

## THE ABERDEEN COPY OF COPERNICUS'S *COMMENTARIOLUS*

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The *Commentariolus* of Copernicus, a short treatise presenting the main features of the new theory of the universe, remained unpublished for over 350 years after it was written at the beginning of the sixteenth century. Its autograph was soon lost and but for a short reference in Tycho Brahe's *Progymnasmata*<sup>1</sup> its contents were unknown until the discovery, by M. Curtze, of a late sixteenth century copy in the Vienna Imperial Court Library (now the Oesterreichische Nationalbibliothek).<sup>2</sup> The Vienna copy is contained in a MS volume which belonged, in 1600, to Tycho's assistant Christian Sørensen (Longomontanus). One folio was at some time detached from this volume and lost. As a result, the Vienna copy of the *Commentariolus* is defective and lacks the major part of the lunar theory. However, several years later a second complete copy was discovered by A. Lindhagen in the library of the Royal Academy of Sciences in Stockholm.<sup>3</sup> The Stockholm transcript is written on folios bound together with a copy of the 1566 Basel edition of *De revolutionibus*; the book itself bears the signature of Hevelius.

The two transcripts mentioned above for a long time formed the sole basis both for the establishment of the most probable original Latin text and for various translations in modern languages.<sup>4</sup> This basis was widened when, in 1962, W. P. D. Wightman published the first announcement of a fragment of the *Commentariolus* written by Duncan Liddel and preserved in his copy of the 1566 edition of *De revolutionibus*, now in King's College library in Aberdeen.<sup>5</sup> A reinvestigation of the book in question in 1965 revealed that, scattered on several interfolia in the volume, there is actually a complete text of the Copernican treatise written by Liddel, as revealed by his own note, in Rostock on 2 November 1585.<sup>6</sup>

Before we describe it in more detail, some remarks should be made on the circumstances in which the Aberdeen copy was made. Its writer, Duncan Liddel (1551-1613) (see Figure 1), physician and astronomer,<sup>7</sup> is perhaps best known as the benefactor of the Aberdeen college, which he enriched by founding a new chair for mathematics (*i.e.* astronomy) and by bequeathing to the college his rich science library, which is still preserved and has been documented in the monograph by Wightman. Beginning in 1569, Liddel spent over 40 years of his life on the Continent climbing the full length of the academic ladder, from a student in Frankfurt to a Doctor of Medicine and dean and vice-chancellor of the university at Helmstadt. In his student years he was tutored first by John Craig in Frankfurt on the Oder and later, until 1584, by the eminent mathematician Paul Wittich in Wroclaw. Both these men were acquainted with Tycho and other contemporary scientists. In the closely woven community of scholars of that period, this meant that the Scottish student found himself in the inner circle of astronomers busy exchanging their experiences and information. He also came in direct contact with Tycho and visited the observatory at Hven

