REGIOMONTANUS (June 6, 1436 – July 6, 1476)

by HEINZ KLAUS STRICK, Germany

Decades after his death, PHILIP MELANCHTHON, the *Praeceptor Germaniae* (Teacher of Germany), gave one of the most important scholars of the 15th century the name by which we know today: REGIOMONTANUS, *the Königsberger*.

He himself, JOHANN MÜLLER, son of a wealthy mill owner from Königsberg (Latin: *mons regius,* near Bamberg in Lower Franconia), enrolled at the age of eleven at the University of Leipzig under the name JOHANNES MOLITORIS DE KÜNIGSPERG, later calling himself JOANNES DE MONTE REGIO. At the age of 14 he transferred to the University of Vienna and became a student of the astronomer GEORG VON PEUERBACH. Two years later he earned the degree of *Baccalaureus*. However, he has to wait five years before he was allowed to use the title of *Magister artium* (and thus obtained the right to teach at the university), as the academic rules did not permit an earlier appointment.

In accordance with Humanism's view of science, which was to subject handed-down findings to scrutiny as a matter of principle, PEUERBACH and REGIOMONTANUS carried out their own astronomical measurements. Discrepancies in the positions of the sun, moon and planets led to the revision of the *Alphonsine tables* (created around 1270 on the orders of ALFONSO X OF CASTILE AND LEÓN).

Above all, they selected celestial constellations in which planets were covered by the moon (occultations) as well as lunar eclipses, since the measurement conditions are then particularly favourable. Since the quality of a measurement depended in particular on the accuracy of the measuring instruments used, REGIOMONTANUS made it his life's work to build astronomical instruments himself and to improve their accuracy.

When REGIOMONTANUS was commissioned to draw up a horoscope for the bride of Emperor FRIEDRICH III and his predictions did not come true, he attributed this to the poor quality of his data: *Astrology is for him ... without doubt the most reliable herald of the immortal God*.

Around 1450, the polymath and Cardinal NICOLAS OF CUSA or CUSANUS (1401 – 1464) sent a treatise to his friend PEUERBACH in which he claimed to show how the transformation of a circle into a square of equal area could be constructed (*De circuli quadratura*).

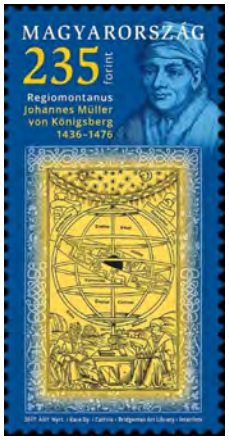
REGIOMONTANUS was commissioned by PEUERBACH to write a reply. When CUSANUS continued to claim that such a construction was possible, and also gave a concrete method in which the corresponding ratio of circumference and diameter lay outside the estimate of ARCHIMEDES, REGIOMONTANUS reacted violently:

C. is a ridiculous figure as a geometer; he has increased the gossip in the world out of vanity.

REGIOMONTANUS compared and corrected the available translations of the elements of EUCLID and wrote a commentary on them. In general, like many scientists of the Renaissance, he was fascinated by the insights of the mathematicians of antiquity, whose findings had been lost from the consciousness of science over the centuries. After his death, copies of texts written by ARCHIMEDES, APOLLONIUS OF PERGA, the BANU MUSA brothers and THABIT IBN QURRA were found in his papers.

Decisive for his further life was his encounter with one of the most important scholars of humanism, BASILIUS BESSARION (1403 – 1472). As a representative of the Greek Orthodox Church, BESSARION had tried in vain to reunite with the Church of Rome. After the failure of the negotiations, he made a career in the Roman Curia, was appointed cardinal and then, as papal legate in Vienna, solicited support for the fight against the Turks, who had conquered Constantinople in 1453.

Among other things, BESSARION was in possession of a copy of the *Almagest* of PTOLEMY. He asked PEUERBACH to assist him in translating this work. After the sudden death of his teacher in 1461, REGIOMONTANUS took over the further translation of the work. He entered the Cardinal's service and accompanied him to Rome. In this way he also got into a dispute with GEORGE OF TREBIZOND, whose translation and interpretation of *Almagest* BESSARION considered to be faulty.



For two years REGIOMONTANUS lived in the cardinal's palace and used his extensive library, which contained a wealth of writings by scholars of antiquity and Islamic culture. He then accompanied BESSARION, who had been appointed papal legate to the Republic of Venice, on his journey. At the University of Padua he gave a lecture on the Persian astronomer AL-FARGHANI (ALFRAGANUS).

When Pope PIUS II died, BESSARION returned to Rome for the papal election. Here REGIOMONTANUS established a variety of contacts, including with MARTIN BYLICA, the court astronomer of the Hungarian king, who arranged an invitation to Hungary. King MATTHIAS CORVINUS of Hungary had just led a campaign against the Turks, during which, among other things, numerous valuable ancient writings were captured.

One of these writings was an incomplete copy of the *Arithmetica* of DIOPHANTUS.

