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NOTES & CORRESPONDENCE

RESEARCH IN ANCIENT INDIAN MATHEMATICS AND ASTRONOMY IN INDIA

By R. Ballabh *

Research in ancient Indian mathematics and astronomy was initiated in the Department of Mathematics, Lucknow University, in the year 1941 by the late Dr. A. N. Singh, joint-author of *History of Hindu Mathematics*, in order to investigate the contributions of ancient Indian mathematics to mathematics and astronomy. The program is now being conducted under the general supervision of Professor R. Ballabh.

The contributions made by the ancient Indians to mathematics have been made known from time to time through the researches of H. T. Colebrooke, E. Burgess, S. Dvivedi, S. B. Dikshit, P. C. Sengupta, B. Datta, A. N. Singh, and other scholars working in Indian mathematics and astronomy. Datta and Singh's *History of Hindu Mathematics*, of which Parts I and II were published in 1935 and 1938 respectively, gives a detailed account of the contributions of Indian mathematicians in arithmetic, algebra, and other branches of mathematics on the basis of works then known. The works on Indian mathematics and astronomy consulted by Datta and Singh were listed by them at the end of Part I of their *History of Hindu Mathematics*.

Collecting manuscripts has since continued, and the Department of Mathematics, Lucknow University, is now in possession of seventy manuscripts of about fifty unpublished works. As a result new authors and new sources of information have come to light. Of the newly discovered works, those of Śrīdharācārya, Sumati, Bhāskara I, and Vaṭeśvara deserve mention here. Śrīdharācārya was perhaps the greatest Indian mathematician. He lived sometime between A. D. 850 and A. D. 950, and wrote two works on arithmetic and mensuration. His smaller work, called *Triśatikā* ("A collection of 300 rules and examples"), was edited by Sudhākara Dvivedī in 1899 A. D. Sudhākara's edition was incomplete in so far as it did not contain 300 rules and examples. The Department of Mathematics has collected six manuscripts of this work. These manuscripts have been studied by Mrs. Usha Asthana and the results of her study submitted in the form of a dissertation to Lucknow University in 1960. The Department of Mathematics has also acquired an incomplete manuscript of Śrīdharācārya's larger work on arithmetic and mensuration (known as *Pāṭīgaṇita*). This was edited with an historical introduction, English translation, relevant notes, and comments by Dr. K. S. Shukla in 1959.

* Lucknow University.

Sumati was an astronomer who lived in Nepal and wrote in 880 A. D. He is the author of two works on astronomy, the *Sumati-mahātāntra* and the *Sumati-karaṇa*. The existence of this author was revealed in a commentary written in the Ninth Century at Quilon. After extensive search, manuscripts of the above works were discovered in Nepal. The importance of the works of Sumati lies in the fact that they are based on the old *Sūrya-Siddhānta*, which is now lost.

Bhāskara I is a different person from his namesake of the Twelfth Century A. D., the author of the *Siddhānta-śiromaṇi* and *Līlāvati*, etc. He lived in the Seventh Century of the Christian era and was a contemporary of Brahmagupta (628 A. D.). He wrote three works on astronomy: (1) the *Mahā-Bhāskariya*, (2) the *Laghu-Bhāskariya*, and (3) a commentary on the *Āryabhaṭīya* of Āryabhaṭa I. Bhāskara I was not an original astronomer. His fame rests on his being a sincere and successful expounder of the astronomical teachings of Āryabhaṭa I. His works provide us with a detailed exposition of the astronomical methods taught by Āryabhaṭa I and throw light on the development of astronomy during the Sixth and early Seventh Centuries in India. Several manuscripts of his works have been acquired by the Department of Mathematics. These manuscripts have been studied by Dr. K. S. Shukla, and the results of his study are in the process of publication.

Vaṭṣeśvara (904 A. D.) is another distinguished Indian astronomer. He came from Ānandapura (modern Barnagar) and is known to have written two works on Astronomy, *Vaṭṣeśvara-siddhānta* and *Karaṇa-sāra*. Two manuscripts of the former have been acquired by the Department. The latter work was mentioned by Albīrūnī, but no manuscript of this work has been discovered so far.

