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THE UNIVERSE OF PHILIP MELANCHTHON: CRITICISM AND USE OF THE COPERNICAN THEORY

By Bruce T. Moran*

In the statutes of 1582 for the University of Altdorf, founded 1578, it is left to the individual judgment of the *mathematici* to expound planetary theory according either to Ptolemy or Copernicus (*vel Ptolemaei vel Copernici*).¹ This concession, that the Copernican hypothesis, as a mathematical construct, is as useful for the description and prediction of planetary movement as the Ptolemaic model, is evidence of a tradition which had long viewed astronomical hypotheses merely as attempts to save appearances rather than as descriptions of the real nature of things. Such a view of the Copernican theory was openly advocated by Philip Melanchthon at the University of Wittenberg. Indeed, Melanchthon's intellectual influence, predominant throughout Lutheran Germany, is particularly apparent at the University of Altdorf. Of the two *Physici* employed in the Faculty of Arts of Altdorf, the first, according to the aforementioned statutes, is to read solely the works of Aristotle, while the second is to read a group of works known collectively as the *Philippus*, i.e., the works of Melanchthon. Such an influence in physics as well as in the interpretation of astronomical hypotheses, has led to the suggestion of a "Wittenberg legacy" which not only encouraged the mathematical utilization of the Copernican theory, but also stimulated astronomical interest and skill in Germany during the latter part of the sixteenth century.² The existence of this tradition demands a closer study of those themes which predominate within Melanchthon's own intellectual universe and which bear upon his initial criticism and subsequent utilization of the Copernican theory as a mathematical device.

EPISTEMOLOGY

Any inquiry into particular motives leading to the acceptance or rejection of a new idea must, initially, confront certain fundamental assumptions about the intellect or the natural world which forge the criteria of theory choice. Philip Melanchthon's attitude toward the nature of knowledge, when viewed collectively with his attitude toward the nature of the universe and his position concerning the Copernican hypothesis, reveals a basic component in any relation of a particular psychology to speculative ideas. What Ernst Cassirer has suggested in this regard seems elemental: all our statements about the physical as well as the intellectual world are about ourselves and the peculiarity of our own organization.³

For Melanchthon all knowledge is oriented toward a knowledge of God. To this end there is fixed in the mind of man a "natural light" (*naturalis lux in intellectu*)⁴ which allows reason and revelation to merge so that divine understanding may be approached through contemplation of the natural world. It is this "natural light," as philosophical intuition, which becomes the arbiter of *both* rational and revealed truth.

"In philosophy and all the arts," writes Melanchthon, "in which the light of human nature judges through itself, there are three precepts of certainty: general experience; principles, or innate ideas within us; and the knowledge of order in determining consequences."⁵ General experience is regarded as ordinary sense perception. That wine and pepper have a certain power to make one hot, and that the motions of the heavens are circular, constitute such sense experiences which are common to all clear thinking persons.

Melanchthon's second precept of intellectual reliability, which he calls "principles," may be characterized as ideas which express *a priori* insight in both the physical and moral realms. They provide, in fact, the means by which all initial assumptions about these two areas of knowledge are formed. "As light is held in the eyes in order to perceive bodies, so like light are these ideas in the mind by which we understand numbers, order, proportions, figures; and by which we form and consider propositions such as: the whole is greater than any of its parts: the cause does not follow its own effect: God is eternal thought, wise, true, just, pure, kind, who preserves the order of things and punishes evil. Moreover, the human intellect was created in this likeness, so that it is said: everyone, in a small image, is a counterpart of God."⁶

Melanchthon now divides these "principles" into two parts: *principia speculabilia* and *principia practica*. *Principia speculabilia*, or visible

principles,⁷ are represented as the innate presuppositions of mathematics and physics: for instance, that all things equal to one factor are equal also among themselves, and that for one simple body, there is only one natural motion.⁸ *Principia practica*, or practical principles, are characterized as inherent moral ideas or propositions "which govern behavior in men, so that human nature may recognize the difference between virtue and shame."⁹

Melanchthon described the third precept of certainty as syllogistic thought, through which similarities and distinctions are recognized, and order is maintained in the operations of the mind.¹⁰

Thus far, two themes have emerged in Melanchthon's epistemology which are useful in understanding his relation to the new theory of Copernicus. First, Melanchthon's structure of knowledge so closely resembles the "threefold nature of knowledge" found in Neo-Platonism as to be indistinguishable from it. For "general experience," read sense perception; for "the knowledge of order in determining consequences," read dialectical reasoning; and for "principles," read intellectual intuition of essences.¹¹ In both systems, the primacy of intuition allows the individual to interpret certain symbolic forms as manifestations of divine revelation. This assumption, moreover, permits Melanchthon to view the order of the planets as a projection of divine intent. Consequently, Melanchthon's universe is inherently astrological; and, I shall argue, it is the Aristotelian structure of the world which provides Melanchthon with a cohesive physical explanation of astrological causation. Second, when Melanchthon uses, as an example of *principia speculabilia*, the strict Aristotelian proposition that for one simple body there is only one natural motion, he gives this aspect of the Aristotelian theory of motion the immense power of an innate idea. Thus, since the earth is viewed as a simple body, Melanchthon is destined, from the foundation of his thinking, to collide with the Copernican physical model.

To these three standards of knowledge, Melanchthon adds a fourth. "In the Church," he writes, "we have a fourth precept of certainty, namely, divine revelation, brought about by the enlightened and infallible testimonies which exist in the prophetic and apostolic books. Although human thought more easily and firmly agrees with these revelations which it discerns by natural light, nevertheless all rational creatures ought, just as firmly, to agree with the revealed judgments of God, even if we (do not) for some reason see these truths and powers by that natural light. Indeed, just as we assert without doubt that two times four is eight, so (similarly) one ought to be convinced that God must

needs call forth the dead, that the Church shall adorn (the pious) with eternal glory and the unjust shall be cast away into eternal punishment."¹² Revelation, therefore, becomes an extenuation of "natural light," and as such, philosophy and the sciences are viewed as legitimate instruments in the pursuit of divine knowledge.

