Bouvelles, Charles | Encyclopedia.com

(*b*. Saucourt, Picardy, France, *ca*. 1470; *d*. Noyon, France, *ca*. 1553)

philosophy, theology, philology, mathematics.

The most important mathematical work of Bouvelles, who was also known as Charles de Bouelles, was published in three languages: in Latin as *Geometricae introductionis* (1503); in French as *Livre singulier et utile* (1542, with several later editions); and in Dutch as *Boeck aenghaende de Conste en de Practycke van Geometrie* (1547). According to H. Bosmans (*Bibliotheca mathematica*, **7** [1906], 384) this translation is a bit abbreviated. The *Geometricae* includes chapters on stellated polygons, which had been discussed in Bradwardine's *De geometria speculativa* (1495). It is very likely that Bouvelles knew this tract, for he refers to Bradwardine in his introduction to the section on the quadrature of the circle, which also was discussed in the *Geometria*. Extending the sides of a regular convex polygon results in a stellated polygon of the first order; in the same way the latter can be transformed into a stellated polygon of the second order, and so on. Bouvelles started with the stellated pentagon, the first stellated polygon of the first order, and showed that the sum of its angles equals two right angles. For this he used the regularity of the polygon and showed that every angle is 36°, so the sum is 180°. After having shown that the sum of the angles of a stellated hexagon equals four right angles, he went on to the first stellated polygon of the second order, the heptagon; and, referring to his proof for the pentagon, he said that the sum of the angles of the heptagon also equals two right angles.

Bouvelles made several attempts to solve the old problem of the quadrature of the circle. In the Middle Ages there had been several treatises on that subject: the *De quadratura circuli* of Franco of Liège (eleventh century), the *De triangulis* of Jordanus de Nemore and the *De quadratura et triangulatura circuli* of Ramón Lull (thirteenth century), the *De geometria speculativa* of Bradwardine (according to Bouvelles, his quadrature is not right), and the *Quaestio de quadratura circuli* of Albert of Saxony (fourteenth century); the *De circuli quadratura* of Nicholas of Cusa (fifteenth century) was refuted by Regiomontanus, but Bouvelles agreed with it, remarking that Nicholas used infinite dimensions unknown to any geometer who would never confess that they were possible.

In the age of Bouvelles, too, there were treatises: Oronce Fine's *De quadratura circuli* (1544), Jean Buteo's *De quadratura circuli* (1559), and Joseph Scaliger's Cyclometrica elementa (1594), which was refuted by Vieta in his *Munimen adversus nova Cyclometrica* (1594) and in his *Pseudo-mesolabium* (1595). In the solution given in the *Livre singulier*, Bouvelles considered a circle rolling along a straight line. After a quarter of a revolution, the point on the circle at which the distance from the line is equal to the radius of the circle has touched the line and has described an are of a circle, the center of which lies 5/4 *r* (radius) beneath the starting point of the center of the given circle. His construction agrees with the Hindu value of . Günther has seen in this the first genetic construction of the cycloid, but this is very unlikely.

In his *Liber de XII numeris* (1510) Bouvelles wrote on perfect numbers, i.e., numbers that are equal to the sum of all their possible factors, such as 6, 28, and 496. He asserted, without proof, that a perfect number (except 6) is always a multiple of 9, plus 1, but that the inverse is not true. This rule was given, also without proof, by Tartaglia in his *General trattato di numeri et misure* (1556).

In 1511 Bouvelles published the *Géométrie en françoys*, probably the first geometrical treatise printed in French.

BIBLIOGRAPHY

I. Original Works. Bouvelles' major work appeared in three versions: in Latin, as *Geometricae introductionis libri sex, breviusculis annotationibus explanati, quibus annectuntur libelli de circuli quadratura, et de cubicatione spherae et introductione in perspectivam* (Paris, 1503); in French, as *Livre singulier et utile touchant l'art et pratique de géométrie, composé nouvellement en françoys, par Maistre Charles de Bouvelles, chanoyne de Noyon* (Paris, 1542); in Dutch, as *Boeck aenghaende de Conste en de Practycke van Geometrie* (Antwerp, 1547). His other works are *Liber de XII numeris* (Paris, 1510) and *Géométrie en françoys* (Paris, 1511).

II. Secondary Literature. Works on Bouvelles are Marshall Clagett, *Archimedes in the Middle Ages* (Madison, Wis., 1964), pp. 33–36; J. Dippel, *Versuch einer systematischen Darstellung der Philosophie des Carolus Bovillus* (Würzburg, 1865); J. Fontès, "Sur le *Liber de numeris perfectis* de Charles de Bouëlles", in *Mémoires de l'Académie des Sciences, Inscriptions et Belles-Lettres de Toulouse*, **6** (1894), 155–167; S. Günther, "Lo sviluppo storico della teoria dei poligoni stellati nell' antichità

e nel medio evo", in *Bollettino di bibliografia e di storia*, **6** (1873), 313–340; S. Günther, "War die Zykloide bereits im XVI. Jahrhunderte bekannt?," in *Bibliotheca mathematica*, **1** (1887), 8–14; D. Mahnke, *Unendliche Sphäre und Allmittelpunkt* (Halle, 1937), pp. 108–117.

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