Nicolaus Copernicus

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Nicolaus Copernicus, Polish Mikołaj Kopernik (born February 19, 1473, Toruń, Poland—died May 24, 1543, Frauenburg, East Prussia [now Frombork, Poland]),
Visit Torun
He was born on 19 February 1473, presumably, in one of the houses in St. Anna Street (present-day Copernicus Street) at no. 15 or 17. His exact birth location is one of the things that still remain unknown. His works, masterpiece and life have been thoroughly examined; nevertheless, there are certain facts of his life that have never ceased to raise serious doubts.
Nicolaus Copernicus was born into a family of an affluent Toruń merchant, Nicolaus Copernicus Sr., who was originally from Kraków. Nicolaus and his wife Barbara had four children: Andrew, Barbara, Catherine and Nicolaus - the youngest. Nicolaus spent his early childhood and youth in Toruń.

The lively and peculiar character of the city had an enormous influence on the development of his versatile personality, in particular the foreign merchants coming to the city on business and stopping at his family house to share their observations with the hosts, arousing young Copernicus’s curiosity. Here Copernicus started his education.

He attended the city school under the auspices of St. Johns' Church, located in School Street – now St. John's Street. There is some evidence to suggest that the school, which itself was of high academic standards, could boast a large number of eminent professors, including Lucas Watzenrode, Copernicus's uncle and successive patron, and a rich library with works and manuscripts in the field of astronomy and astrology. It was presumably here that Copernicus for the first time took interest in the sciences.

At the age of 18 Copernicus began his university education in Krakow.
Between 1491 and about 1494 Copernicus studied liberal arts—including astronomy and astrology—at the University of Cracow (Kraków). Like many students of his time, however, he left before completing his degree, resuming his studies in Italy at the University of Bologna.

The Bologna period (1496–1500) was short but significant. For a time Copernicus lived in the same house as the principal astronomer at the university, Domenico Maria de Novara (Latin: Domenicus Maria Novaria Ferrariensis; 1454–1504).

Copernicus was “assistant and witness” to some of Novara's observations, and his involvement with the production of the annual forecasts means that he was intimately familiar with the practice of astrology. Novara also probably introduced Copernicus to Epitoma in Almagestum Ptolemaei (“Epitome of Ptolemy's Almagest”) by Johann Müller (also known as Regiomontanus, 1436–76). The first provided a summary of the foundations of Ptolemy's astronomy, with Regiomontanus's corrections and critical expansions of certain important planetary models that might have been suggestive to Copernicus of directions leading to the heliocentric hypothesis.
In 1500 Copernicus spoke before an interested audience in Rome on **mathematical subjects**, but the exact content of his lectures is unknown.

In 1501 he stayed briefly in Frauenburg but soon returned to Italy to continue his studies, this time at the **University of Padua**, where he pursued medical studies between 1501 and 1503. At this time medicine was closely allied with astrology, as the stars were thought to influence the body's dispositions. Thus, Copernicus's astrological experience at Bologna was better training for medicine than one might imagine today.

Copernicus later painted a self-portrait; it is likely that he acquired the necessary artistic skills while in Padua, since there was a flourishing community of painters there and in nearby Venice.

In May 1503 Copernicus finally received a doctorate —like his uncle, in canon law—but from an Italian university where he had not studied: the University of Ferrara.
Copernicus’s actual duties at the bishopric palace, however, were largely administrative and medical. As a church canon, he collected rents from church-owned lands; secured military defenses; oversaw chapter finances; managed the bakery, brewery, and mills; and cared for the medical needs of the other canons and his uncle. Copernicus’s astronomical work took place in his spare time, apart from these other obligations.