Manuscripts of mathematical and astronomical works are also available in the various libraries and private collections in India. In order to get a complete picture of Indian achievements in the fields of mathematics and astronomy, it is necessary to go through these manuscripts. This is really a great task and one beset with many difficulties. The greatest difficulty lies in deciphering these manuscripts, those already done being generally erroneous and defective. Moreover, works contained in them are in verse and in the form of a statement of the bare rules, containing neither an explanation of the rules nor any indication of the subject dealt with in the various verses. The result is that the deciphering of these manuscripts and identifying the contributions of individual authors is an uphill task. The Department of Mathematics has therefore undertaken to edit and publish the important works on Indian mathematics and astronomy under a series called Hindu Astronomical and Mathematical Texts Series. Three works, the *Sūrya-siddhānta*, the *Pāṭiganīta* of Sṛidharācārya and the *Mahā-Bhāskariya* of Bhāskara I) have already been published. It is hoped that at least one work will be published every year. The publications of this proposed series will contain:

- (1) A general introduction, containing discussions on

- (i) the manuscripts used in the preparation of the text and their authenticity
- (ii) the data and the origin of the work
- (iii) the importance of the work and its contents
- (iv) the commentaries on the work and their authors, etc.
- (2) The edited text of the original together with a commentary on it, if possible
- (3) An English translation of the original text along with critical and explanatory notes, etc.
- (4) Appendices:
 - (i) list of quotations found in the commentary
 - (ii) list of references to names and places
 - (iii) list of quotations from the text found in later works
 - (iv) glossary of technical terms with equivalents in English
 - (v) index

In addition to the above editorial work a history of Hindu astronomy is planned, but at present there is no work being done on this subject.

WAS COPERNICUS A PYTHAGOREAN?

*By Edward Rosen **

"Let no one suppose that I have gratuitously asserted, with the Pythagoreans, the motion of the earth." Copernicus, *Commentariolus*, Assumptions.

In a recent article Professor Thomas W. Africa maintained that Copernicus saw his thesis "as the foundation of a Pythagorean Restoration."¹ In support of this contention Professor Africa offered no evidence whatever. Instead, he cited Kepler and Galileo. But both of these great Copernicans were born decades after Copernicus died. Galileo made a number of egregious errors regarding Copernicus.² Although Kepler did have access to some of Copernicus' correspondence which is no longer available to us, his thinking was far from a carbon copy of Copernicus'. Therefore no opinion of Kepler may

legitimately be imputed retroactively to Copernicus.

Having reminded ourselves that Copernicus' mentality was quite different from Galileo's and Kepler's, let us now see whether the statements quoted from them by Professor Africa mean that Copernicus intended to restore Pythagoreanism. Kepler referred to "Pythagoras, grandfather of all Copernicans." This little joke proclaims a remote ancestral intellectual relationship between Pythagoras and Copernicus; it does not ascribe to Copernicus any intention to restore Pythagoreanism. By the same token, Galileo labeled the belief in "the earth's mobility a Pythagorean opinion." But in using this entirely correct label, Galileo did not attribute to Copernicus any intention to restore Pythagoreanism. According to Professor Africa (p. 404), "Copernicus insisted that his system was . . . the revival of . . . the lost doctrine of Pythagoras." If a doctrine is lost, how can it be revived? When and where did Copernicus insist that he was reviving a doctrine that could not be

* City College of New York.

¹ "Copernicus' Relation to Aristarchus and Pythagoras," *Isis*, 1961, 52: 403.

² Edward Rosen, "Galileo's Misstatements about Copernicus," *Isis*, 1958, 49: 319-330; reprinted as Massachusetts Institute of Technology, Publications in the Humanities, no. 32 (1958).

revived? No citation to this effect appears in the fifty-seven footnotes accompanying Professor Africa's seven-page article.