Melanchthon admits that there are many differences between the teachings of physics and the Bible. "Nevertheless," he writes, "there are many things in the teachings of the Church which are not able to be explained without physics."¹³ Melanchthon maintains that without philosophy and the sciences, all religious knowledge corresponds to a mere crude theology (*inerudita theologia*). "It (theology) becomes a disorderly teaching in which essential ideas are not expressed methodically; in which things which ought to be separated are mixed, and, on the other hand, in which those things which by nature demand to be joined are estranged . . . nothing in this system would cohere. Indeed, neither the fundamental elements, nor the progression of ideas, nor even the conclusion could be discerned. Such a doctrine would only produce an infinity of errors."¹⁴

This divine function of philosophy and the sciences is reminiscent of Thomas Aquinas, who saw that in their relation to theology, "other sciences are called the handmaidens of this one."¹⁵ Indeed, Aquinas appears to have directly influenced Melanchthon's conception of innate principles. There are some sciences, Aquinas writes, "which proceed from principles recognized by the natural light of the intellect such as arithmetic and geometry."¹⁶ The Thomist-realist tradition is fundamental to Melanchthon's epistemology and allows him to proceed, by means of "natural light," from the physical world to a knowledge of God.

Although he felt that certain parts of Aristotle, particularly the notion of the world's eternity,¹⁷ needed to be harmonized with the teachings of the Church, Melanchthon, in general, considered himself an Aristotelian.¹⁸ While at Tübingen, Melanchthon convinced his teacher, Franciscus Stadianus, that the medieval commentators had grossly distorted Aristotle's metaphysics. Consequently, the two set upon the monumental task of producing yet another edition of the *pure* Aristotle in the original Greek text. Before the project was completed, Johannes Reuchlin, Willibald Pirckheimer, Georg Simler, Wolfgang Fabricius Capito and Johannes Husgen (Oecolampadius) had assisted in the endeavor.¹⁹

But if Melanchthon, on the one hand, could compose an oration on Aristotle, glorifying his life and placing him first in a list of "best authors,"²⁰ Luther, on the other, could obstinately write: "The whole of Aristotle is to theology as darkness is to light."²¹ To be sure, Luther's nominalism prevented any epistemological inferences leading from rational contemplation of natural phenomena to divine understanding. To this end neither reason nor Aristotle could replace the certain knowledge of revelation. Nevertheless, the naive faith in Scriptural revelation as the only source of certain knowledge, characteristic of the thought of Andreas Carlstadt, Gabriel Zwilling and Thomas Münster, led Melanchthon to open hostility. He writes: "I am not disturbed by the clamor of those hypocrites who, under the pretense of religion, censure the investigation of nature and propound aloud that minds are thereby led away from those testimonies which God delivered with his own voice."²²

MELANCHTHON AND THE SCIENCES AT WITTENBERG

The new teachings of the reformation perplexed and confused many people who had formerly accepted the theological explanations of an established religious hierarchy. Now with spiritual distinctions removed, and each believer a priest unto himself, it became apparent that some type of guidance was necessary from within the reformed Church, not only in matters of Biblical interpretation, but also in the fundamentals of knowledge. But if dogmatism had been deposed, how was one to guide the laity without projecting doctrine? The best approach, Melanchthon thought, was to acquaint everyone with at least the foundations of scientific knowledge. Such knowledge, he believed, when correctly pursued, would inevitably lead to a clearer understanding of the nature of God. It was, however, just such scientific instruction, eclipsed by theological debate, which was missing in the schools. The situation was appalling to Melanchthon, and he designated it as the greatest evil of his time. No other period, he thought, had revolted so much against true education as his own.²³ Somehow, the sciences, which had been neglected at the universities, had to be preserved. Some sanctuary – Nürnberg, Prussia, Wittenberg – free from theological and scriptural prejudice, had to be found. Indeed, Melanchthon called upon all properly educated men to summon everything in their power so that the youth might once again become interested in these studies. For you see, we can almost hear him imploring, a certain degree of knowledge is required before we can grasp the relationship of the surrounding world to

ourselves and learn the plan of the eternal creators — the Father, Son and Holy Spirit.²⁴

It is undeniable that Melanchthon was greatly troubled by those who regarded the sciences as superfluous to the revealed word of the Bible; but it is also certain that these studies had been almost traditionally ignored in the schools. In a style typical of the *Praeceptor Germaniae*, he writes: "What other did Homer wish to indicate when he painted the heavenly bodies on the shield of Achilles and described the rotation of the heavenly vault, than that the investigation of these things was worthy of the most illustrious men. In the writings of Virgil, Iopas, at a royal banquet sings of the wandering moon and the labors of the sun. It is shameful, however, that these sciences were admired in military camps and at banquets while they were despised, scorned and neglected in the schools to which were entrusted the preservation of philosophy and the protection of the state."²⁵

As for the significance of astronomical study, Melanchthon pointedly remarks in the preface to the *Tabulae Astronomicae Resolutae* of Johann Schoner, 1536:

Let others admire wooden doves or other creations of automata: these tables which indicate the position of every heavenly body, not merely for a single year, but for many centuries, are much more deserving of wonder.

So much have I written in order that I might remind those youths who have read this work, how much they owe to Schoner who, by the publication of such distinguished books which are indispensable in the schools, furthers public instruction . . . but Schoner himself did not think it necessary to admonish the studious lest they allow themselves to be deterred from these sciences by the most absurd opinions of the unlearned who deride, in every respect, this sort of astronomical discipline. For those who are even moderately educated in philosophy are easily able to judge the great worth, pleasantness and enormous benefit of the sciences concerning the movements of the heavens.²⁶

Through their very beauty and order, Melanchthon observes, the celestial bodies beckon to the human intellect. Even so, it is arithmetic

and geometry, viewed as "the wings of the human soul," which allow the intellect to take flight and "enter into the heavens to wander freely in the heavenly company."²⁷ Mathematics, therefore, aspires to astronomy. This is of such importance to Melanchthon, that when reforming the structure of education at Wittenberg in 1545, he instructed that the study of arithmetic be made obligatory for *all* students. "By having arithmetic," he writes, "the entrance immediately opens to the doctrine of the motions of the heavens; and although it seems abstruse, it will easily be able to be comprehended. Therefore, *in all the schools*, we instruct those who are acquainted with grammar and dialectics to join with them the study of arithmetic. Moreover, we order the teachers who govern the study of youths to bring those youths to arithmetical instruction and exercise."²⁸

