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WILLIAM OUGHTRED (1574-1660).

*Frontispiece to The Open Court.*

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## THE LIFE OF WILLIAM OUGHTRED.

BY FLORIAN CAJORI.

AT SCHOOL AND UNIVERSITY.

WILLIAM OUGHTRED, or, as he sometimes wrote his name, *Owtred*, was born at Eton, the seat of Eton College, the year of his birth being variously given as 1573, 1574 and 1575. "His father," says Aubrey,<sup>1</sup> "taught to write at Eton, and was a scrivener; and understood common arithmetique, and 'twas no small helpe and furtherance to his son to be instructed in it when a schoole-boy." "He was a boy at Eton in the year of the Spanish Armada." At this famous school, which prepared boys for the universities, young Oughtred received thorough training in classical learning.

According to information received from F. L. Clarke, Bursar and Clerk of King's College, Cambridge, Oughtred was admitted at King's a scholar from Eton, on September 1, 1592, at the age of 17. He was made Fellow at King's on September 1, 1595, while Elizabeth was still on the throne. He received in 1596 the degree of Bachelor of Arts and in 1600 that of Master of Arts. He vacated his fellowship about the beginning of August, 1603. His career at the University of Cambridge we present in his own words. He says:<sup>2</sup>

"Next after Eaton schoole, I was bred up in Cambridge in

<sup>1</sup> Aubrey's *Brief Lives*, ed. A. Clark, Vol. II, Oxford, 1898, p. 106.

<sup>2</sup> "To the English Gentry, and all others studious of the Mathematicks, which shall bee readers hercof. The just Apologie of Wil: Oughtred, against the slanderous insimulations of Richard Delamain, in a Pamphlet called *Grammologia*, or the Mathematical Ring, or *Mirifica logarithmorum projectio circularis*" [1633], p. 8. Hereafter we shall refer to this pamphlet as the *Apologetical Epistle*, this name appearing on the page-headings.

King's Colledge: of which society I was a member about eleven or twelve yeares: wherein how I behaved my selfe, going hand in hand with the rest of my ranke in the ordinary Academicall studies and exercises, and with what approbation, is well knowne and remembered by many: the time which over and above those usuall studies I employed upon the Mathematicall sciences, I redeemed night by night from my naturall sleep, defrauding my body, and inuring it to watching, cold, and labour, while most others tooke their rest. Neither did I therein seek only my private content, but the benefit of many: and by inciting, assisting, and instructing others, brought many into the love and study of those Arts, not only in our own, but in some other Colledges also: which some at this time (men far better than my selfe in learning, degree, and preferment) will most lovingly acknowledge."

These words describe the struggles which every youth not endowed with the highest genius must make to achieve success. They show, moreover, the kindly feeling toward others and the delight he took throughout life in assisting any one interested in mathematics. Oughtred's passion for this study is the more remarkable as neither at Eton nor at Cambridge did it receive emphasis. Even after his time at Cambridge mathematical studies and their applications were neglected there. Jeremiah Horrox was at Cambridge in 1633-1635, desiring to make himself an astronomer. "But many impediments," says Horrox,<sup>3</sup> "presented themselves: the tedious difficulty of the study itself deterred a mind not yet formed; the want of means oppressed, and still oppresses, the aspirations of my mind: but that which gave me most concern was that there was no one who could instruct me in the art, who could even help my endeavours by joining me in the study; such was the sloth and languor which had seized all. . . . I found that books must be used instead of teachers."

Some attention was given to Greek mathematicians, but the works of Italian, German and French algebraists of the latter part of the sixteenth and beginning of the seventeenth centuries were quite unknown at Cambridge in Oughtred's day. It was part of his life-work as a mathematician to make algebra, as it was being developed in his time, accessible to English youths.

At the age of 23, Oughtred invented his "Easy way of delineating Sun-dials by Geometry," which, though not published

<sup>3</sup> *Companion to the [British] Almanac of 1837*, p. 28, in an article by Augustus De Morgan on "Notices of English Mathematical and Astronomical Writers between the Norman Conquest and the year 1600."

until about half a century later, in the first English edition of Oughtred's *Clavis mathematicae* in 1647, was in the meantime translated into Latin by Christopher Wren, then a Gentleman Commoner of Wadham College, Oxford, now best known through his architectural creations. In 1600 Oughtred wrote a monograph on the construction of sun-dials upon a plane of any inclination, but that paper was withheld by him from publication until 1632. Sun-dials were interesting objects of study, since watches and pendulum clocks were then still unknown. All sorts of sun-dials, portable and non-portable, were used at that time and long afterwards. Several of the college buildings at Oxford and Cambridge have sun-dials even at the present time.

