tradition, clarity and obscurity, certainty and uncertainty.

Copernicus begins by presenting himself ironically as someone worthy of laughter and derision, someone who goes against tradition and whose theories will surely be repudiated. . . . Why does Copernicus put himself to such trouble? Well, he says, it is like this: His friends the cardinal of Capua and the bishop of Chelmino had repeatedly urged him to publish. They

argued that even if his theory appeared to be crazy, 'so much the more admiration and thanks would it gain after they saw the publication of my writings dispel the fog of absurdity by the most transparent proofs [*liquidissimis demonstrationibus*]. Finally, he has acceded to their entreaties and will 'permit it to appear after being buried among my papers and lying concealed not merely until the ninth year but by now the fourth period of nine years'. Here is his story: For a long time, he pondered the uncertainties in the traditional astronomies and the disagreements among them. Some use homocentrics; others use eccentrics. The homocentrists cannot get their theories to fit the phenomena absolutely; the eccentricists can deduce the phenomena but violate 'first principles'. Worst of all, neither tradition can deduce what Copernicus calls 'the arrangement of the universe and the sure symmetry of its parts'. In short, we have an ironic reversal: It is tradition itself that is full of monstrous incoherence and absurdity. And here follows the famous metaphor to which Kuhn and others have attached so much significance, which allegedly ties Copernicus to Florentine Neoplatonism through his Bolognese teacher Domenico Maria de Novara:

With them it is just as though someone were to join together hands, feet, a head, and other members from different places, each part well drawn, but not proportioned to one and the same body, and not in the least matching each other, so that from these [fragments] a monster rather than a man would be put together.

Put logically, the problem is that the old theories have deduced a false universe from false principles. A scientific demonstration of the sort recommended by Aristotle in his *Posterior Analytics*, surely known to Copernicus, stringently required that true conclusions be deduced from true causes. Such *cognitio certa per causas* is certain because it is grounded on causes that are true, proper, and irrevocable.

But, in the following paragraph, Copernicus makes no reference to this strict demonstrative ideal. Instead, he introduces the explicitly humanist theme of reform as a solitary voyage, instigated by the disorder of tradition: 'I reflected on this confusion . . .', 'I began to be annoyed . . .', 'I undertook the task of rereading . . . to learn if anyone had ever proposed . . .', 'I found in Cicero . . .', 'I also discovered in Plutarch . . .', 'I have decided to set his words down here . . .'. This parable of 'rereading' (*libros relegerem*) the old, pre-Christian philosophers allows Copernicus to valorize the 'absurd' idea of the earth's motion as a thought worth entertaining against 'those who teach mathematics in the schools'. After all, if the old, unreformed astronomies are permitted to make assumptions that are false, 'being granted the freedom to imagine any circles whatever for the purpose of explaining the heavenly phenomena', then perhaps he can be permitted to make a new assumption that, although physically absurd, leads to 'sounder demonstrations (*firmitores*

demonstrationes) than those of my predecessors'. Copernicus's search, then, ends in the discovery of order:

I finally found that if the motions of the other planets are brought into relation with the circular course of the earth, and are reckoned for the revolution of each planet, not only do their phenomena follow therefrom but also the order and size of all the planets and spheres, and heaven itself is so linked together that nothing can be moved from its place without causing confusion in the remaining parts and the universe as a whole.

In logical terms, the deductive outcome of Copernicus's hypothetical premise is a conclusion: that his theory possesses the *symmetria* lacking in rival traditions, and that the consequence of his argument – the fitting together of the universe's parts – is warrant for his putatively absurd conditional premise (that the earth moves).

Now, what kind of audience will be receptive to such a shift in demonstrative standards and to the language in which it is cast? One answer seems to lie in an oft-cited passage: 'Mathemata mathematicis scribuntur': He apparently intends the book for mathematically trained astronomers, 'outside the schools', who alone can follow his theories. Possibly, Copernicus has in mind someone like his fervent disciple G. J. Rheticus, but Rheticus is nowhere mentioned. The audience constructed in the preface provides another explanation. The preface, although dedicated to Paul III, divides the church into two groups: those enlightened by mathematical training, and those not. Copernicus includes popes Leo X and Paul III, Cardinal Schönberg, Bishop Giese, and Paul of Middleburg, bishop of Fossombrone, in the first group. In the second, he places untutored theologians – Copernicus calls them 'idle talkers' – who know nothing about mathematics and whom he imagines will deride him by distorting Scripture for their own purposes. The sole example of the latter is the church father Lactantius, 'otherwise an illustrious writer but hardly a mathematician, [who] speaks quite childishly about the earth's shape, when he mocks those who declared that the earth has the form of a globe'. Copernicus hopes that the present pope, by his authority and learning, will suppress any 'calumnious attacks'. For in fact his book not only promises a reform of the theoretical part of astronomy, namely the principles of planetary motion, but also of the practical part, namely the calendar. In the end, the intended audience is supposed to judge whether Copernicus has succeeded.