Professor Africa asserted (p. 406) that "in the manuscript of *De revolutionibus*, Copernicus frankly professed Pythagoreanism as he conceived it, but deleted the passage." Actually, in the deleted passage Copernicus did not profess Pythagoreanism. On the contrary, he discussed it without professing it. Nor is it true that here "Copernicus associated Aristarchus and Philolaus with a view of the earth's motion other than the traditional Pythagorean scheme" (p. 407). Copernicus' language provides no basis for distinguishing between the older and later Pythagorean schemes. Professor Africa himself declared (p. 408) that Copernicus "felt that he was restoring the Pythagorean astronomy in its purity." Professor Africa then proceeded to mis-translate a statement by Copernicus' first disciple, whose reference to "the Pythagoreans" was altered by Professor Africa to "Pythagoras." Professor Africa printed this incorrect version in such a way as to imply that the error occurs in Edward Rosen's *Three Copernican Treatises*, which Professor Africa cited according to the first edition, instead of the second and enlarged edition.³

Having translated the deleted passage (after a fashion), Professor Africa maintained (pp. 407-408) that it "revealed Copernicus' conviction that . . . Plato shared the scientific views of Philolaus." But the deleted passage says no such thing. It does say that "according to Plato, there were only a few philosophers who at that time knew how to explain the motions of the planets." Just before this strange distortion of Copernicus' simple Latin, Professor Africa charged (p. 407) that "Copernicus drew an unwarranted assumption from Plato's notion that 'true' astronomy rested on intuitive reason." Did Copernicus ever draw an assumption, warranted or unwarranted, from a notion? If he ever did,

how are we to tell whether this particular assumption was unwarranted? Professor Africa somehow neglected to tell us what the unwarranted assumption was.

In addition to gratuitously accusing one of the greatest astronomers in mankind's history of not thinking straight, Professor Africa undertook to sit in judgment on Copernicus' personality as a scientist. Thus Professor Africa has decided (pp. 403-404) that "Copernicus lacked . . . concern for data and method." He has aimed this grave indictment at the man whose first disciple, having worked with him nearly three years, reported that

my teacher always has before his eyes the observations of all ages together with his own, assembled in order as in catalogues; then when some conclusion must be drawn or contribution made to the science and its principles, he proceeds from the earliest observations to his own, seeking the mutual relationship which harmonizes them all; the results thus obtained by correct inference under the guidance of Urania he then compares with the hypotheses of Ptolemy and the ancients; and having made a most careful examination of these hypotheses, he finds that astronomical proof requires their rejection; he assumes new hypotheses, not indeed without divine inspiration and the favor of the gods; by applying mathematics, he geometrically establishes the conclusions which can be drawn from them by correct inference; he then harmonizes the ancient observations and his own with the hypotheses which he has adopted; and after performing all these operations he finally writes down the laws of astronomy.⁴

The foregoing passage occurs in Rheticus' *First Report* (*Narratio prima*). To Professor Africa (p. 403), "the tone of Rheticus' *Narratio prima* suggests that Copernicus' attitude toward other scientists was generally . . . contempt." Let us look at the *First Report's* attitude toward other scientists: Domenico Maria Novara is "very learned"; Copernicus "knows that Ptolemy, working with the utmost care, . . . accurately investigated the motions of the sun and the moon and established them correctly, so far as he could"; "Surely students hereafter will see the value of Ptolemy and the other ancient writers, so that they will recall

³ New York: Dover; London: Constable, 1959.

⁴ *Three Copernican Treatises*, p. 163.

these men who have been until now excluded from the schools, and restore them, like returned exiles, to their ancient place of honor"; "How modestly and wisely Aristotle speaks on the subject of the celestial motions can be seen everywhere in his works"; "Pliny set down an excellent and accurate statement"; "Plato and the Pythagoreans, the greatest mathematicians of that divine age"; "that wise statement of Socrates."⁵ Where in the *First Report* is the tone which suggested to Professor Africa "that Copernicus' attitude toward other scientists was generally . . . contempt"?