Because of Melanchthon's diligence, scientific studies at Wittenberg received a tremendous impulse. While nominally engaged as a professor of Greek, Melanchthon nevertheless lectured on Aristotle's *De Mundo* and the *Quadripartitum* of Ptolemy.²⁹ Indeed, the *Leges Academiae Witenbergensis*, written by Melanchthon in 1545, reorganized the Faculty of Arts to include two *mathematici*, one of whom was to instruct students in the "lower" mathematics of arithmetic and the *Sphere* of Sacro Bosco, while the other delivered lectures on Euclid, Purbach's *New Theories of the Planets* and Ptolemy's *Almagest*. Aristotle and Dioscorides were to be examined under the direction of the *physicus*, while two *Inspectores Collegii* were named — the first to lecture on dialectics and rhetoric, the second on physics and the second book of Pliny.³⁰ Moreover, Melanchthon himself formulated an introductory textbook in physics, *Initia Doctrinae Physicae* (1549), and combined his masterful Ciceronian style with a historical knowledge of science in numerous academic discourses and orations. In addition, Melanchthon edited and prefaced works by Sacro Bosco, Euclid, Ptolemy, Alfraganus, Purbachius, Regiomontanus, Johann Schoner, Erasmus Reinhold and Georg Joachim Rheticus, many of which he intended to be used in the schools. But perhaps the best indication of Melanchthon's effect on the status of science at Wittenberg can be discovered in his own admonition to students about to be examined in the Faculty of Arts: "The studious know that we will not consume examinations in sophistries . . . but in special subjects of the arts, in dialectics, and in physics, in arithmetic, in Euclid, in the *Sphere* (of Sacro Bosco), in the *Theories* (i.e., Purbach's *New Theories of the Planets*), in computing the distances of places from the longitude and latitude of their positions, and in the doctrines of the Church."³¹

ASTROLOGY

In 1512, Melanchthon matriculated at the University of Tübingen in order to continue his studies for the Masters Degree. During the following six years, three learned men particularly influenced him: the humanist Heinrich Bebel von Justingen (1472–1516), the philosopher-dialectician Franciscus Stadianus, and the astronomer-astrologer Johannes Stöffler (1452–1531). It was Stöffler however, esteemed and remembered by Melanchthon throughout his life, who played a crucial part in forming Melanchthon's understanding of the universe by acquainting him with a coherent astrological theory based on a physically consistent concept of nature. Melanchthon's correspondence, in which he never tires of writing of the astrological implications of comets and the positions of the planets, bears witness to the immense influence of this Tübingen professor.³²

From the moment of his birth Melanchthon had been exposed to astrology. At that time, his father commissioned Johann Virdung von Hassfurt, court astrologer of the Palatinate and later professor of astronomy at Heidelberg, to draw up his son's horoscope. It appears that in his later life, Melanchthon was sincerely convinced by Virdung's calculations which implied that a northerly journey would some day be harmful and that he would endure shipwreck in the Baltic Sea. In 1560, as he lay dying, Melanchthon is reported to have pointed to a map which hung not far from his bed, upon which a large body of water was depicted. Contemplating the map he said, "Virdungus once prophesied to me from the stars that I would suffer shipwreck on the sea, now I am not far from it."³³

Essentially, Melanchthon views the celestial bodies as revealed images or symbols of God's wisdom and goodness. As such, they do not predetermine events, but rather manifest divine purpose. Thus, not only does God reveal himself through Scripture, but also through the symbolic motions of the heavens. The entire universe becomes an emblem of divine will in which God governs everything, ruling the course of the heavenly bodies and all of nature by an absolutely fixed law.³⁴ Order and harmony reign overall. This is the greatest appeal of astrology to Melanchthon. He writes: "It is not merely the utility of these arts which pleases me . . . but much more it is this: when I consider the extraordinary concord of the celestial and lower bodies, such (a condition of) order and harmony suggests to me, *in itself*, that the world was not brought about by accident, but is ruled by God."³⁵

Melanchthon always considered astrology to be a true science. Indeed, it was to establish astrology as a particular science that he composed the *Oratio de Dignitate Astrologiae*, 1535. Here astrology is regarded as "that part of physics which teaches what effect the light of the stars has on simple and mixed bodies, and what sort of temperaments, changes and inclinations occasion these effects."³⁶ Just as we can easily see that the light of the sun imparts warmth and dryness, and that the appearance of the moon produces moisture, so too, in various ways, do the other heavenly bodies affect mankind and the world. Saturn brings melancholy, Jupiter affords tranquility. The Sun vivifies, Mercury brings drought, and Venus and the moon induce rain.³⁷

As with other sciences, Melanchthon continues, astrology bases all its presuppositions upon specific observation. While an astrologer might recognize from the aspects of the planets at the time of the birth of Catiline that this man would cause unrest and come to a tragic end, he could not predict that Catiline would cause an insurrection during the Consulship of Cicero and would eventually be killed in a battle at the foot of the Apennines. If, Melanchthon observes, the predictions of astrologers are not always accurate, so it is also with the physician who is not able to diagnose every illness and the statesman who is not able to avoid all political crises. Indeed, these sciences — medicine and politics — are much more easily investigated than astrology because the objects of their study are always very near.³⁸

In an astrological universe, each particular bears the mark of the whole. Thus the temperaments and inclinations of a single individual are not the result of an isolated planet, but arise from the entire order of stars in the universe. In this way, the microcosm reflects the macrocosm. Indeed, the very proportions of the heavens are reflected on earth. "The doctrines concerning the motions of the heavens and geography," writes Melanchthon, "are inseparably bound together and cannot be split apart."³⁹ The possibility of such an ordered and harmonic relation between the earth and the upper spheres is the main feature, for Melanchthon, of the Aristotelian universe. By allowing God to operate through these spheres, Melanchthon opposes any fatalistic conception of nature whereby all occurrences are seen as deriving from strictly natural causes emanating from the heavenly bodies themselves.

