

## ROBERT RECORDE (1510 – 1558)

by HEINZ KLAUS STRICK, Germany

The fact that the Welsh mathematician and physician ROBERT RECORDE will still be remembered centuries later is due to one brilliant idea. In his book *The Whetstone of Witte* (1557) to avoid the annoying repetition of the word *aequalis*, he used a sign consisting of a pair of parallel lines of equal length: "=".

He chose this symbol for equality because – as he wrote – *no other two things can be more equal*. It took another 60 years, however, before JOHN NAPIER was the next to adopt this notation and on the continent the symbol only became established in the course of the 18th century.

The adjacent section with the equation  $14x + 15p = 71p$  shows that RECORDE still wrote the symbol in elongated form.

Incidentally, he was the first Briton to adopt the signs "+" and "-" introduced in 1489 by the German *coassist* JOHANNES WIDMANN.

Little is known about the early years of ROBERT RECORDE, who came from the South Welsh town of Tenby.

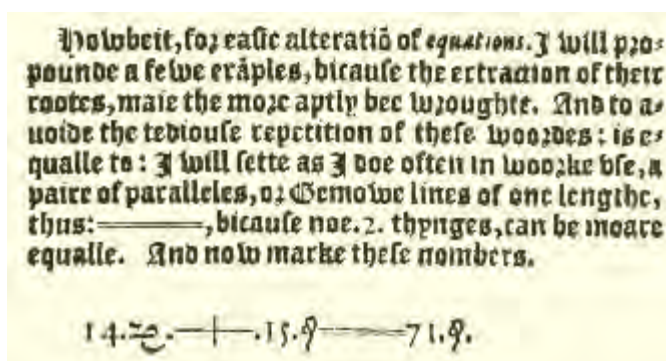
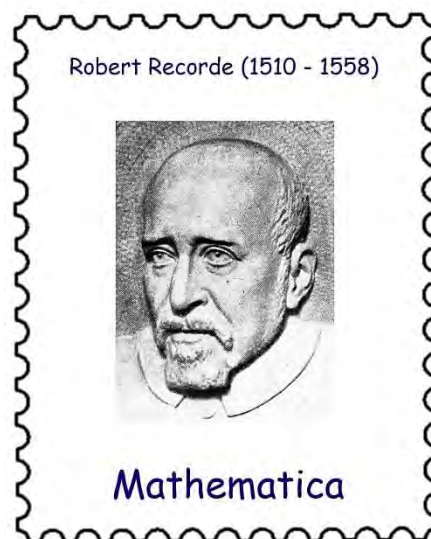
Around 1525 he began studying in Oxford, passed the Bachelor's examination in 1531 and became a fellow at *All Souls College* in Oxford, where church music, theology, law and medicine were taught. In 1533 he obtained a licence to practise medicine there. In order to obtain the title of MD (*medicinae doctor*), he transferred to the cosmopolitan University of Cambridge in 1537 – mainly for religious reasons, since he was convinced by the teachings of the Reformation and had to reckon with disadvantages if he stayed longer at the strict Roman Catholic College in Oxford.

For several years RECORDE lectured at Cambridge and also at Oxford on astronomy, geography, mineralogy, zoology and mathematics. For him arithmetic was the basis of all learning, thus also of all sciences, and so he gave his first book the title *The Grounde of Artes* (published about 1542 in London).

It was the first book on mathematics in English, and it was very successful. After three editions an extended version followed in 1552. Even after RECORDE's death the book was reprinted again and again (with additions by subsequent mathematicians). It was published in 45 editions up to 1700.

In his preface RECORDE complained that his fellow countrymen were surpassed in natural common sense (*mother witte*) by only a few peoples, but that they were too lazy to learn. With his book he wanted to help reduce the great ignorance about arithmetical knowledge.

The work was designed in the form of a dialogue between a teacher (*master*) and a precocious student. In small, easy to follow steps, and in simple, understandable language the topics were worked out and the methods taught were practised. At the beginning, the student made (typical) mistakes; it seems that RECORDE had brought in experience from his own teaching. The teacher conceded that the student did not need to understand all the steps immediately, but should first learn and apply a rule (often in rhyme form).



The book began with an introduction to writing numbers with the nine Arabic numerals, whose value was explained using Roman numerals, and the number zero, which Recorde called *cipher*. This was followed by written arithmetic in the basic arithmetic operations and the results were checked using *casting out nines*. The conversion of units of coinage, weight, length, area and volume was also very important. Various types of tasks were also dealt with using arithmetical progression, and the difference between arithmetical progression and geometric progression was then explained.