#### AS RECTOR AND AMATEUR MATHEMATICIAN.

It was in 1604 that Oughtred entered upon his professional life-work as a preacher, being instituted to the vicarage of Shalford in Surrey. In 1610 he was made rector of Albury, where he spent the remainder of his long life. Since the era of the Reformation two of the rectors of Albury obtained great celebrity from their varied talents and acquirements, our William Oughtred and Samuel Horsley. Oughtred continued to devote his spare time to mathematics, as he had done in college. A great mathematical invention made by a Scotchman soon commanded his attention—the invention of logarithms. An informant writes as follows:<sup>4</sup>

“Lord Napier, in 1614, published at Edinburgh his *Mirifici logarithmorum canonis descriptio*. . . . It presently fell into the hands of Mr. Briggs, then geometry reader at Gresham College in London: and that gentleman, forming a design to perfect Lord Napier's plan, consulted Oughtred upon it: who probably wrote his *Treatise of Trigonometry* about the same time, since it is evidently formed upon the plan of Lord Napier's *Canon*.”

It will be shown later that Oughtred is very probably the author of an “Appendix” which appeared in the 1618 edition of Edward Wright's translation into English of John Napier's *Descriptio*. This “Appendix” relates to logarithms and is an able document, containing several points of historical interest. Mr. Arthur Hutchinson of Pembroke College informs me that in the university library at Cambridge there is a copy of Napier's *Constructio* (1619) bound up with a copy of Kepler's *Chilias logarithmorum* (1624), that at the beginning of the *Constructio* is a blank leaf, and before this

<sup>4</sup> *New and General Biographical Dictionary* (John Nichols), London, 1784, Art. “Oughtred.”

occurs the title page only of Napier's *Descriptio* (1619), at the top of which appears Oughtred's autograph. The history of this interesting signature is unknown.

#### HIS WIFE.

In 1606 Oughtred married Christ's gift Caryll, daughter of Caryll Esq., of Tangley, in an adjoining parish.<sup>5</sup> We know very little about Oughtred's family life. The records at King's College, Cambridge,<sup>6</sup> mention a son, but it is certain that there were more children. A daughter was married to Christopher Brookes. But there is no confirmation of Aubrey's statements,<sup>7</sup> according to which Oughtred had nine sons and four daughters. Reference to the wife and children is sometimes made in the correspondence with Oughtred. In 1616 J. Hales writes, "pray let me be remembered, though unknown, to Mistress Oughtred."<sup>8</sup>

As we shall see later, Oughtred had a great many young men who came to his house and remained there free of charge to receive instruction in mathematics, which was likewise gratuitous. This being the case, certainly great appreciation was due to Mrs. Oughtred upon whom the burden of hospitality must have fallen. Yet chroniclers are singularly silent in regard to her. Hers was evidently a life of obscurity and service. We greatly doubt the accuracy of the following item handed down by Aubrey; it cannot be a true characterization:<sup>9</sup>

"His wife was a penurious woman, and would not allow him to burne a candle after supper, by which meanes many a good notion is lost, and many a probleme unsolved; so that Mr. [Thomas] Henshawe when he was there, bought candle, which was a great comfort to the old man."

#### IN DANGER OF SEQUESTRATION.

Oughtred spent his years in "unremitted attention to his favorite study," sometimes, it has been whispered, to the neglect of his rectorial duties. Says Aubrey:<sup>10</sup> "I have heard his neighbour min-

<sup>5</sup> Rev. Owen Manning, *History of Antiquities in Surrey*, Vol. II, p. 132.

<sup>6</sup> *Skeleton Collegii Regalis Cantab: or A Catalogue of all the Provosts, Fellows and Scholars, of the King's College...since the Foundation thereof*, Vol. II, "William Oughtred."

<sup>7</sup> Aubrey, *op. cit.*, Vol. II, p. 107.

<sup>8</sup> Rigaud, *Correspondence of Scientific Men of the Seventeenth Century*, Oxford, Vol. I, 1841, p. 5.

<sup>9</sup> Aubrey, *op. cit.*, Vol. II, p. 110.

<sup>10</sup> *Ibid.*, p. 111.



isters say that he was a pitiful preacher; the reason was because he never studied it, but bent all his thoughts on the mathematiques; but when he was in danger of being sequestred for a royalist, he fell to the study of divinity, and preacht (they sayd) admirably well, even in his old age."