More significant, from the point of view of Melanchthon's encounter with the Copernican theory, is his justification of astrology from within the Aristotelian conceptual framework. Melanchthon was, in fact, totally committed to the Aristotelian physical theory of the universe; it

provided him with a logically consistent and physically coherent system from which astrological causality could be directly explained. In his preface to *Liber Joannis de Sacro Busto libellus de Sphaera* (Wittenberg, 1531), Melanchthon remarks: "I am of the opinion that Aristotle was correct when he said that this lower world is ruled by the higher, and that the cause of motion (change) in this world comes from that superior part . . . Since the motion of the heavens is first, it follows that the motion of the heavens is the cause of all other motions."⁴⁰

The question of causality demands a *physical* explanation of astrological influences which, for Melanchthon, must also be consistent with peripatetic metaphysics. While the constructions of Ptolemy or Copernicus might be used to predict planetary positions, only the Aristotelian physical universe is viewed as in accord with experience and the real nature of things, even though it is less than satisfactory as a predictive instrument. The views of Melanchthon in this regard are very similar to those of Aquinas who, developing the opinion of Simplicius, concluded that astronomical hypotheses *qua* mathematical constructions might be used to describe the apparent motions of the planets but ought never to be considered as strictly true representations of reality.⁴¹ To accept a theory, therefore, which denied the Aristotelian edifice would have required the articulation of a new physics sufficiently convincing to alter fundamental peripatetic assumptions of nature. This the heliocentric model of Copernicus, though harmonically ordered and mathematically compelling as a system of planetary motion, was not initially able to achieve.

ATOMISM AND EPICUREANISM

There may also be a philosophical issue involved in Melanchthon's attitude toward the new theory of Copernicus. Certain elements of the Copernican doctrine may have led Melanchthon to view the physical aspects of this hypothesis as inherently atomistic and therefore Epicurean in nature. Because, in the traditional sense, atomism does away with all distinctions in the universe, "it is no wonder," writes John Dillenberger in his study of *Protestant Thought and Natural Science*, "that to Melanchthon and others the notion that the earth was like other planets immediately suggested the revival of atomism."⁴² Such a view, however, misinterprets the physical nature of the Aristotelian universe and seems to overlook the essentially anti-religious features of Epicureanism to which Melanchthon adamantly objected.

Professor Dillenberger's evaluation implies that the earth loses its preeminence in nature when moved from the center of the cosmos, and becomes indistinguishable from all other heavenly bodies. But Melanchthon, as an Aristotelian, could not have held that the earth itself maintained such a position of perfection. Viewed from within the Aristotelian conceptual scheme, the earth, subject to corruption and change, was outshone entirely by the changeless and quintessential superlunary spheres. It was not the physical place of the earth in space, but rather man's moral place in the hierarchy of being which was of significance; and this unique moral status could be maintained whatever the earth's spatial position.⁴³

Moreover, when Melanchthon condemns Epicureanism, he does not cease until he has rejected much more than simple atomism. He writes: "The Epicurean system is full of horrible ravings. First, dialectics are neglected by them all. In physics, it constructs the world from atoms and imagines that other worlds are separately born and others are continually destroyed, it removes from the world two principle causes of things, efficient and final. It denies the existence of God and affirms that everything was created and brought about without divine providence, merely by accident. It absurdly teaches that the stars are not durable bodies, but that daily new vapors catch fire and are consumed which produces the appearances of the sun and all the other stars. It affirms that the soul of man is destroyed with the body . . . in ethics, it affirms that the goal of human nature is pleasure, that is, to be without pain. Therefore, since it prefers pleasure to virtue, there follow many false opinions."⁴⁴

The ethical features of the Epicurean system were frequently discussed in the Renaissance. In contrast, however, with Erasmus and Thomas More who were able, at least implicitly, to recognize elements compatible with Christianity within the ethical doctrines of Epicurus, Melanchthon remained logically and ethically opposed to the Epicurean philosophy, directing his attack primarily against the Renaissance champion of that philosophy, Lorenzo Valla.⁴⁵ Yet, whatever his ethical objections to the Epicurean system, Melanchthon was particularly uneasy concerning the denial of the existence of God, and its religious consequences. The exclamation of Lucretius in the opening lines of *De Rerum Natura* – *Tantum religio potuit suadere malorum*⁴⁶ – could easily represent the attitude responsible for much of Melanchthon's disfavor toward the system of Epicurus. Lucretius' poem scoffed at religion as the necessary consequence of ignorance. It dispelled God from

the natural world and replaced the deity with an autonomous array of "atoms." Surely Epicurus and his followers ("who make the soul share in the body's death"⁴⁷) deserved to burn in the fiery iron tombs of hell's sixth circle to which Dante had condemned them.

Hence, it is not atomism *per se* which Melanchthon rejects, but rather the anti-religious and atheistic effects of the entire Epicurean system. Melanchthon's real view of atomism may be discerned from a poem which he composed on the flyleaf of his copy of Vesalius' *De Humani Corporis Fabrica*, 1543:

Think not that atoms, rushing in a senseless, hurried
flight
Produced without a guiding will this world of novel
form.
The mind which shaped them, wise beyond all other
intellects
Maintains and fashions everything in logical
design. . . .
The ordered movements of the stars recurring in their
course
Bear witness that a deity intelligent and good
Established these provisions and now holds them in
control.⁴⁸

It would appear that Melanchthon was much less interested in "atomism" than in maintaining the hand of God in the whole of nature. But since no theologically adaptable form of atomism existed in the sixteenth century, any reference to an atomist attitude smacked also of the anti-religious system of Epicurus. It is just such a reference, found in the *De Revolutionibus*, which might have repelled Melanchthon.

As it is with the tiny and indivisible bodies which are called atoms, although they are not perceptible or even make up a visible body when duplicated several times: but are able to be multiplied to such an extent that they eventually coalesce into an observable magnitude: so also it is concerning the position of the earth, although it is not at the center of the world, still its own distance (from the center of the universe) is incomparable (to the distance) of the sphere of the non-wandering stars.⁴⁹

As with the atom, so the earth – “The metaphor,” writes Georg Christoph Lichtenberg, “is far more intelligent than its author . . . He who has eyes sees something in everything.”⁵⁰

If Melanchthon's relation to the physical theory of Copernicus was made difficult by atomism, the cause is to be found in the inherent anti-religious doctrine of the Epicurean philosophy of nature. It was not that Copernicus made the earth like the other planets, but that he seemingly adopted a point of view which held the theological implication, for Melanchthon, of a renewal of the materialistic teachings of Epicurus. In Melanchthon's view, such a revival of materialism necessarily led to the materiality and therefore the mortality of the soul.