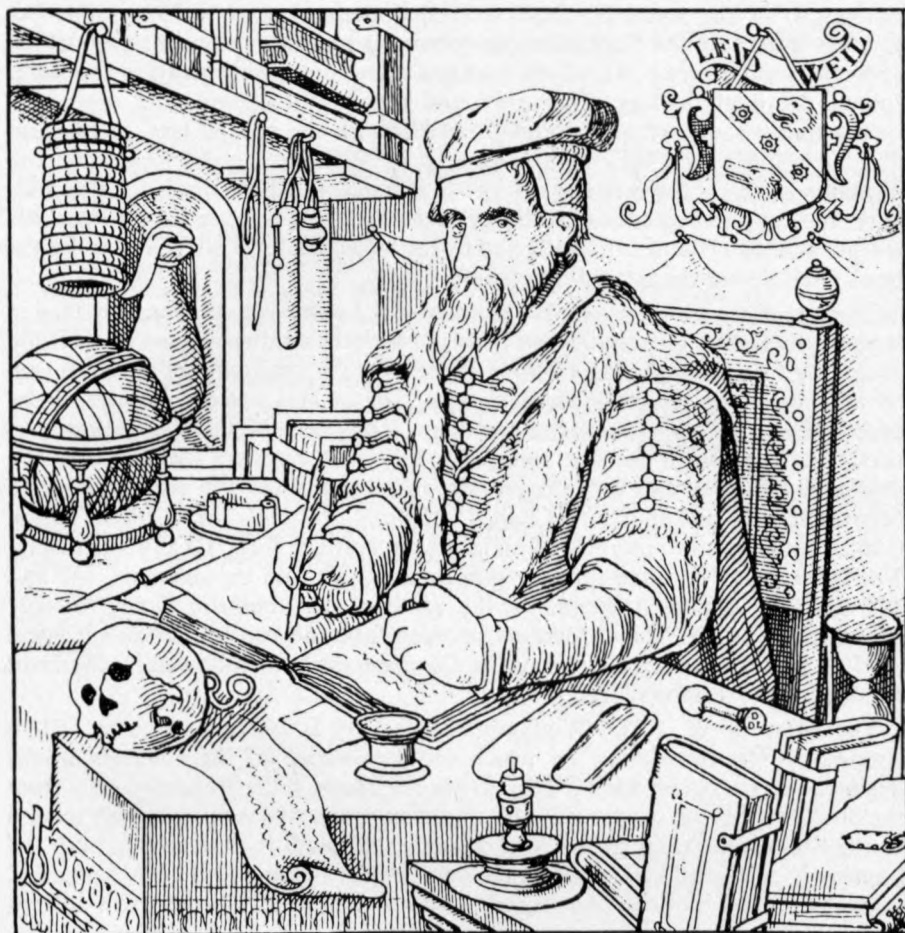


FIG. 1. Portrait of Duncan Liddel, from the memorial brass in St Nicholas Church, Aberdeen (reproduced from vol. xi (1874–76) of *Proceedings of the Society of Antiquaries of Scotland*).

on 24 June 1587. Later he was to be admitted to the large body of learned men involved in a more-or-less heated dispute with Tycho. It can be surmized, therefore, that in Rostock in 1585 Liddel (then resident in Frankfurt) was one of those “quibusdam in Germania mathematicis” to whom Tycho Brahe made his copy of the *Commentariolus* available.

Liddel’s astronomical activity, although not of primary importance, is nevertheless noteworthy as he may well have been the first in the long series of academics who lectured on all three main cosmological systems—Ptolemaic, Copernican and Tychonic—first (after 1587) in private lessons at Rostock, and later (after 1591) from his chair at the Helmstadt university. The Copernican mathematical astronomy is well represented (although his cosmology is not

envisaged) in the students' theses defended under Liddel in Helmstadt, but Liddel's interest in the Copernican astronomy is best attested by his copy of the 1566 *De revolutionibus*. This copy contains numerous notes testifying to a careful and thorough reading. They are found both on the margins and, especially, on numerous sheets of paper bound together with the printed text. Altogether 22 double folios have been added, forming 44 folios (although in fact there are 43 folios—one corresponding with the first interfolio is missing), for the most part forming outer extensions of the printer's sheets. The paper of the interfolia is from Budissin (Bautzen), as attested by the water-mark,<sup>8</sup> while the paper of the book itself shows the typical Basel water-mark.

The text of the *Commentariolus*, as written by Liddel, is to be found divided in six parts located at the appropriate places of the printed text. Thus the interfolio preceding fol. a<sub>1</sub> (beginning of Book I) contains the beginning of the *Commentariolus*, including the seven "assumptions" (*petitiones*) and the chapter on the order of the spheres (*De ordine orbium*). This part of the *Commentariolus* occupies the *recto* of the first interfolio; following chapters, dealing with the motions of the Sun and with the motion of the equinoxes, are on the interfolio between fols. 85 and 86 (facing Chap. 15 of Book III). The chapter on the Moon is to be found on the *recto* side of an interfolio between fols. 100 and 101 (Chap. 3 of Book IV). The three superior planets are dealt with between fols. 148 and 149 (Book V, Chap. 9), Venus on the verso of the interfolio facing fol. 161 (Book V, Chaps. 20–21) and Mercury between fols. 168 and 169 (Book V, Chaps. 29–30). The last line of the text of the *Commentariolus* is followed by the date: Rostock, 2 Nov[embris] 1585.