This remark on sequestration brings to mind one of the political and religious struggles of the time, the episcopacy against the independent movements. Says Manning:<sup>11</sup> "In 1646 he was cited before the Committee for Ecclesiastical Affairs, where many articles had been deposed against him; but, by the favour of Sir *Bulstrode Whitlock* and others, who, at the intercession of *William Lilly* the Astrologer, appeared in great numbers on his behalf, he had a majority on his side, and so escaped a sequestration."

Not without interest is the account of this matter given by Lilly himself:<sup>12</sup>

"About this Time, the most famous Mathematician of all Europe, (Mr. William Oughtred, Parson of Aldbury in Surrey) was in Danger of Sequestration by the Committee of or for plunder'd Ministers; (*Ambo-dexters* they were;) several inconsiderable Articles were deposed and sworn against him, material enough to have sequestered him, but that, upon his Day of hearing, I applied my self to Sir Bolstrode Whitlock, and all my own old Friends, who in such Numbers appeared in his Behalf, that though the Chairman and many other Presbyterian Members were stiff against him, yet he was cleared by the major Number. The truth is, he had a considerable Parsonage, and that only was enough to sequester any moderate Judgment: He was also well known to affect his Majesty [Charles I]. In these Times many worthy Ministers lost their Livings or Benefices, for not complying with the Three-penny Directory."

#### HIS TEACHING.

Oughtred had few personal enemies. His pupils held him in highest esteem and showed deep gratitude; only one pupil must be excepted, Richard Delamain. Against him arose a bitter controversy which saddened the life of Oughtred, then an old man. It involved, as we shall see later, the priority of invention of the circular slide rule and of a horizontal instrument or portable sun-

<sup>11</sup>*History and Antiquities, etc.*, Vol. II, p. 132.

<sup>12</sup>*Mr. William Lilly's History of His Life and Times, From the Year 1602 to 1681*, London, 1715, p. 58.

dial. In defense of himself, Oughtred wrote in 1633 or 1634 the *Apologeticall Epistle*, from which we quoted above. This document contains biographical details, in part as follows: "Ever since my departure from the University, which is about thirty yeares, I have lived neere to the Towne of Guilford in Surrey: where, whether *I have taken so much liberty to the losse of time, and the neglect of my calling* the whole Countrey thereabout, both Gentry and others, to whom I am full well knowne, will quickly informe him; my house being not past three and twenty miles from London: and yet I so hid my selve at home, that I seldomly travelled so farre as London once in a yeare. Indeede the life and mind of man cannot endure without some interchangeableness of recreation, and pawses from the intensive actions of our severall callings; and every man is drawne with his owne delight. My recreations have been diversity of studies: and as oft as I was toyled with the labour of my owne profession, I have allayed that tediousnesse by walking in the pleasant and more than Elysian fields of the diverse and various parts of humane learning, and not the Mathematics onely."

Even the opponents of Delamain must be grateful to him for having been the means of drawing from Oughtred such interesting biographical details. Oughtred proceeds to tell how, about 1628, he was induced to write his *Clavis mathematicae* upon which his reputation as a mathematician largely rests:

"About five years since, the Earle of Arundell my most honourable Lord in a time of his private retiring to his house in the countrey then at West Horsley, foure small miles from me (though since he hath a house in Aldebury the parish where I live) hearing of me (by what meanes I know not) was pleased to send for me: and afterward at London to appoint mee a Chamber in his owne house: where, at such times, and in such manner as it seemed him good to employ me, and when I might not inconveniently be spared from my charge, I have been most ready to present my selve in all humble and affectionate service: I hope also without the offence of God, the transgression of the good Lawes of this Land, neglect of my calling, or the observed scandall of any good man. . . .

"And although I am no *mercenary man*, nor make profession to teach any one in these arts for gaine and recompence, but as I serve at the Altar, so I live onely of the Altar: yet in those interims that I am at London in my Lords service, I have been still much frequented both by Natives and Strangers, for my resolution and instruction in many difficult poynts of Art; and have most freely and lovingly imparted myselve and my skill, such as I had, to their

contentments, and much honourable acknowledgement of their obligation to my Lord for bringing mee to London, hath been testified by many. Of which my liberality and unwearied readinesse to doe good to all, scarce any one can give more ample testimony than R. D. himself can: would he be but pleased to allay the shame of this his hot and eager contention, blowne up onely with the full bellows of intended glory and gaine; . . . they [the subjects in which Delamain received assistance from Oughtred] were the first elements of Astronomie concerning the second motions of the fixed starres, and of the Sunne and Moone; they were the first elements of Conics, to delineate those sections: they were the first elements of Optics, Catoptrics, and Dioptrics: of all which you knew nothing at all."