THE COPERNICAN MODEL AS A MATHEMATICAL DEVICE

In her survey, *The Scientific Renaissance*, Marie Boas points out that: “Protestants, especially Lutherans, had been quicker to condemn Copernicanism” because “they did not see it as an astronomical hypothesis . . . but as a system fatal to the truth of the Bible.”⁵¹ Such generalizations, however, neglect major intellectual and psychological differences between the reformers which ultimately determined their relation to the new ordering of the planets. Indeed, Melanchthon's world view was substantially different from Luther's. While Melanchthon was devoted to astrology, Luther referred to it as “his (Melanchthon's) airy fantasy.”⁵² Moreover, Melanchthon *did* accept the theory of Copernicus as a mathematical hypothesis, while his realist objections to the heliocentric model might have arisen from epistemological or physical obstructions regardless of his Biblical opposition.

Traditionally there are two instances in the correspondence and writings of Melanchthon which reveal his hostility toward the Copernican theory. The first, a letter written to Mithobius (October 16, 1541), refers to Copernicus only generally as “that Sarmatian astronomer, who moves the earth and fixes the sun. Wise rulers ought to control the petulance of such natures.”⁵³ This is nevertheless only a spontaneous, although emphatic, response to the Copernican notion based solely on Rheticus' *Narratio Prima*. Of much more significance, is his apparent denunciation of the Copernican theory in the section *Quis est motus mundi* from the *Initia Doctrinae Physicae*, 1549. Here Melanchthon writes:

But some dare say, either because of the love of novelties or in order to appear ingenious, that the earth moves, and contend that neither the eighth

sphere nor the sun moves while they assign other movement to the celestial spheres and place the earth among the stars. The joke is not new. There is a book by Archimedes called *De Numeratione Arenae*, in which he reports that Aristarchus of Samos defended this paradox, that the sun remains fixed and the earth turns round the sun. And although clever workers investigate many questions to give expressions to their ingenuity, the young should know it is not decent to defend such absurd opinions publicly, nor is it honest or a good example.⁵⁴

Nevertheless, in 1904, Emil Wohlwill discovered that this passage had been measurably altered in the 1550 edition of the *Initia* and in all subsequent publications of the work, omitting altogether such phrases as "the love of novelties," "the joke is not new," and exhibiting, generally, a more dispassionate attitude concerning the heliocentric model. Noting Melanchthon's own reference in the *Initia* that 5507 years had elapsed since the creation of the world to 1545, Wohlwill argues that this section of the treatise was written in 1545 although it was set aside and not published until 1549. Seeing the work in print, he suggests, and being no longer of such an adverse inclination concerning the work of Copernicus, Melanchthon rewrote this segment of the *Initia* and republished the treatise in the following year.⁵⁵ Consequently, it would appear that in the nine years which lay between the letter to Mithobius and the first republication of the *Initia Doctrinae Physicae*, Melanchthon began to consider more rationally the mathematical utility of the Copernican hypothesis. Indeed, two professors at Wittenberg, Georg Joachim Rheticus and Erasmus Reinhold, who advocated and made use of the Copernican model, were both actively supported by Melanchthon during this time.

It was Rheticus who finally was able to persuade Copernicus to publish the *De Revolutionibus*, 1543, by introducing the Copernican system in his *Narratio Prima*, 1540. In fact, Rheticus may properly be called the first *real* Copernican. Erasmus Reinhold came as a student to Wittenberg, where he matriculated at the beginning of the winter semester 1530-31, and developed a close association with his teacher Jacob Milichius, professor of mathematics. Very soon, however, Reinhold's academic proficiency came to the attention of Melanchthon and by the end of April 1536, he was accepted as a member of the

Faculty of Arts at Wittenberg and began lecturing on Euclid, Archimedes and Ptolemy.⁵⁶ Along with his colleague, Georg Rheticus, Reinhold was very early impressed by the Copernican hypothesis. But it was due to the efforts of Melanchthon, who won for him financial assistance from the Duke of Prussia, that Reinhold was able to formulate and complete his *Tabulae Prutenicae*, 1551, which was based on the Copernican theory.

Melanchthon's letters to Duke Albrecht of Prussia on Reinhold's behalf reveal not only Melanchthon's high regard for the Wittenberg mathematician, but also expose the continual struggle for patronage which prevailed in every area of scientific investigation.

July 16, 1544:

If I, because of my numerous requests, seem obtrusive, I nevertheless dare to write again in the confidence of Your Princely Grace, for it concerns the promotion of the sciences. Now, very few study mathematics, and among those of influence there are only a trifling number who promote this study. Nevertheless, at present, there is among us a learned man, who has dedicated himself to this study and has undertaken a work which will contribute much to the spread of this knowledge. Our Prince, however, cares little for these studies . . . I therefore would ask you to promote this profitable work and his *Ephemerides* . . . for *Princes are the images of God who calls Himself the father of orphans*.⁵⁷ (my italics)

October 18, 1544:

Private persons, without the aid of princes, are truly not able to make instruments for the observation of the sun, stars, eclipses, equinoxes etc. for it costs something.

Therefore, will Your Princely Grace, who is so graciously consoling, grant such a stipend to Master Erasmus (Reinhold) who is now occupied with several useful works, and is an honorable Christian man, learned in the whole of philosophy . . .

Moreover, he will show his humble gratitude with a few works which he will dedicate to Your Princely Grace.⁵⁸

July 15, 1545:

The learned mathematician Master Erasmus Reinhold . . . has received from Your Princely Grace now on the feast of Peter and Paul, fifty florins, for which I along with him humbly thank you. He (Reinhold) will also prove to be thankful with his work.⁵⁹

Melanchthon was well acquainted with the work of both Rheticus and Reinhold,⁶⁰ and it was, perhaps, their influence which led him to speak more approvingly of Copernicus. In a letter to Georg and Huldreich Fugger, which Melanchthon later used as the preface to the 1552 edition of Regiomontanus' *Tabulae Directionum*, he notes that King Alfons (thirteenth century) had "opened the way, for many discerning and inquisitive men to a better (astronomical) knowledge; and a few of them, like Purbachius, Blanchius, Cusanus, Regiomontanus, Copernicus, have by their zeal and acumen . . . widened considerably the scope of astronomical understanding. Therefore we must not refrain from investigating the wisdom in the work of God and we must contemplate the light of divine knowledge which resides in our spirit. We cannot overlook the fact that the sciences are a gift of God in order to recognize Him and thereby to maintain life in a wiser order."⁶¹ Indeed, in 1549, the same year as the first edition of the *Initia Doctrinae Physicae* with its open invective against the new hypothesis, Melanchthon wrote to Caspar Cruciger: "For this and similar observations of motion we begin rather to admire and love Copernicus."⁶²