The value of W. P. D. Wightman's discovery is twofold. First of all, it strengthens the foundation on which our knowledge of the *Commentariolus* depends—in particular for the chapter *On the Moon*, hitherto known only from the Stockholm copy. In general, the Aberdeen transcript is more closely related to the Stockholm than to the Vienna copy, although it shares with both the hopelessly corrupted line asserting the solar year, as determined by Albatagnius, to be "13 and  $\frac{2}{3}$  minutes, that is, one-third of a minute" shorter than that of Ptolemy.

Secondly, in particular cases the Aberdeen copy is important as helping to confirm the better readings, for example of the value of the diameter of the auxiliary circles in the theory of Mercury ( $r = 14' \cdot 5$  in the Aberdeen and Stockholm copies, as against  $24' \cdot 5$  from Vienna). One important omission in both the Stockholm and Vienna copies is corrected in Liddel's copy: the sidereal period of Mars. This lacuna has been supplied in different ways by various scholars, the most probable being 29 months, as attested by a later passage in the treatise.<sup>9</sup> Liddel's copy gives the sidereal period of Mars as equal to two years. But this number (*biennio*) is written above the line of the text, and may have been the result of the writer's consulting the neighbouring pages of Chap. 10 of Book I of *De revolutionibus* and the well known diagram accompanying it.

The discovery of an additional source made a new recension of the *Commentariolus* possible and indeed necessary. Such a recension is now in press, and will be included in the third volume of *Nicolai Copernici opera omnia*, edited by the Polish Academy of Sciences in Warsaw.

*Acknowledgement*

The cooperation of the staff of the library of King's College, Aberdeen, is gratefully acknowledged.

## REFERENCES

1. *De nova stella anni 1572* (ed. Frankfurt, 1610), 479: “. . . Copernicus in tractaculo quodam de hypothesisibus a se constitutis, quem mihi Ratisbonae aliquando [1575] manuscriptum impertijt clarissimus vir D. Thaddaeus Hagecius [Hájek]. . . ego vero eundem postea alijs quibusdam in Germania mathematicis communicavi. . .”. Tycho goes on to quote several numerical values from the *Commentariolus*.
2. *Mittheilungen des Copernicus-Vereins*, i (1878), 1–17.
3. *Bihang till K. Svenska Vet. Akad. Handlingar*, vi (1880–1882), no. 12 (1881), 1–15.
4. Into German, by P. Müller, 1899 and F. Rossman, 1948; Polish by L. A. Birkenmajer, 1920; English by E. Rosen, 1937 and Russian by N. I. Veselovskij, 1964. For a full bibliography of these translations and of recent writings on Copernicus, see E. Rosen, *Three Copernican treatises* (3rd edn, New York, 1971).
5. W. P. D. Wightman, *Science and the Renaissance* (Edinburgh, 1962), ii, 67.
6. J. Dobrzycki and W. P. D. Wightman, “The *Commentariolus* of Copernicus”, *Nature*, ccviii (1965), 1263.
7. Cf. J. Stuart, *A sketch of the life of Dr. Duncan Liddel, of Aberdeen* (Aberdeen, 1790); vol. xxxiii of *Dictionary of national biography*; and W. P. D. Wightman, *op. cit.*, ii, pp. xii–xvii.
8. Briquet No. 2034; *Les filigranes*, i (Geneva, 1907), 149.
9. E. Rosen, *Three Copernican treatises*, 60, note 7.