

WILLEBRORD SNEL (SNELLIUS)\*  
1580-1626

Snel was born in Leiden in 1580. His father was Rudolph Snel van Royen (Snellius), professor of mathematics at the University of Leiden. Willebrord Snel studied law but also became interested in mathematics and, in 1600, was allowed to teach mathematics at the university. Soon, however, he left Leiden and traveled to Würzburg, where he met Adriaan van Roomen, to Prague, where he conducted some observations with Tycho Brahe and also with Kepler, and then to Altdorf and Tübingen, where he met Maestlin. In 1602 Snel was in Paris to study Law. From Paris he went to Switzerland with his father and in 1604 he finally returned to Holland.

Back in Leiden Snel devoted himself to mathematics. He translated Stevin's *Wisconstighe Ghedachtenissen* into Latin as *Hypomnemata mathematica* (1608) and worked on the restoration of the books of Apollonius on plane loci. The third part of this work was published as *Apollonius batavus* in 1608. In the same year he received his M.A. and married Maria de Lange, the daughter of a burgomaster of the small town of Schoonhoven (only three of their children survived).

After the death of his father in 1613, Willebrord Snel took over his teaching duties and in 1615 officially succeeded him as professor of mathematics. Like his father, he propagated the philosophy and pedagogical ideas of Petrus Ramus. In 1613, for instance Snel published Ramus' *Arithmetica* (with commentary). In 1613 he also published a short treatise on money in ancient Israel, Greece and Rome, *De re numeraria*. During the same period he worked on a (not always accurate) Latin translation of Van Ceulen's *Vanden circkel*, to which he added some notes.

Snel's main interest, however, was geodesy. He set himself the task of determining the length of the meridian, using a method of triangulation first suggested by Gemma Frisius. Starting from his house in Leiden and using instruments made by Blaeu (including a 210-centimeter quadrant) Snel mapped out a net of triangles, stretching from Alkmaar to Bergen op Zoom, two towns on about the same meridian, 130 kilometers apart. The results were published in his *Eratosthenes batavus* (1617). Later on he extended his net of triangles to the city of Mechelen, but he was prevented from publishing his quite accurate findings by his early death.

\* For a discussion of the correct spelling of his name, see p. 33.

Snel was also interested in astronomy and published some observations of Bürgi and Tycho in 1618. In November 1618 he made observations of the comet and in 1619 he published a short tract on this comet (including notes on the comet of 1585). He demonstrated that the comet was beyond the sphere of the moon, but he adhered to the Ptolemaic system of the world and still considered a comet to be an omen for future events. In arithmetic, Snel worked on the determination of  $\pi$ , and with the help of Van Ceulen's method he found  $\pi$  to thirty-four decimal places in his *Cyclometricus* (1621).

In Leiden Snel also taught navigation and he published his lessons in 1624 as *Tiphys batavus*, which comes down to a study and tabulation of Pedro Nuñez's so-called rhumb lines (Snel named them loxodromes). Around 1625 Snel devoted himself to plane and spherical trigonometry, publishing his *Canon triangulorum* in 1626. His *Doctrina triangulorum* was left unfinished and was completed by his student Martinus Hortensius (1627).

Willebrord Snel died in 1626 in Leiden. Only after his death it came to light that as early as 1621 he had discovered the law of refraction of light rays. It was the result of many years of experimentation and of the study of well-known books on optics such as Kepler's *Ad Vitellionem paralipomena* and Risner's *Optica*. Isaac Vossius and Christiaan Huygens were able to consult Snel's manuscript. Vossius commented on it in his *De lucis natura et proprietate* (1662), while Huygens did so in his *Dioptrica* (1703, 1728). The first, however, to publish the law of refraction (without giving a demonstration) was Descartes in his *Dioptrique* (1637). He has been accused of plagiarism and it may indeed be the case that during one of his visits to Leiden Descartes had heard of Snel's discovery, although there is no evidence for this.

#### *Primary works*

*Apollonius batavus* (Leiden, 1608); Petrus Ramus, *Arithmetica*. W. Snellius ed. (Leiden, 1613); *De re numeraria* (Leiden, 1613); *Eratosthenes batavus* (Leiden, 1617); *Descriptio cometæ qui anno 1618 mense Novembri primum effulsit* (Leiden, 1619); *Cyclometricus de circuli dimensione* (Leiden, 1621); *P. Rami Meetkonst*. Translated by Dirk Houtman, annotations by W. Snel (Amsterdam, 1622); *Tiphys batavus* (Leiden, 1624); *Canon triangulorum* (Leiden, 1626); *Doctrina triangulorum* (Leiden, 1627).

*Secondary sources*

P. van Geer, 'Notice sur la vie et les travaux de Willebrord Snellius', *Archives néerlandaises des sciences exactes et naturelles* 18 (1883) 453-468; D.J. Korteweg, 'Descartes et les manuscrits de Snellius', *Revue de métaphysique et de morale* 4 (1896) 489-501; H. Bosmans, 'Le degré du méridien terrestre mesuré par la distance de Berg-op-Zoom et de Malines', *Annales de la Société scientifique de Belgique* 24, pt. 2 (1900) 113-134; C. de Waard, 'Le manuscrit perdu de Snellius sur la réfraction', *Janus* 39 (1935) 51-75; J.A. Vollgraff, 'Snellius' notes on the reflection and refraction of rays', *Osiris* 1 (1936) 718-725; N. Haasbroek, *Gemma Frisius, Tycho Brahe and Snellius, and their triangulations* (Delft, 1968). D.J. Struik, in: *DSB*, vol. 12, 499-502; C. de Waard, in: *NNBW*, vol. 7, 1155-1163.

[K.v.B.]