Professor Africa (p. 406) proposed "vanity" as a possible motive for one of Copernicus' most significant actions. But Rheticus tells us that Copernicus "promised that he would draw up astronomical tables with new rules and that if his work had any value he would not keep it from the world."⁶ Does that sound like "vanity"?

Professor Africa (p. 403) referred to "Copernicus' imperious *Letter against Werner*." Let us see how imperious it is: "Faultfinding is of little use and scant profit. . . . Hence I fear that I may arouse anger if I reprove another while I myself produce nothing better. . . . It is one thing to snap at a man and attack him, but another thing to set him right and redirect him when he strays."⁷ Is this letter "imperious," that is, arrogant or haughty?

According to Professor Africa (p. 405), in the dedication of the *Revolutions* "Copernicus was not entirely frank, for his obligation to the ancients included more than simple suggestions of the earth's mobility." But in the dedication Copernicus had occasion to describe only this part of his obligation to the ancients. Elsewhere he described other parts. For instance, in the *Letter against Werner*, which Professor Africa termed "imperious," Copernicus wrote with regard to the ancient mathematicians:

we must follow in their footsteps and hold fast to their observations, bequeathed to us

like an inheritance. . . . It is well known that they observed all these phenomena with great care and expert skill, and bequeathed to us many famous and praiseworthy discoveries.⁸

On the one hand, Professor Africa held that "Copernicus frankly professed Pythagoreanism" where he did not profess it, whether frankly or not. On the other hand, Professor Africa concluded that "Copernicus was not entirely frank" because he chose to put a partial statement in its proper place. In order to be able to determine whether another human being was or was not entirely frank, the self-appointed judge should first try to acquire some understanding of his victim's character and thought.

It might also be helpful if he learned about his victim's career and associates. Professor Africa referred (p. 405) to a teacher of philosophy as Copernicus' "colleague at Ferrara," where Copernicus never taught. And Professor Africa (p. 405) spoke of "Cordus Urceo," when he meant Antonio Urceo, who playfully adopted the nickname "Codro" (the pauper).⁹

A would-be judge might likewise be expected to inform himself about his victim's reputation. According to Professor Africa (pp. 403-404), "Copernicus lacked the concern for data and method which partly prevented Tycho Brahe from accepting the Copernican system." This ungrammatical verdict seems intended to convey the idea that Brahe had a low opinion of Copernicus' "concern for data and method." Since Professor Africa again failed to provide us with a citation, let us listen to Brahe's famous oration:

In our time Nicholas Copernicus may not undeservedly be called a second Ptolemy. Through observations made by himself he discovered certain gaps in Ptolemy, and he concluded that the hypotheses established by Ptolemy admit something unsuitable in violation of the axioms of mathematics. Moreover, he found the Alfonsine computations in disagreement with the motions of the heavens. Therefore, with wonderful intellectual acumen he

⁸ *Op. cit.*, pp. 99-100.

⁹ Edward Rosen, "Copernicus' Quotation from Sophocles," in *Didascalidae, Studies in Honor of Anselm M. Albareda*, ed. Sesto Prete (New York: Rosenthal, 1961), p. 372.

⁵ *Op. cit.*, pp. 111, 126, 132, 141, 144, 147, 168.

⁶ *Op. cit.*, p. 192.

⁷ *Op. cit.*, p. 93.

established different hypotheses. He restored the science of the heavenly motions in such a way that nobody before him had a more accurate knowledge of the movements of the heavenly bodies.¹⁰

Brahe's reasons for rejecting Copernicanism had nothing to do with "data and method." He found the new system in conflict with "not only the principles of physics but also the authority of Holy Scripture."¹¹ Brahe's biographer and editor of his collected works tells us that Tycho never mentioned Copernicus' name "without some expression of admiration."¹²

The aforementioned deleted passage was characterized by Professor Africa as being "incongruous in an astronomical tract" (p. 407). Why did Copernicus write the passage in the first place, and why did he later delete it? He had to explain why he kept his treatise hidden so long. For this purpose he recalled the Pythagoreans' practice of communicating their knowledge only to friendly persons. When he was finally persuaded to release his manuscript to a printer, he drafted the dedication to the pope. In the dedication he related that he had debated with himself for a long time whether to publish his treatise or "follow the example of the Pythagoreans and certain others." His discussion of their example made the earlier passage redundant, and consequently he deleted it. But, despite Professor Africa, it was never incongruous. On the contrary, either it or some equivalent was indispensable to account for Copernicus' long delay in publishing his book.