REGIOMONTANUS was so taken with the content of the fragment that he tried to use his contacts with other scholars to obtain a complete copy of the writing – with the intention of then translating the work as a whole. Such a complete copy has not been found to this day. However, it is thanks to REGIOMONTANUS that interest in DIOPHANTUS's writings was rekindled in Europe.

(drawings © Andreas Strick)

During his stay in Hungary, he completed work on new tables of sines (*Compositio tabularum sinuum*). At first – as usual – in the sexadecimal system, the radius of the circle was assumed to be 600,000 units. A few years later, tables in the decimal system also appeared. Since a decimal notation had not yet been developed, the integer values of the table refer to a circle with a radius of 10,000,000 units. This surpassed the tables of PEUERBACH and his predecessor at the University of Vienna, JOHANNES VON GMUNDEN, and thus also enabled more precise calculations.

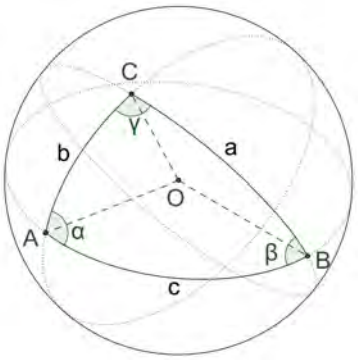
Finally REGIOMONTANUS was able to complete the translation of the *Almagest* under the title *Epytoma in almagestum Ptolomei*. The text was more than a mere translation of PTOLEMY's work: It contained a number of critical annotations, corrections in the calculations and additions through observations that were made in the time after PTOLEMY.

The book was published posthumously in Venice in 1496 and it attracted great attention in scientific circles, including that of NICOLAUS COPERNICUS, who was a student at the University of Bologna from 1496 to 1500. The critical additions, some of which were made by PEUERBACH, formed the basis for a revision of the world view, which was then undertaken by COPERNICUS.

While working on the *Almagest* commentary and studying the works of mathematicians in the Islamic cultural sphere, REGIOMONTANUS realised that there is no systematic treatise containing all the questions related to the calculation of triangles. After thorough research, *De triangulis omnimodis libri quinque* appeared in 1464. It comprised five books (chapters) and is structured similarly to the *Elements* of the EUCLID. The first chapter contained the basic concepts and axioms as well as theorems on triangulation. In the second chapter, it introduced the methods of plane trigonometry and it contained the *sine theorem* as well as a method of calculating the area of the triangle from the lengths of two sides and the size of the included angle.

The remaining three chapters dealt with the solution of problems from spherical trigonometry, including the "side-cosine" theorem discovered by REGIOMONTANUS:

- From two sides and the included angle, the third side can be determined: $\cos(a) = \cos(b) \cdot \cos(c) + \sin(b) \cdot \sin(c) \cdot \cos(\alpha)$ (where one may cyclically interchange the variables a, b, c and α, β, γ).



(source: Wikipedia Fr)

Around 1471 REGIOMONTANUS applied to become a citizen of the free imperial city of Nuremberg, at that time one of the most important cities in the Holy Roman Empire along with Cologne and Prague. Here he set up an observatory according to his ideas, as well as a workshop in which sundials, astrolabes and armillary spheres etc. were built for astronomical observations.

With the help of a *Jacob's staff*, which he developed further, he was able to carry out measurements on the orbit of a comet in 1472 (*De cometae magnitudine, longitudineque, ac de locus eius vero problemata*).

REGIOMONTANUS quickly recognised the importance of the printing press invented by JOHANN GUTENBERG.

He set up his own printing press in his house and drew up plans for future publications – thus becoming the first publisher of scientific literature in Europe. First he had the *Nova theoria planetarum* of his teacher PEUERBACH printed, then his own calendar. In this, he calculated the date of Easter according to the valid procedure and astronomical point of view and showed the increasing difference from the system in use at the time.

In 1474 he published the *Ephemerides* (star charts, literally: diaries) for the period up to 1506. In it, he described the method of determining the geographical longitude of the observation site from the time of a lunar eclipse. The *Ephemerides* are among the books that CHRISTOPHER COLUMBUS and AMERIGO VESPUCCI took with them on their voyages of discovery. However, COLUMBUS failed twice (1494 and 1504) in his attempt to use REGIOMONTANUS's method to determine the longitude of his location in the Caribbean.

On the basis of the calendar calculations mentioned above, Pope SIXTUS IV invited him to participate in the overdue calendar reform. However, more than 100 years would pass before this was finally carried out.

When the Tiber burst its banks in January 1476, a plague epidemic broke out in Rome, of which REGIOMONTANUS was probably one of the victims. However, there is also a rumour that he was poisoned by the sons of GEORGE OF TREBIZOND – after all, before his departure for Rome, he had announced that he would publish a paper in which he would show that the latter's translation and commentary on the *Almagest* was extremely faulty.

The estate of REGIOMONTANUS was conscientiously administered by his friend, helper and financial supporter BERNHARD WALTHER, who completed projects he had begun. When WALTHER died in 1504 without any descendants, no one took care of the furnishings of the observatory or the valuable holdings of the private library. In 1509, the plundered house was acquired by ALBRECHT DÜRER.

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