In the *Initia Doctrinae Physicae*, the physical aspects of the Copernican theory are always rejected. But if Melanchthon has recourse to the Psalms in this regard, he also stresses, much more, those arguments from Aristotle which rest on the notion that the earth is a simple body (*Terra est corpus simplex*) and therefore capable of only one natural motion.⁶³ Further, from Melanchthon's point of view, the heliocentric theory of Copernicus was not a new hypothesis at all, but rather a revival of the long subdued error of Aristarchus. The same Aristotelian physical arguments traditionally drawn up against Aristarchus, therefore, could be employed equally well against the physical aspects of the Copernican theory.

In conclusion I wish to note that while even in the first edition of the *Initia Doctrinae Physicae* Melanchthon makes use of the astronomical values of Copernicus, it becomes clear from the subsequent editions of

the work that Melanchthon had largely reconciled the Copernican notion as a *hypothesis* which was suitable for the interpretation of the appearances of the heavens. According to this view, both the Ptolemaic and the Copernican hypotheses were regarded as equally useful instruments for the prediction of planetary movement. It is precisely this *instrumentalist interpretation* which was accommodated by the mathematical faculties of the universities and which, at least initially, provided the most rational incentive for the use of the Copernican theory.

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FOOTNOTES

* I wish to express my gratitude to professors Robert S. Westman and Claus-Peter Clasen whose suggestions and criticisms have been extremely helpful.

1. Friedrich Klee, *Die Geschichte der Physik an der Universität Altdorf bis zum Jahre 1650* (Erlangen, 1908), p. 19.
2. Robert S. Westman, "The Wittenberg Interpretation of the Copernican Theory," *The Nature of Scientific Discovery*, ed. Owen Gingerich (Washington, D.C., forthcoming 1974).
3. Ernst Cassirer, *The Philosophy of the Enlightenment*, tr. Fritz C.A. Koelln and James P. Pettigrove (Boston, 1955), p. 116.
4. Philip Melanchthon, *Corpus Reformatorum*, ed. Carolus Gottlieb Bretschneider, XIII (Halle, 1834), p. 150. Cited hereafter as *CR*. For a very good discussion of Melanchthon's epistemology, see the introduction by Hans Engelland in *Melanchthon on Christian Doctrine*, ed. Clyde L. Manschreck (New York, 1965).
5. *CR* XIII, p. 647: "In Philosophia et omnibus artibus, de quibus lux humani per sese iudicat, tres sunt normae certitudinis: Experientia universalis, Principia, id est, noticiae nobiscum nascentes, et ordinis Intellectus in iudicanda consequentia."

6. Ibid.: "... ut lumen in oculis conditum est ad cernenda corpora, sic in mente quasi lumen sunt hae noticiae, quibus intelligimus numeros, ordinem, proportiones, figuras, et contexamus ac iudicamus has primas propositiones: Totum est qualibet sua parte: Causa non est posterior effectui suo: Deus est mens aeterna, sapiens, verax, iusta, casta, benefica, conditrix mundi, servans rerum ordinem, et puniens scelera. Mens humana ad hanc similitudinem condita est, ut dicitur: Exemplumque Dei quisque est in imagine parva."
7. Melanchthon's *principia speculabilia* are undoubtedly reflections of Aquinas' *scientiae speculativae*. I have, however, adopted a literal translation of Melanchthon's terminology.
8. CR XIII, p. 649.
9. Ibid.: "... quae regunt hominum mores, ut natura humana intelligit discrimen honestorum et turpium."
10. CR XIII, p. 652.
11. For the Neo-Platonic theory of knowledge, see E.H. Gombrich, "Icones Symbolicae: The Visual Image in Neo-Platonic Thought," *Journal of the Warburg Institute*, XI (1948), 165-192: see particularly 168-171.
12. CR XIII, p. 151: "In Ecclesia habemus et quartam normam certitudinis, videlicet, patefactionem divinam, illustribus et non fallentibus testimoniis factam, quae extat in libris propheticis et apostolicis. Etsi autem facilius et firmiter adsentitur mens humana iis, quae luce naturali cernit, tamen simili constantia omnes creaturas rationales adsentiri oportebat sententiis a Deo patefactis, etiamsi luce naturali non videmus esse veras et firmas. Ut sine dubitatione adseveramus, bis 4 esse 8: ita statuendum est, Deum excitatum esse homines mortuos, et Ecclesiam ornatum aeterna gloria, et impios abiectum in aeternas poenas."
13. CR XIII, pp. 190-191: "... tamen multa sunt in doctrina Ecclesiae, quae sine physicis explicari non possunt."
14. CR XI, p. 280: "Est enim confusanea doctrina, in qua magnae res non explicantur diserte, miscentur ea quae oportebat seiungi, rursus illa quae natura coniungi postulat, distrahantur: ... Nihil in ea cohaeret, non initia, non progressionem, non exitus cerni possunt. Talis doctrina non potest non gignere infinitos errores..."
15. Thomas Aquinas, *Summa Theologiae, cura et studio Petri Caramello* (Rome, 1952), Part I, question I, art. 5.
16. Ibid., Part I, question I, art. 2.