According to Professor Africa (p. 403), Copernicus' "hesitation in publishing the *Revolutions* has often been ascribed to fear of ecclesiastical opposition, but the theme of sacerdotal oppression is difficult to maintain in view of demonstrated papal favor. In 1536 Pope Paul III extended encouragement to Copernicus through Cardinal von Schönberg." How was the papal favor

demonstrated? What is the basis of Professor Africa's pronouncement that "in 1536 Pope Paul III extended encouragement to Copernicus through Cardinal von Schönberg"? Certainly the cardinal's letter of 1536 to Copernicus said nothing about papal encouragement or favor. Nor did Copernicus, in dedicating the *Revolutions* to Pope Paul III, say anything about any papal encouragement or favor in 1536 or any other year. Copernicus gave the first place in the *Revolutions* to the cardinal's letter. Next came the dedication to the pope. Here a bishop was singled out as having frequently exhorted Copernicus to publish. Amid all this impressive parade of ecclesiastical dignitaries, Copernicus made no mention of any papal encouragement or favor. Had he ever received any, would he not have displayed it as conspicuously as possible? Has the argument from silence ever been more eloquent?

We have now seen that there is absolutely no historical foundation for Professor Africa's allegation about Copernicus' receiving papal favor or encouragement. Let us next consider how well Professor Africa understood why Copernicus hesitated to publish the *Revolutions*. "His hesitation . . . has often been ascribed to fear of ecclesiastical opposition." To this correct remark, Professor Africa added: "but the theme of sacerdotal oppression is difficult to maintain" (p. 403). Is the "fear of ecclesiastical opposition" identical with "sacerdotal oppression"? Copernicus felt an acute "fear of ecclesiastical opposition." But, having delayed the publication of the *Revolutions* thirty-six years, he escaped feeling "sacerdotal oppression." He died a natural death, before he could be burned at the stake, like Giordano Bruno, or sentenced to life imprisonment, like Galileo. Professor Africa introduced a further confusion in his discussion of this highly important matter by talking about Copernicus' "timidity at the professional opposition of rival astronomers" (p. 403).¹³

¹⁰ *Tychonis Brahe dani opera omnia* (Copenhagen, 1913-1929), I, 149: 22-30.

¹¹ See pp. 326-327 of the article cited in n. 2, above.

¹² J. L. E. Dreyer, *Tycho Brahe* (Edinburgh, 1890), p. 125.

¹³ If "Copernicus' attitude toward other scientists was generally . . . contempt," and if he wrote an "imperious *Letter against Wer-*

But it was not professional astronomers who burned Bruno at the stake or condemned Galileo to life imprisonment.

Professor Africa was confident that Copernicus delayed the publication of the *Revolutions* "not through fear of rack" (p. 409). But the rack was one of the most persuasive arguments in the armamentarium of the theologians. By showing Galileo the rack and other instruments of torture, the theologians persuaded him to abjure Copernicanism. And Kepler has preserved that portion of a letter to Copernicus in which his correspondent advised him to mollify the "theologians, whose opposition you fear."¹⁴

Copernicus began his dedication to the pope by expressing his certainty that "certain persons," as soon as they heard what his book was all about, would immediately shout that he must be hissed off the stage. Toward the close of the dedication he anticipated attacks on his book by people who knew nothing about mathematics but presumed to meddle in it "on account of some passage in Scripture." That is why Copernicus coined his single most renowned utterance: "Mathematics is written for mathematicians." He implied that it was not written for theologians who had no competence in the mathematical sciences.