These last passages are instructive as showing what topics were taken up for study with some of his pupils. The chief subject of interest with most of them was algebra which at that time was just beginning to draw the attention of English lovers of mathematics.

Oughtred carried on an extensive correspondence on mathematical subjects. He was frequently called upon to assist in the solution of knotty problems,—sometimes to his annoyance, perhaps, as is shown by the following letter which he wrote in 1642 to a stranger, named Price:<sup>13</sup>

"It is true that I have bestowed such vacant time, as I could gain from the study of divinity, (which is my calling,) upon human knowledges, and, amongst other, upon the mathematics, wherein the little skill I have attained, being compared with others of my profession, who for the most part contenting themselves only with their own way, refuse to tread these salebrous and uneasy paths, may peradventure seem the more. But now being in years and mindful of mine end, and having paid dearly for my former delights both in my health and state, besides the prejudice of such, who not considering what incessant labour may produce, reckon so much wanting unto me in my proper calling, as they think I have acquired in other sciences; by which opinion (not of the vulgar only) I have suffered both disrespect, and also hinderance in some small perferments I have aimed at. I have therefore now learned to spare myself, and am not willing to descend again in arenam, and to serve such ungrateful muses. Yet, sir, at your request I have perused your problem. . . . Your problem is easily wrought per Nicomedis conchoidem lineam."

<sup>13</sup> Rigaud, *op. cit.*, Vol. I, p. 60.

## APPEARANCE AND HABITS.

Aubrey gives information about the appearance and habits of Oughtred:<sup>14</sup>

"He was a little man, had black haire, and black eies (with a great deal of spirit). His head was always working. He would draw lines and diagrams on the dust". . . .

"He [his oldest son Benjamin] told me that his father did use to lye a bed till eleaven or twelve a clock, with his doublet on, ever since he can remember. Studyed late at night; went not to bed till 11 a clock; had his tinder box by him; and on the top of his bed-staffe, he had his inke-horne fix't. He slept but little. Sometimes he went not to bed in two or three nights, and would not come to meales till he had found out the *quaesitum*."

"He was more famous abroad for his learning, and more esteemed, than at home. Severall great mathematicians came over into England on purpose to converse with him. His countrey neighbours (though they understood not his worth) knew that there must be extraordinary worth in him, that he was so visited by foreigners". . . .

"When learned foreigners came and sawe how privately he lived, they did admire and blesse themselves, that a person of so much worth and learning should not be better provided for."

"He has told bishop Ward, and Mr. Elias Ashmole (who was his neighbour), that 'on this spott of ground,' (or 'leaning against this oake' or 'that ashe') 'the solution of such or such a probleme came into my head, as if infused by a divine geni<sup>u</sup>s, after I had thought on it without successe for a yeare, two, or three'. . . .

"Nicolaus Mercator, Holsatus. . . .went to see him few yeares before he dyed."

"The right honble Thomas Howard, earle of Arundel and Surrey, Lord High Marshall of England, was his great patron, and loved him intirely. One time they were like to have been killed together by the fall at Albury of a grott, which fell downe but just as they were come out."

Oughtred's friends convey the impression that, in the main, Oughtred enjoyed a comfortable living at Albury. Only once appear indications of financial embarrassment. About 1634 one of his pupils, W. Robinson, writes as follows:<sup>15</sup>

<sup>14</sup> Aubrey, *op. cit.*, Vol. II, p. 107.

<sup>15</sup> Rigaud, *op. cit.*, Vol. I, p. 16.

“I protest unto you sincerely, were I so able as some, at whose hands you have merited exceedingly, or (to speak more absolutely) as able as willing, I would as freely give you 500 pounds per ann. as 500 pence; and I cannot but be astonished at this your age, wherein self and dross is made their summum bonum, and the best part of man, with the true ornaments thereof, science and knowledge, are so slighted. . . .”

In his letters Oughtred complains several times of the limitations for work and the infirmities due to his advancing old age. The impression he made upon others was quite different. Says one biographer:<sup>16</sup>

“He sometimes amused himself with archery, and sometimes practised as a surveyor of land. . . . He was sprightly and active, when more than eighty years of age.”