17. Essentially, Aristotle argues that the world must be eternal as nothing can come into being from nothing. Melanchthon replies that only God, as the first cause, is eternal with *infinite powers of realization*. All that is finite, therefore, is brought about through this infinite power. Consequently, the world is ultimately created from nothing. Once created however, nothing else arises from nothing; there only remain changes within the world itself. Melanchthon replies to five other arguments of Aristotle relating to the world's eternity; for these, see CR XIII, pp. 376-380; also Bernhardt, *Philipp Melanchthon als Mathematiker und Physiker* (Wittenberg, 1865), pp. 72-73.
18. CR VII, p. 1126; also Bernhardt, p. 10.
19. Karl Hartfelder, *Philipp Melanchthon als Praeceptor Germaniae*, (1889; rpt. Nieuwkoop, 1964), pp. 39-40.
20. CR II, p. 815.
21. Etienne Gilson, *Reason and Revelation in the Middle Ages* (London, 1950), p. 93.
22. CR XI, p. 933: "Nec moveor histrionum quorundam clamoribus, qui simulatione religionis vituperant, naturae inquisitionem, et abduci mentes ab iis scriptis vociferantur, quae Deus sua voce tradidit."
23. Georg von Puerbach, *Theoricae novae planetarum cum praefatione Philippi Melanchthonis* (Vitebergae, 1535). Also, CR II, p. 819.
24. CR VII, p. 473.
25. CR II, p. 818: "Homerus cum in clypeo Achillis pingeret sidera, et coeli verticem ac motum describeret, quid aliud voluit significare, quam harum rerum inquisitionem summis heroibus dignam esse. Apud Virgilium Iopas in regio convivio canit errantem Lunam Solisque labores. Turpe est autem, in castris et in convivio in admiratione fuisse has artes, et in scholis iacere spretas atque neglectas, quibus Philosophiae defensionem atque conservationem respublica commendavit."
26. CR III, p. 118: "... hae tabulae multo magis sunt dignae admiratione, quae omnium siderum positus ostendunt, nec unius tantum anni, sed multorum seculorum.
"Haec eo praefatus sum, ut admonerem iuvenes, qui haec lecturi sunt, et quantum debeant Schonero iuvanti publica studia editione talium librorum, quibus in scholis opus est, deinde ut utilitate harum tabularum, excitati ad discendum invitentur. Illa admonitione hoc loco non putavi opus esse, ne se ab his artibus studiosi deterreri sinant, insulsissimis iudiciis indoctorum, qui totum hoc genus doctrinae de rebus coelestibus superbissime derident."

27. CR XI, p. 288. Also, William Hammer, "Melanchthon, Inspirer of the Study of Astronomy: with a translation of his oration in praise of astronomy," *Popular Astronomy* (June 1951), 308-319.
28. CR X, p. 1015: "Tenentibus autem Arithmeticam, patet iam aditus ad motuum coelestium doctrinam, et quamvis abstrusa videtur, tamen comprehendi facile poterit. Praecipimus igitur omnibus Scholasticis qui Grammaticen et Dialecticen discunt, ut adiungant Arithmeticam, Magistris etiam mandamus qui regunt adolescentum studia, ut adigant eos ad audiendam et exercendam Arithmeticen."
29. Hartfelder, *Melanchthon als Praeceptor Germaniae*, pp. 561-565.
30. CR X, p. 1010. Also, Walter Friedensburg, *Geschichte der Universität Wittenberg* (Halle, 1917), pp. 216-217.
31. CR X, pp. 1014-1015: "... sciant studiosi nos examina non in cavillationibus, aut ociosis quaestionibus consumpturos esse, sed in praecipuis artium materiis, in Dialecticis, et Physicis, Arithmetica, Euclide, Sphaera, Theoricis, in locorum intervallis computandis ex longitudine et latitudine locorum, et in doctrina Ecclesiae."
32. Karl Hartfelder, "Der Aberglaube Philipp Melanchthons," *Historisches Taschenbuch* (Leipzig, 1889), pp. 233-269: see particularly pp. 243-245.
33. CR X, p. 278: "Virdungus hat mir einmals prophezeiet aus der Sternguckerkunst, ich werde Schiffbruch leiden auf der See; jetzt bin ich nicht weit darvon . . ."
34. CR III, p. 114.
35. CR XI, p. 263: "Me quidem non solum utilitas in his artibus delectat . . . sed multo magis hoc, quod cum hunc mirificum consensum corporum coelestium et inferiorum contemplor, ipse me ordo et harmonia admonet, mundum non casu ferri, sed regi divinitus."
36. *Ibid.*: "Astrologia pars est Physices, quae docet, quos effectus astrorum lumen in elementis et mixtis corporibus habeat, qualia temperamenta, quas alterationes, quas inclinationes pariat."
37. *Ibid.*: pp. 264-265.
38. *Ibid.*: pp. 262-265.
39. CR XI, p. 296: "Coniunctae artes sunt doctrina, de motibus coelestibus et Geographia, nec divelli possunt."

40. *CR II*, p. 533: "Ideoque recte dixisse Aristotelem iudico, cum ait, hunc inferiorem mundum a superiore gubernari, et superiora causam motus in inferioribus esse . . . cum initium motus sit a coelo, consequi, motum coeli et reliquis causam motus esse."
41. Pierre Duhem, *To Save the Phenomena*, tr. Edmund Doland and Chaninah Maschler (Chicago, 1969), pp. 41-43.
42. John Dillenberger, *Protestant Thought and Natural Science* (New York, 1960), p. 40.
43. Arthur O. Lovejoy, *The Great Chain of Being* (New York, 1960), p. 104.
44. *CR XIII*, pp. 656-657: "Epicurea plena est horribilium furorum. Primum Dialecticem omnino praetermisit. In Physicis componit mundum ex atomis, et somniat subinde alios mundos nasci, et alios interire, removet ab universitate rerum duas praecipuas causas, Efficientem et Finale. Negat esse Deum, et affirmat omnia sine providentia divina, tantum casu nata esse, et casu ferri. Stellas ridicule fingit non esse durabilia corpora, sed quotidie novos halitus accendi et deflagrare, qui speciem Solis et aliarum stellarum efficiant. Animas hominum affirmat interire cum corporibus. . . . In Ethicis finem humanae affirmat esse voluptatem, hoc est, vacare cruciatu. Inde, cum anteferat voluptatem virtuti, multa falsa sequuntur."
45. Concerning the Renaissance reaction to the ethical aspects of Epicureanism, see D.C. Allen, "The Rehabilitation of Epicurus and His Theory of Pleasure in the Early Renaissance," *Studies in Philology*, XLI (1944), 1-15: see particularly 10-12.
46. Lucretius, T. *Lucreti Cari De Rerum Natura Libri Sex*, ed. H.A.J. Munro (Cambridge, 1866), line 101. That Melanchthon came into contact with this work seems unquestionable. Scattered copies of the poem already existed in manuscript in various libraries during the Middle Ages. The first printed edition was published at Brescia in 1473.
47. Dante Alighieri, *The Inferno*, tr. John Ciardi (New York, 1962), X.6.13-15.
48. Philip Melanchthon, "Observations on the Human Body," a poem written in Latin by Melanchthon on the cover of a copy of the first edition of Vesalius' *De Humani Corporis Fabrica*, 1543, tr. Dorothy M. Schullian (Los Angeles, 1949). The original of Vesalius' *De Humani Corporis Fabrica* with Melanchthon's poem is in the National Library of Medicine.
49. Nicolaus Copernicus, "De Revolutionibus Orbium Coelestium Libri Sex," *Nikolaus Kopernikus Gesamtausgabe*, II (München, 1949), Liber primus, Cap. VI. 17: "Quemadmodum ex aduerso in minimis corpusculis ac insectilibus, quae atomi vocantur, cum sensibilia non sint, duplicata vel aliquoties sumpta non statim componunt visibile corpus; at possunt adeo multiplicari, ut demum sufficiant in apparentem coalescere magnitudinem. Ita quoque de loco terrae, quamuis in centro mundi non fuerit, distantiam tamen ipsam incomparabilem adhuc esse praesertim ad non errantium stellarum sphaeram."

