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(*b*. Eton, Buckinghamshire, England, 5 March 1575; *d*. Albury, near Guildford, Surrey, England, 30 June 1660), *mathematics*

Oughtred's father was a scrivener who taught writing at Eton and instructed his young son in arithmetic. Oughtred was educated as a king's scholar at Eton, from which he proceeded to King's College Cambridge, at the age of fifteen. He became a fellow of his college in 1595, graduated B. A. in 1596, and was awarded the M. A. 1600.

Ordained a priest in 1603, Oughtred at once began his ecclesiastical duties, being presented with the living of Shalford, Surrey. Five years later he became rector of Albury and retained this post until his death. Despite his parochial duties he continued to devote considerable time to mathematics , and in 1628 he was called upon to instruct Lord William Howard, the young son of the earl of Arundel. In carrying out this task he prepared a treatise on arithmetic and algebra. This slight volume, of barely 100 pages, contained almost all that was then known of these two branches of mathematics; it was published in 1631 as *Clavis mathematicae*.

Oughtred's best-remembered work. the *Clavis* exerted considerable influence in England and on the Continent and immediately established him as a capable mathematician. Both Boyle and Newton held a very high opinion of the work. In a letter to Nathaniel Hawes, treasurer of Christ's Hospital, dated 25 May 1694 and entitled "A New Scheme of learning for the Mathematical Boys at Christ's Hospital," Newton referred to Oughtred as "a man whose judgement (if any man's) may be relyed on." In Lord king's *Life of Locke* we read " The best Algebra yet extant is Oughtred's" (I227). John Aubrey, in *Brief Lives*, maintained that Oughtred was more famous abroad for his learning than at home and that several great men came to England for the purpose of meeting him (II, 471).

John Wallis dedicated his *Arithmetica infinitorum* (1655) to Oughtred. A pupil of Oughtred, Wallis never wearied of sounding his praises. In his *Algebra* (1695) he wrote. The *Clavis* doth in as little room delvier as much as the fundamental and useful parts of geometry (as well as of arithmetic and algebra) as any book I know, " and in its preface he classed Oughtred with the English mathematician Thomas Harriot.

The *Clavis* is not easy reading. The style is very obscure, and rules are so involved as to make them difficult to follow. Oughtred carried symbolism to excess, using signs to denote quantities, their powers, and the fundamental operations in arithmetic and algebra. chief among these were X for multiplication,⊐ for "greater than";⊏for "less than"; and ~ for difference between. "Ratio was denoted by a dot; proportion, by∷. Thus the proportion A: B=α: β was written A · B ∷α· β. Continued proportion was written ∺ Of the maze of symbols employed by Oughred, only those for multiplication and proportion are till used. Yet, surposingly, there is a complete absence of indices or exponents from his work. Even in later editions of the *Clavis,* Oughtred used Aq, *Ac Aqq, Aqc, Acc, Aqcc, Accc, Aqqcc,*to denote successive powers of *A* up to the tenth. In his *Géométrie* (1637) Descartes had introduced the notation x^n but restricted its use to cases in which *n* was a positive whole number. Netwon extended this notation to include fractional and negative indices. These first appeared in a letter to Oldenburg for transmission to Leibniz— the famous *Epistola Prior* of June 1676— in which Newton illustrated the newly discovered binomial theorem.

In *La disme,* a short tract published in 1585, Simon Stevin had outlined the principles of decimal fractions. Although a warm admirer of Stevin's work, Oughtred avoided his clumsy notation and substituted his own, which, although an improvement, was far from satisfactory. He did not use the dot to separate the decimal from the whole number, undoubtedly because he already used it to denote ratio; instead, he wrote a decimal such as 0.56 as 0/$\underline{56}$.

Oughtred is generally regarded as the inventor of the circular and rectilinear slide rules. Although the former is described in his *Circles of Proportion and the Horizontal Instrument* (1632), a description of the instrument had been published two years earlier by one of his pupils, Richard Delamain, in *Grammelogie, or the Mathematical Ring*. A better quarrle ensued between the two each claiming priority in the invention. There seems to be no very good reason why each should not be credited as an independent inventor. Oughtred's claim to priority in the invention of the rectilinear slide rule, however, is beyond dispute, since it is known that he had designed the instrument as early as 1621.

In 1657 Oughtred published *Trigonometria*, a work of thirty-six pages dealing with both plane and spherical triangles. Oughtred made free use of the abbreviations *s* for sine *t* for tangent , *se* for secant sco for sine of the complement (or cosine), *tco* for secant cotangent, and *seco* for cosecant. The work also contains tables of sinces, tangents, and secants to seven decimal places as well as tables of logrithms, also to seven places.

It is said that Oughtred, a staunch royalist, died in a transport of joy on hearing the news of the restoration of Charles II.

BIBLIOGRAPHY

I. Original Works. Oughtred's chief writing is *Arithmeticae in numeris et speciebus institutio…quasi clavis mathematicae est* (London, 1631); 2nd ed., *Clavis mathematicae* (London, 1648). English translations were made by Robert Wood (1647) and Edmond Halley (1694) Subsequent Latin eds,. appeared at Oxford in 1652, 1667 and 1693.

His other works are *The Circles of Proportion and the Horiziontal Instrument,* W. Forster, trans, (London, 1632), a treatise on navigation; *The Description and Use of the Double Horizional Dial* (London, 1636); *A Most Easy Way for the Delination of plain Sunidals, Only by Gometry*(1647); *The solution of All Spherical Triangles* (Offord, 1651); *Description and use of the General Horological Ring and the Double Horizotal Dial*(London, 1653); *Trignometria* (London, 1657), trans by R. Stokes as *Trignometric* (London, 1675); and *Canones sinuum, tangentium, sectantium et logarithmorum* (London, 1657).

A collection of Oughtred's papers, mainly on mathematical subjects, was published posthumously under the direction of Charles Scarborough as *Opuscula mathematica hactenus inedita* (Oxford, 1677).

II. Secondary Literature. On Oughtred or his work see John Aubrey, *Briey Lives* Andrew Clark, ed. (Oxford, 1898), II, 106, 113–114, W. W. R. Ball,*A History of the study of Mathematics at Cambridge* (Chicago-London, 1916); *Florian Cajori, William Oughtred, a Great Sevententh Century Teacher of Mathematics* (Chicago-London, 1916); Moritz Cantor,*volesungne über Geschite der Mathematick*, 2nd, ed., II (Liepzig, 1913), 720–721; charles Hutton, *Philosophical and Mathematical Dictionary, new* (London, 1918), II, 141–142; and S. J. Riguaud, ed., *Correspondence of scientific Men of the seventeenth Century*, I(Oxford, 1841), 11, 16,66.

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