Copernicus’s reputation outside local Polish circles as an astronomer of considerable ability is evident from the fact that in 1514 he was invited to offer his opinion at the church’s Fifth Lateran Council on the critical problem of the reform of the calendar. The civil calendar then in use was still the one produced under the reign of Julius Caesar, and, over the centuries, it had fallen seriously out of alignment with the actual positions of the Sun. This rendered the dates of crucial feast days, such as Easter, highly problematic. Whether Copernicus ever offered any views on how to reform the calendar is not known; in any event, he never attended any of the council’s sessions. The leading calendar reformer was Paul of Middelburg, bishop of Fossombrone. When Copernicus composed his dedication to De revolutionibus in 1542, he remarked that “mathematics is written for mathematicians.” Here he distinguished between those, like Paul, whose mathematical abilities were good enough to understand his work and others who had no such ability and for whom his work was not intended.
From antiquity, astronomical modeling was governed by the premise that the planets move with uniform angular motion on fixed radii at a constant distance from their centres of motion.

Two types of models derived from this premise. solar system: Aristotle's theory of the solar system The first, represented by that of Aristotle, held that the planets are carried around the centre of the universe embedded in unchangeable, material, invisible spheres at fixed distances. Since all planets have the same centre of motion, the universe is made of nested, concentric spheres with no gaps between them.

As a predictive model, this account was of limited value. Among other things, it had the distinct disadvantage that it could not account for variations in the apparent brightness of the planets since the distances from the centre were always the same.
Ptolemy: theory of the solar system

A second tradition, deriving from Claudius Ptolemy, solved this problem by postulating three mechanisms: uniformly revolving, off-centre circles called *eccentrics*; epicycles, little circles whose centres moved uniformly on the circumference of circles of larger radius (deferents); and equants. The equant, however, broke with the main assumption of ancient astronomy because it separated the condition of uniform motion from that of constant distance from the centre.

A planet-bearing sphere revolving around an equant point will wobble; situate one sphere within another, and the two will collide, disrupting the heavenly order. In the 13th century a group of Persian astronomers at Marāgheh discovered that, by combining two uniformly revolving epicycles to generate an oscillating point that would account for variations in distance, they could devise a model that produced the equalized motion without referring to an equant point.
A simple illustration showing the basic elements of Ptolemaic astronomy. It shows a planet rotating on an epicycle which is itself rotating around a deferent inside a crystalline sphere. The center of the system is marked with an X, and the earth is slightly off of the center. Opposite the earth is the equant point, which is what the planetary deferent would actually rotate around. Distances have been exaggerated as has the simplicity for the purposes of illustration.
Movement of the sun according to Hipparchus's theory of epicycles, recounted by Ptolemy. Earth (T) is the center of the deferent, P is the center of the epicycle of the Sun (S). The result is in red.

Representation of the apparent motion of the Sun and planets from the Earth. It shows the movement of Mercury's orbit for 7 years and Venus for 8, in which time the path of Venus returns to almost the same apparent position.
Astronomer Copernicus, or Conversations with God, by Matejko. In background: Frombork Cathedral.
Nicolaus Copernicus’s

“De revolutionibus orbium coelestium libri vi”

“Six Books Concerning the Revolutions of the Heavenly Orbs”
NC remarked in the preface to De revolutionibus that he had chosen to withhold publication not for merely the nine years recommended by the Roman poet Horace but for 36 years, four times that period. And, when a description of the main elements of the heliocentric hypothesis was first published, in the Narratio prima (1540 and 1541, “First Narration”), it was not under Copernicus’s own name but under that of the 25-year-old Georg Rheticus. Rheticus, a Lutheran from the University of Wittenberg, Germany, stayed with Copernicus at Frauenburg for about two and a half years, between 1539 and 1542.

The Narratio prima was, in effect, a joint production of Copernicus and Rheticus, something of a “trial balloon” for the main work. It provided a summary of the theoretical principles contained in the manuscript of De revolutionibus, emphasized their value for computing new planetary tables, and presented Copernicus as following admiringly in the footsteps of Ptolemy even as he broke fundamentally with his ancient predecessor. It also provided what was missing from the Commentariolus: a basis for accepting the claims of the new theory.
Optical Gravitational Lensing Experiment

Prof. Bohdan Paczyński