... Kepler's old teacher Michael Maestlin (1550–1631) is an ideal example, for by sixteenth-century standards he was a preeminent astronomer; and he was also a prolific annotator of *De revolutionibus* and well steeped in the classics. Concerning the passage where Copernicus mentions that it took him four times nine years to publish his book, Maestlin immediately recognized a line from Horace's famous treatise *Ars poetica*, and in the margin of his own copy Maestlin quoted the passage in full: 'Yet if ever you do write

anything, let it enter the ears of some critical Maecius, and your father's, and my own; then put your parchment in the closet and keep it back till the ninth year. What you have not published you can destroy; for the word once sent forth can never come back.' Maestlin's note immediately suggested to me the possibility that other sections of the preface might have Horace as their subtext. The opening verse yields a valuable clue:

If a painter chose to join a human head to the neck of a horse, – so begins *The Art of Poetry* – and to spread feathers of many a hue over limbs picked up now here now there, so that what at the top is a lovely woman ends below in a black and ugly fish, could you, my friends, if favoured with a private view, refrain from laughing? Believe me, dear Pisos, quite like such pictures would be a book whose idle fancies shall be shaped like a sick man's dreams, so that neither head nor foot can be assigned to a single shape. 'Painters and poets,' you say, 'have always had an equal right in hazarding anything.' We know it: this licence we poets claim and in our turn we grant the like; but not so far that savage should mate with tame, or serpents couple with birds, lambs with tigers.

Copernicus has indeed invoked the aesthetic – but it is a Horatian aesthetic, not a Kuhnian one. And the central theme emphasized by Horace and noticed by his Renaissance commentators was the principle of 'fittingness' or 'belongingness'. Style must fit its subject; diction its characters; characters must preserve decorum, appropriateness; the beginning must fit the end. Significantly, the audience is the custodian of 'appropriateness' and rejects through laughter what it perceives not to agree with nature. What moves or delights or persuades the audience is what makes for good poetry. And it was this rhetorical view of poetry that many Renaissance commentators so appreciated in Horace.

In his preface to the pope, Copernicus is always mindful of the audience whose assent and patronage he seeks. But it is also useful to notice what is not explicitly present in the text. By scholastic standards, Copernicus had made himself vulnerable to a serious objection. He had violated Aristotle's prohibition against *metábasis*, a prohibition that disallowed the transfer of the principles of one discipline into those of another. In this case, Copernicus tacitly transferred the Horatian ideal of good poetry into the domain of astronomical practice: Just as one prefers a coherent to an incoherent literary work, so a theory of the planets possessing mathematical coherence (*symmetria*, *armoniae nexum*) is to be preferred over one that does not. The implication is that such a world picture is not arbitrary, for art imitates nature; hence, a decorous audience will judge such a theory to be true, while shunning as absurd one lacking in *symmetria*. If such an argument did violence to the *Posterior Analytics* in its rejection of irrevisable knowledge, it was entirely in keeping with humanist commentators on Horace. [...]