50. Georg Christoph Lichtenberg, *Lichtenberg: Aphorisms and Letters*, tr. Franz Mautner and Henry Hatfield (London, 1969), p. 42.
51. Marie Boas, *The Scientific Renaissance* (New York, 1966), p. 125. Cf. Ernst Zinner, *Entstehung und Ausbreitung der Copernicanischen Lehre* (1943), p. 229: "The new theory was publicly promoted by the administration of the Catholic Church and repressed by the administration of the Protestant Church." Also, Thomas Kuhn, *The Copernican Revolution* (New York, 1959), p. 196: "Luther, Calvin and Melanchthon led in citing Scripture against Copernicus and in urging the repression of Copernicans."
52. Hartfelder, "Der Aberglaube Philipp Melanchthons," p. 256.
53. CR IV, p. 679: "... ille Sarmaticus Astronomus, qui movet terram et figit Solem."
54. Philip Melanchthon, *Initia Doctrinae Physicae*, 1549, in CR XIII, p. 216. Quoted in A.B. Wrightsman, *Andreas Osiander and Lutheran Contributions to the Copernican Revolution*, dissertation at the University of Wisconsin, Madison, 1970, p. 342.
55. Emil Wohlwill, "Melanchthon und Copernicus," *Mitteilungen zur Geschichte der Medizin und Naturwissenschaft*, III (1904), 260-267. Wohlwill's discovery has been embellished by more recent scholarly activity including: Hans Blumenberg, "Melanchthons Einspruch gegen Kopernicus," *Studium Generale*, XIII (1960), 174-182. Wilhelm Maurer, "Melanchthon und die Naturwissenschaft seiner Zeit," *Archiv für Kulturgeschichte*, XLIV (1962), 218-226. Konrad Müller, "Philip Melanchthon und das Copernicanische Weltssystem," *Centaurus*, IX (1963), 16-28. I have also used the *Initia Doctrinae Physicae in Academia Vuitebergensi*, Johann Lufft (Witebergae, 1550), second edition. Here the revised passages which Wohlwill cites appear on 39^r-40^r.
56. Friedensburg, p. 232.
57. CR V, p. 444: "Etsi autem videri possum impudentior, quod de multis negociis ad Cels. v. scribo, tamen sapientia Cels. v. spem mihi facit, Celsitudinem vestram boni consulere si ea scribam quae ad provehendas honestas artes conducunt. Mathematica paucissimi nunc discunt, et pauciores ex potentibus ea studia adiuvant. Est autem apud nos vir doctus qui huic uni studio se dedit, et quaedam opera inchoavit profutura ad earum artium propagationem. Sed aula nostra parum curat haec studia. Si celsitudo vestra quotannis aliquod seu munus, seu stipendium ei daret, ipsis artibus profuturum hanc liberalitatem sperarem. Et vellem esse hortator, ut opera utilia et Ephemeras ederet. . . Principes sint dei imagines, qui se vocat patrem orphanorum."
58. CR V, pp. 510-511: "Nu Können Wahrlich Privat-Personen ohne Hülf der Regenten nit Instrumenta zur Observation der Sonnen, Sternen, Eclisum, Equinoctiorum etc. machen, denn es kost etwas.

“Darum wollen E.F.G. wie sie gnädiglich verträöst, dieses Stipendium auf Magistrum Erasmum wenden, der etliche nützliche Werk jetzund vorhat, und ist ein ehrlicher christlicher Mann, gelahrt in ganzer Philosophia . . .

“Dazu erbeut er sich zu unterthäniger Dankbarkeit, die er mit etlicher seiner Arbeit beweisen will, welche er E.F. G. zuschreiben wird . . .”

59. CR V, p. 791: “Der wolgelart Magister Erasmus Reinhold Mathematicus, . . . hat von E.F.G. jetzund auf Petri und Pauli funfzig Floren empfangen, derwegen ich neben ihm E.F.G. unterthaniglich danke, Er wird sich auch mit seiner Arbeit dankbar erzeigen.”
60. Melanchthon possessed a copy of Rheticus’ *Narratio Prima* since 1540, and by 1550, he had acquired Reinhold’s *Prutenic Tables* a copy of which he saw fit to send along to Christoph Strathmion in the same year. CR VII, p. 683.
61. CR VII, p. 951: “. . . tamen aditum multis ingeniosis et discendi cupidis ad perfectionem huius doctrinae patefecerunt, quorum aliqui, ut Purbachius, Blanchius, Cusanus, Regiomontanus, Copernicus, postea ingeniorum acie et sua solertia . . . totum hunc orbem artium illustrarunt.
“Itaque non simus adeo seu ferrei, seu Cyclopici, ut nec artem in opificio Dei, nec radios divinae nec cogitemus, disciplinas esse dona Dei, tradita nobis, et ut ipsum agnoscamus, et ut ordinem vitae regant ac tueantur . . .”
62. CR XI, p. 839: “His et similibus observationibus moti, Copernicum magis admirari et amare coepimus.”
63. CR XIII, pp. 217-221.