Now we are in a position to understand Copernicus' conduct with regard to Aristarchus. He retained his references to Aristarchus' determinations of the obliquity of the ecliptic and the length of the year. But it was not for these strictly mathematical results that it was "thought that the Greeks ought to bring charges of impiety against Aristarchus."¹⁵ Those charges would have been based on Aristarchus' conception of a moving earth. That was precisely what Copernicus suppressed in the deleted passage. According to

ner," a well-known mathematician and astronomer, when did he undergo the personality change that made him feel "timidity at the professional opposition of rival astronomers?"

¹⁴ *Three Cop. Tr.*, p. 23.

¹⁵ Plutarch, *The Face in the Moon*, 923.

Professor Africa (p. 406), his motive in so doing was "either vanity, 'Pythagorean' scruples, or both." Actually Copernicus had no wish to inform or remind anybody that a great astronomer could have been prosecuted for impiety. If Aristarchus was indeed "the ancient Copernicus," Copernicus had no desire to become the modern Aristarchus.

It is time to delimit the sense in which Copernicus may be said to have been a Pythagorean. He was indebted to the Pythagoreans for his basic conception, the moving earth. Little else of their astronomy was known to him. What he prized was their prudence in intellectual matters.

In the letter from which Professor Africa quoted Kepler's jest about "Pythagoras, grandfather of all Copernicans," the great reformer of Copernicanism went on to advise the teacher who had introduced him to the Copernican astronomy:

Let us imitate the Pythagoreans even in their customs. If anybody approaches us privately, let us tell him our opinion frankly. Publicly let us be silent. Why go and ruin astronomy by means of astronomy? The whole world is full of men of the type who are ready to throw all of astronomy, if it sides completely with Copernicus, off the earth, and to forbid the specialists an income. But specialists cannot live off themselves or on air. Therefore let us act in astronomical affairs in such a way that we hold on to the supporters of astronomy and do not starve.¹⁶

The Pythagorean prudence recommended by the extrovert Kepler in a private letter exhibited more explicitly the intense fear justifiably felt by Copernicus the introvert.

What is commonly called the Copernican Revolution was not completed by Copernicus, but commenced by him. To speak, as does Professor Africa (p. 409), of "the Copernican Revolution, to which Copernicus was not party" is to perform *Hamlet* without the prince of Denmark.

¹⁶ *Johannes Kepler Gesammelte Werke*, XIII (Munich, 1945), 231: 505-512.

A REPLY TO PROFESSOR ROSEN

By Thomas W. Africa *

Recently, Professor Rosen has excoriated numerous scholars in *Centaurus* (7: 152-156) and *Journal of the History of Ideas* (21: 431-441; 22: 386-388) — some deservedly; others not. Much of his criticism of my paper is aimed at nonexistent points. The “Copernican Revolution in which Copernicus had no part” was clearly indicated as the philosophic effect of displacing man from the center of the universe. Obviously, “lost” (particularly non-existent) arcana cannot be revived (my note 18). The “frankly professed Pythagoreanism” was deleted as too revealing! Copernicus’ “contempt” (too strong, but surely not humility toward contemporaries) naturally did not apply to the ancients. The date of Kepler’s interesting letter might help for comparative purposes. My passing remark on Tycho Brahe said simply that Tycho was a greater observer than Copernicus and as such felt that his own system was more scientific; because of his religious scruples, I added “partly.” (I hope that Kepler has not misled me on this). Professor Rosen’s footnote 13 eludes me. “Cordus” Urceo is as legitimate as “Plato” or “Caligula”; Pomponazzi was “his colleague” (Urceo’s), teaching philosophy at another university (Professor Rosen should score poor syntax, not invincible ignorance).