The politics of heavenly reform

Judged strictly as an instance of conceptual change in astronomy, Copernicus's work achieved little that was revolutionary in the terms of such writers as Koyré, Butterfield, Kuhn, and Burt. For them, Copernicus simply discovered how to make a new transformation; others completed the 'revolution'. Our purpose has not been to reappraise the entire epoch denoted by that term. But it is important to point out here that the canonical view of Copernicus as a conceptual conservative – or even Nicholas Jardine's more historically sophisticated and challenging view of him as a kind of 'neo-conservative' natural philosopher – ignores both the subtle politics of Copernicus's reformist strategy within the church and the fact that that strategem initially failed. For *De revolutionibus* was immediately perceived as a resource of disciplinary disruption – a threat not merely to belief about the ordering of the heavens but to the ordering of the disciplines upon which such belief rested. In medieval astronomical textbooks and trees of classification, with their love of divisions and distinctions, astronomy occupied a somewhat disputed zone as a 'middle science' combining mathematics and physics. The parts of this disciplinary couple might coexist in quite different relations to one another. In some works, the mathematical and physical parts have a mutually complementary relation; in others, mathematics is separated from physical considerations and sometimes placed above the latter; but in medieval classification schemes, especially those of Thomas Aquinas and Albertus Magnus, and in many commentaries on Aristotle's *De caelo*, physics is regarded as the superior science from which the mathematical part of astronomy draws its principles – a view still quite prominent in Copernicus's time. Indeed, when Osiander claimed that Copernicus's work would not 'throw the liberal arts into confusion', he was trying to avoid objections from academic philosophers and theologians who associated themselves with this latter tradition, whom he referred to obliquely as 'the peripatetics and theologians'. And Osiander proved to be right: Not long after its publication, a highly placed Dominican in the court of Paul III privately attacked *De revolutionibus* for violating the principles of the 'superior science' of physics.

In his preface to the pope, Copernicus avoids this language of medieval scholastic classification. As we have seen, he draws on a practical knowledge of rhetorical strategies, probably acquired through his association with an artistic culture at Padua blessed by cardinalate patronage. In addition, as Paul Rose has shown, Copernicus was conscious of a discourse of astronomical reform that had already emerged in the work of the Viennese humanist astronomers Georg Peurbach and Regiomontanus and that passed down to him through Domenico Maria de Novara. Evidently Copernicus aimed to solicit reform sentiment from among those in the church who, like the Viennese school, valued the mixed mathematical disciplines but saw them as needing renewal through a return to a purified

ancient tradition. Elements of this mathematical humanism appear in the suppressed introduction to Book 1, where he casts his view of the priority of mathematics in the rhetoric of a humanist encomium: Mathematics is the source of astronomy's highest principles by virtue of the dignity of its subject matter, its pedagogical priority, and the kind of knowledge to which it can lay claim. From mathematics one can deduce the true structure of the universe and thus put an end to warring schools of the sort that have kept the universe's true order from being known – an echo, perhaps, of Regiomontanus's sentiment in the *Tabulae primi mobilis* (1467–1468). Mathematics, 'the summit of the liberal arts', prepares us, in short, for a Platonic image of the unity of all knowledge: common principles underlying all disciplines.

Quite apart from the Copernican theory's threatening implications for those interests committed to the Thomist hierarchy of the disciplines, the preface had wider political associations that hitherto have gone unnoticed. Noticing these sorts of political meaning, however, now requires us to make explicit a view of language silently assumed in this paper, a view that rejects as its primary object specific propositions or utterances. As J. G. A. Pocock has observed about the languages of political thought, 'We wish to study the languages in which utterances were performed, rather than the utterances which were performed in them. ... When we speak of "languages", therefore, we mean for the most part sub-languages: idioms, rhetorics, ways of talking about politics, distinguishable language games of which each may have its own vocabulary, rules, preconditions and implications, tone and style.' ... I want to open the possibility that Copernicus's language in the preface shows remarkable convergences with the political vocabularies of humanist curial reformers, as well as with familiar visual images of Reformation popular propaganda. These overlapping arenas of language and image permit another inference: Copernicus's aim was not merely to recommend that the church improve the scandalous state of the calendar but that it reconsider its teachings about the order of the heavens.

Consider how Copernicus writes of the pope. The pope, who, in Copernicus's words, 'holds dominion over the Ecclesiastical Commonwealth', answers to a God of order – 'The best and most orderly Artisan of all.' The pope is also presented to us as a protector – of Copernicus, of truth-seeking philosophers, and of the church's view of the heavens. His authority does not come merely from God but also from his human qualities: 'Even in this very remote corner of the earth where I live you are considered the highest authority by virtue of the dignity of the office and love of the mathematical arts and all learning.' The pope is urged to protect Copernicus against the hostility, uncertainty, and disagreement engendered by certain astronomers and philosophers: 'By your authority and judgement, you can easily suppress calumnious attacks.' ... The pope at the head of his flock is not corrupt; it is he who must expurgate those who are and thereby protect Rome from abuse.