

THOMAS LITTLE HEATH

IN the death of Sir Thomas Little Heath* on 16th March, at the age of seventy-eight, there passed away a great scholar whose literary achievements had been internationally recognised. During the first quarter of the present century he and Heiberg were the two leading authorities in the world in the field of Greek mathematics and astronomy. But Heiberg's profound erudition displayed, for example, in connection with his texts of Apollonius of Perga, Archimedes, Euclid, Ptolemy, Serenus, and Theodosius, put him in a class by himself.

When Heath's publications commenced to appear fifty-five years ago there was hardly anything in the English language about Greek mathematics. Gow's *A Short History of Greek Mathematics* had just been published and several chapters by G. J. Allman on *Greek Geometry from Thales to Euclid* had already appeared in *Hermathena* and these with later instalments were finally issued in book form in 1889. The first edition of the first volume of Cantor's monumental *Vorlesungen über Geschichte der Mathematik* (with over 340 pages on Greek mathematics) had been published in 1880, and summarised the work of earlier scholars. In this early period was also J. S. Mackay (1843-1914), a Scot, who for many years had given his holidays to the collation of manuscripts of the *Collection* of Pappus, and his nights to patient elucidation of the interpretation, until the work was finally complete, with a wealth of drawings. Just then (1876) the first volume of Hultsch's edition of Pappus came out and he discovered that all of his work, even to the smallest detail, had been anticipated. A little later he found himself forestalled in a less direct and complete way by the publication of Allman's work. His article on Euclid appeared in more than one edition of the *Encyclopædia Britannica*.

Before referring to outstanding features of Heath's achievements let us view a skeleton sketch of his career. He was born 5th October, 1861, at Barnetby-le-Wold, Lincolnshire, being the third son of Samuel Heath. One of Thomas's elder brothers, Robert Samuel Heath, was second wrangler in 1881 and afterwards professor of mathematics and vice-principal in the University of Birmingham. At school and at Trinity College, Cambridge, Thomas Heath read both classics and mathematics and took first class honours in both the classical tripos and the mathematical tripos, and he was twelfth wrangler in 1882. In 1884 he passed first in the open competition for the Home Civil Service, entered the Treasury and became

* Volume 2 of *Osiris*, 1936, was dedicated to Sir Thomas and contained an excellent portrait as frontispiece, an extended biographical sketch (pp. v-xxiii) by Professor D. E. Smith, and a bibliography of Heath's publications. A fine obituary notice by Sir D'Arcy W. Thompson appeared in *Nature*, 13th April, 1940, v. 145, pp. 578-579.

finally (1913-19) joint permanent secretary to the Treasury and auditor of the Civil List. In 1919 he was appointed comptroller of the National Debt Office, from which position he retired at the end of 1926, because of age limitations. Thus his regular duties kept him busy for seven hours a day for over forty years. In his interesting little book on *The Treasury* (1927) he described the many changes he had witnessed in his long career.

But Heath was occupied in other ways. He served as president of the Mathematical Association in 1922. Elected a fellow of the Royal Society in 1912, he was a member of its Council, 1920-21 and 1926-28. He was also one of the Cambridge Commissioners under the University of Oxford and Cambridge Act of 1923, and a member of the Royal Commission on National Museums and Galleries (1927-29).

Let us now turn to his extraordinary literary output, a product of his evening hours. These commenced to appear in print in 1885. Already we find "T. L. Heath, B.A.", shortly after graduation, contributing two articles to the *Encyclopædia Britannica*, an edition of which was then in process of publication. Since such articles are not listed in Professor Smith's bibliography,* it may be well as a matter of record to bring them together here. Ninth edition, vols. 18-19 (1885); eleventh edition (1910-11); fourteenth edition (1929). "Apollonius of Perga" (11th, 14th), "Archimedes" (11th, 14th), "Arithemius" (11th), "Diophantus" (11th, 14th), "Eratosthenes" (11th, 14th), "Euclid" (14th), "Heraclides Ponticus" (14th), "Heron of Alexandria" (11th, 14th), "Nicomachus" (14th), "Pappus" (9th, 11th, 14th), "Porism" (9th, 11th, 14th), "Ptolemy" (in part, 14th), "Pythagoras" (14th), "Serenus of Antissa" (11th, 14th), "Theodosius" (11th, 14th).

But, of other publications of 1885, apart from contributions to *Journal of Philology*, there was Heath's first book *Diophantus of Alexandria; a Study in the History of Greek Algebra*. This was a dissertation, written with Glaisher's encouragement, which led to his election as Fellow of Trinity College. It was published by the Cambridge University Press on Cayley's recommendation. Two-thirds of the work were occupied with just the kind of material the scholarly student of Diophantus would like to have, and in the last third, an appendix, in an abstract of the Arithmetics and the tract on Polygonal Numbers. This youthful work, entirely recast by the mature scholar in its second edition just twenty-five years later, not only takes account of all pertinent new material which had become available, but presents also the work of Fermat and Euler which is intimately associated with that of Diophantus. The result was a volume of great importance.