Example (in modern spelling):

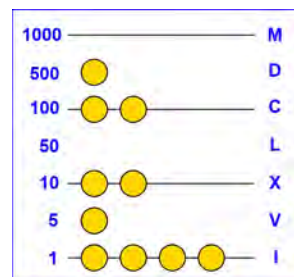
*If you have distributed 685 pounds to a certain number of men, you neither can tell how many they were, or how much the one's money exceeded his next before, but you are sure that the excess was equal between every two next and also you remember that the first had 19, the last had 118 pounds, how would you find both the number of the men and the excess, continually observed in the succession of their payments.*

The extensive chapter *The Golden Rule* dealt with problems on the *rule of three* in proportional and anti-proportional relationships (also with multiple applications).

Example:

*If a captain over a band of men did set 300 pioneers at work which in eight hours did cast a trench of 200 rods: I demand how many labourers will be able to entrench a camp of 3400 rods with a like trench in three hours.*

The detailed treatment of *Arithmeticke with the pen* (Calculating with the pen) was completed by a section on calculating with *counters* (*Rechenpfennige* in ADAM RIESE's *Rechnen auf den Linien*) – for all those who could not read or write or who did not have pens or tables at their disposal.



From the fourth edition onwards, the book contained detailed explanations of calculating with fractions (shortening and extending, multiplication and division, addition and subtraction) as well as examples of applications such as the splitting of profits from investments or mixing tasks.

A further chapter deals with the application of the *Rule of false position*.

Example:

*Two men having several sums, which I know not, do thus talk together: The first says to the second, if you give me 2 shillings of your money, then shall I have three times as much money as you. The second man answers, it were more reason that our sums were made equal, and so will it be if you give me 3 shillings of your money. Now guess what each of them had.*

In 1545 RECORDE was awarded a doctorate in medicine (*Physicke*); in London he worked temporarily as a doctor, also at the royal court, before being appointed head of the *Royal Mint* in Bristol.

After the death of King HENRY VIII in 1547, ten-year-old EDWARD, his son from his third marriage (with JANE SEYMOUR) was appointed to succeed him and the dispute over the exercise of the regency led to uprisings in various parts of the country.



RECORDE, in his capacity as head of the Bristol Mint, refused to finance an army to crush insurrections, and the up-and-coming WILLIAM HERBERT (later EARL OF PEMBROKE) had RECORDE imprisoned for 60 days for treason.

However, in 1551 the king designate appointed him overseer of all mines and mints in Ireland in the expectation that they would make a profit, which was not the case.

When EDWARD died of tuberculosis in July 1553, MARY, daughter of HENRY VIII's first marriage, took over the government, assisted by WILLIAM HERBERT, whom she elected as her personal adviser. When MARY, who had married PHILIP II of Spain, adopted Roman Catholicism as the state religion, there were riots, which were quashed by the EARL OF PEMBROKE.

In 1556, RECORDE attempted to regain his former position at court, but made the unforgivable mistake of suggesting that PEMBROKE's misconduct was responsible for this. PEMBROKE sued RECORDE for defamation and won the case. And since RECORDE was unable to pay the £1000 compensation, he went to prison, where he died a few weeks later.

The irony of the story is that he was still entitled to £1000 in compensation for RECORDE's activities in Ireland and this was paid to his children 12 years after his death.

It is astonishing that RECORDE, despite the turbulence of the last years of his life, came to write more books.

- In 1551 he published a shortened version of the first chapters of EUCLID's *Elements*: called *Pathwaie to Knowledge*. Here he only dealt with the constructions, but without the proofs; he explained their application with examples.
- In 1556 *The Castle of Knowledge* was published, an introduction to PTOLEMY's astronomy. He mentioned the theories of ARISTARCHUS and COPERNICUS, but in view of the burning of heretics under the new government of Queen BLOODY MARY, he did not dare to profess a heliocentric world view.
- In 1557, a continuation of his arithmetic book *The Whetstone of Witte* (whetstone = latin "cos"), a book on algebra, was published; it contained calculating with roots as well as the solving of linear and quadratic equations. In its content, RECORDE followed a book by the German cossist JOHANN SCHEUBEL published a few years earlier.



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