Another informant<sup>17</sup> says that Oughtred was “as facetious in Greek and Latine as solid in Arithmetique, Astronomy, and the sphere of all Measures, Musick, etc.; exact in his style as in his judgment; handling his Cube, and other Instruments at eighty, as steadily, as others did at thirty; owing this, he said, to temperance and Archery; principing his people with plain and solid truths, as he did the world with great and useful Arts; advancing new Inventions in all things but Religion. Which in its old order and decency he maintained secure in his privacy, prudence, meekness, simplicity, resolution, patience, and contentment.”

#### ALLEGED TRAVEL ABROAD.

According to certain sources of information, Oughtred traveled on the European continent and was invited to change his abode to the continent. We have seen no statement from Oughtred himself on this matter. He seldom referred to himself in his books and letters. The autobiography contained in his *Apologeticall Epistle* was written a quarter of a century before his death. Aubrey gives the following:<sup>18</sup>

“In the time of the civill warres the duke of Florence invited him over, and offered him 500 li. per annum; but he would not accept it, because of his religion.”

A portrait of Oughtred painted in 1646 by Hollar and inserted

<sup>16</sup> Owen Manning, *op. cit.*, p. 132.

<sup>17</sup> *New and General Biographical Dictionary*, London, 1784 (John Nichols), Art. “Oughtred.”

<sup>18</sup> Aubrey, *op. cit.*, Vol. II, p. 110.

in the English edition of the *Clavis* of 1647, contains underneath the following lines:

“Haec est Oughtredi senio labantis imago  
Itala quam cupiit, Terra Britannia tulit.”

In the sketch of Oughtred by Owen Manning<sup>19</sup> it is confessed that “it is not known to what this alludes; but possibly he might have been in *Italy* with his patron, the Earl of Arundel.” It would seem quite certain, either that Oughtred traveled in Europe or that he received some sort of an offer to settle in Italy. In view of Aubrey’s explicit statement and of Oughtred’s well-known habit of confining himself to his duties and studies in his own parish, seldom going even as far as London, we strongly incline to the opinion that he did not travel on the continent, but that he received an offer from some patron of the sciences—possibly some distinguished visitor—to settle in Italy.

#### HIS DEATH.

He died at Albury, June 30, 1660, aged about 86 years. Of his last days and death, Aubrey<sup>20</sup> speaks as follows:

“Before he dyed he burned a world of papers, and said that the world was not worthy of them; he was so superb. He burned also several printed bookes, and would not stirre, till they were consumed. . . . I myselfe have his Pitiscus, imbelished with his excellent marginall notes, which I esteeme as a great rarity. I wish I could also have got his Bilingsley’s Euclid, which John Collins sayes was full of his annotations. . . .

“Ralph Greatrex, his great friend, the mathematical instrument-maker, sayed he conceived he dyed with joy for the coming-in of the King, which was the 29th of May before. ‘And are yee sure he is restored?’—‘Then give me a glasse of sack to drinke his sacred majestie’s health.’ His spirits were then quite upon the wing to fly away. . . .”

In this passage, as in others, due allowance must be made for Aubrey’s lack of discrimination. He was not in the habit of sifting facts from mere gossip. That Oughtred should have declared that the world was not worthy of his papers or manuscripts is not in consonance with sweetness of disposition ordinarily attributed to him. More probable was the feeling that the papers he burnt—possibly old sermons—were of no particular value to the world.

<sup>19</sup> Rev. Owen Manning, *The History and Antiquities of Surrey*, Vol. II, London, 1809, p. 132.

<sup>20</sup> Aubrey, *op. cit.*, Vol. II, 1898, p. 111.

That he did not destroy a large mass of mathematical manuscripts is evident from the fact that a considerable number of them came after his death into the hands of Sir Charles Scarborough, M.D., under whose supervision some of them were carefully devised and published at Oxford in 1677 under the title of *Opuscula mathematica hactenus inedita*.

Aubrey's story of Oughtred's mode of death has been as widely circulated in every modern biographical sketch as has his slander of Mrs. Oughtred by claiming that she was so penurious that she would deny him the use of candles to read by. Oughtred died on June 30, the Restoration occurred on May 29. No doubt Oughtred rejoiced over the Restoration, but the story of his drinking "a glass of sack" to his Majesty's health, and then dying of joy is surely apocryphal. De Morgan humorously remarks, "it should be added, by way of excuse, that he was eighty-six years old."<sup>21</sup>

<sup>21</sup> De Morgan, *Budget of Paradoxes*, London, 1872, p.451; 2d ed., Chicago and London, 1915, Vol. II, p. 303.