Heath's second and third books came out in successive years 1896 and 1897; they were the Conic Sections of Apollonius of Perga,

* Another article is also omitted here, namely: "Geometry old and new", *Nineteenth Century and After*, vol. 103, 1928, pp. 238-246.

“ edited in modern notation, with introductions, including an essay on the earlier history of the subject ” with notable help from Zeuthen’s survey, and the Works of Archimedes, “ edited in modern notation with introductory chapters ” The extraordinary discovery by Heiberg in an Istanbul library of the work of Archimedes on “ The Method ” led to Heath publishing a supplement to the latter work in 1912. (A German edition, with the supplement, appeared in 1914.) For the first time these treatises, taking account of the latest research, made it possible for the ordinary mathematician to gain a true appreciation of the wonderful achievements of these great Greeks. The condensation of texts from complete literal translations, into modern notation and abbreviated forms, while always retaining the spirit and lines of argument of the originals, was carried out in masterly fashion.

Eleven years later, 1908, a literal translation of Euclid’s Elements, from the text of Heiberg, with introduction and commentary, was published in three volumes. This is a most remarkable work and constitutes a veritable encyclopedia of elementary geometry. It was a noble monument to be erected in a country where the Elements had been studied for a thousand years. That this large work was already out of print soon after the great war was over is of interest. A second edition, materially revised and somewhat enlarged, appeared in 1926. In 1920 Heath published another Euclid work of great merit, helpful alike to Greek and to Mathematics, *Euclid in Greek, Book I ; with Introduction and Notes*. “ The notes are admirable. They contain, it is true, a good deal of elementary Greek for the weaker vessels ; but they also deal with the philosophy of the work and its foundations in a way which will be found valuable by many thoughtful men.” (Review in *Classical Review*, v 34, p. 180.)

Heath’s next major work was *Aristarchus of Samos the ancient Copernicus, A History of Greek Astronomy to Aristarchus together with Aristarchus’s Treatise on the Sizes and Distances of the Sun and Moon, a new Greek Text with Translation and Notes*, Oxford, 1913. It owed its inception to questions raised by an old school-fellow, Professor H. H. Turner of Oxford. Not only was one more remarkable geometrical work thus made available to the English student, but the validity of referring to Aristarchus as the Copernicus of Antiquity was well established. In 1932 this work was followed by another of a somewhat popular nature in the “ Library of Greek Thought ” series, his last published book, *Greek Astronomy*. After an Introduction of 44 pages there are 180 pages of translations, from different authors, of passages dealing with astronomical matters. These are somewhat in the style of the recently published volume of the Loeb Classical Library, *Selections illustrating the History of Greek Mathematics*, except that there the Greek text is given with the translations.

As soon as his Aristarchus volume was published Heath started the preparation of the splendid work which was to crown his achieve-

ments in connection with his "favourite hobby of Greek Mathematics", namely, the preparation of *A History of Greek Mathematics*. The bulk of this was "written as a distraction during the first three years of the war", and the manuscript was sent to the printer in October 1916; but the two volumes did not actually appear until 1921. This work was written both for the classical scholar and for the expert mathematician. To provide for the less expert intelligent reader who could dispense with considerable detail, Heath published in 1931 the single volume work, *A Manual of Greek Mathematics*, which contains corrections of slips in the larger work, changes due to advances in knowledge, and several pages on the remarkable discoveries of Neugebauer in connection with Babylonian mathematics.

All of Heath's writings are characterised by extraordinary clarity, especially noticeable in dealing with a complex mass of material, and remarkable accuracy, which could only be achieved by outstanding abilities coupled with exceptional lucidity of thought and relentless thoroughness in bibliographic surveys. His gift for literary expression, freed from all that was fanciful, was also most noticeable. That Heath's ten works should have been written and published simply as one of his hobbies, in an otherwise very busy life, seems almost unbelievable. Another occupation of his leisure was music (Bach's being a special comforter in times of spiritual trial), and yet another, mountaineering—he had made most of the principal ascents of the Dolomites.

When he was fifty-three Sir Thomas married Miss Ada Thomas, an accomplished pianist of professional standing, and they had a son and a daughter. He was created a Companion of the Bath in 1903, a Knight Commander of the Bath in 1909, and a Knight Commander of the Royal Victorian Order in 1916. He received the Sc.D. degree from Cambridge in 1896, that of Hon. Sc.D. from Oxford in 1913, and that of Hon. Litt.D. from Dublin in 1929. In 1920 he was made an honorary fellow of Trinity College, Cambridge. Everyone who had the privilege of meeting Sir Thomas must have been impressed by the delightful simplicity and courtesy of his bearing.

R. C. ARCHIBALD.

Brown University,
Providence, Rhode Island.

GLEANINGS FAR AND NEAR.

1321. We have no knowledge, that is, no general principles drawn from the contemplation of particular facts, but what has been built up by pleasure, and exists in us by pleasure alone. The Man of Science, the Chemist and Mathematician, whatever difficulties and disgusts they may have had to struggle with, know and feel this.—William Wordsworth, Preface to *Lyrical Ballads*, Vol. I. [Per Mr. A. F. Mackenzie.]