My paper assumed: (1) The intellectual climate of Renaissance Italy was heavy with “Platonism” and pseudo-Pythagoreanism; (2) Catholic bigotry did not restrain Copernicus from publishing his theories, which were not subversive until the Counter Reformation killed Bruno in 1600 and silenced Galileo in 1616 — two tragedies involving more than astronomy. Apparently, Professor Rosen does not share these opinions on the early Sixteenth Century, but many scholars do, not all of

whom are hopelessly ignorant. Surely Bishop Giese and Rheticus did not want their friend burned alive when they advocated his publication.

Professor Rosen dislikes my translation (“after a fashion”) of the deleted passage, but the key sentence still says that Aristarchus and Philolaus shared views which were not those Aristotle ridiculed. Copernicus found this notion in no classical writer, but he did believe that Philolaus had enlightened Plato (my note 44 and discussion in text). I suggest that the good canon felt he had recovered “lost” arcana and released it with “Pythagorean” selectivity. Professor Rosen feels that my interpretation of Copernicus as a “Pythagorean” elitist degrades the great scientist as “not thinking straight.” I do not, nor does anyone who holds that the history of science is the study of men with ideas and techniques.

Why did Copernicus delete Aristarchus and the Letter of Lysis from the Dedication? Other references to ancient advocates of the earth’s mobility were not deleted. If the mere mention of Aristarchus would arouse the Inquisition,¹ he was cited three times in the text of *De Revolutionibus*. Both Copernicus and the Holy Office knew that Plutarch did not say Aristarchus had been indicted but only that one quarrelsome Stoic thought he ought to be. (Plato felt that Homer ought to be banned). Of course, Plutarch thought as little of the Stoics as Professor Rosen does of my paper. The only Greek martyr to astronomy was Anaxagoras, who was indicted for Medism as well.

Professor Rosen does not have to accept my interpretation of Copernicus, but he has not refuted it. If it is erroneous, surely the good sense of the scholarly community will reject it.

¹ In 1559, why did the ferocious Caraffa neglect Copernicus’ book, which was not put on the Index until 1616?

* University of Southern California.

Queries

Answers to queries appearing in *Isis* should be addressed to the author of the query, in care of the Editor. All answers will be forwarded to the author. Please mark the envelope: "Answer to query no. —."

Query 166 — *Correspondence of Robert Boyle: 1627-1691.*

Dr. R. E. W. Maddison, who has written many articles about Robert Boyle, has been awarded a Leverhulme Research Fellowship for the purpose of producing an annotated edition of the Boyle correspondence. He wishes to know if there are letters *to or from* Boyle that have not come to his notice, and will be glad to receive information about any items not listed in his Tentative Index (*Notes and Records of the Royal Society*, 1958, 13, 128-201). His address is 2 Alderney Avenue, Heston, Middlesex, England.

Query 167 — *Edition of Malpighi's Correspondence.*

Howard B. Adelmann, Professor of Histology and Embryology at Cornell University, Ithaca, New York, has begun work on a complete edition of the letters written by and to Marcello Malpighi. He would be grateful for information concerning any such letters in private hands or in libraries (except for the libraries of Bologna and the Royal Society). He is prepared to

defray the cost of photographing manuscripts and would, of course, return promptly any original material sent to him for photographing in Ithaca.

Query 168 — *Life of Henry G. J. Moseley.*

Bernard Jaffe (25 Eastern Parkway, Brooklyn 38, New York), author of *Crucible: The Story of Chemistry*, is planning a book on the life of Henry G. J. Moseley, the discoverer of the Law of Atomic Numbers. He will appreciate receiving copies of letters, photographs, notes, and recollections about him from relatives, colleagues, and friends.

* * *

"*Questiones Alani*"

To the Editor of *Isis*:

In my article, "*Questiones Alani*," published in *Isis*, (1960), 51, 181-185, I was mistaken in saying that the work had not been attributed to Alanus de Insulis, since it had been so briefly in Manitius's *History of Latin Medieval Literature* (1931) III, 804, as Professor Pearl Kibre discovered in working on the revision of *A Catalogue of Incipits of Medieval Scientific Writings in Latin*.

Moreover, it seems to be the same text as that on the natures of animals attributed to Alanus de Insulis.

LYNN THORNDIKE