

# Nicolaus Copernicus



Nicolaus Copernicus was a Renaissance-era mathematician, astronomer, who formulated a model of the universe that placed the Sun rather than Earth at its center.

The publication of Copernicus' model in his book *De revolutionibus orbium coelestium* (On the Revolutions of the Celestial Spheres), just before his death in 1543, was a major event in the history of science, generating the Copernican Revolution and making a pioneering contribution to the Scientific Revolution.

Nicolaus Copernicus was born on 19 February 1473 in the city of Toruń (Thorn), in Poland. His father was a merchant from Krakow and his mother was the daughter of a wealthy Toruń merchant. Nicolaus was the youngest of four children. After his father's death, young Nicolaus' maternal uncle, Lucas Watzenrode the Younger took the boy under his wing and saw to his education and career.

Watzenrode first sent young Copernicus to the University of Kraków. Without taking a degree, probably in the fall of 1495, Copernicus left Kraków and Watzenrode decided to send his nephew to study canon law in Italy, seemingly with a view to furthering their ecclesiastic careers and thereby also strengthening his own influence in the Warmia chapter. In mid-1496 Copernicus arrived in Bologna, where he met the famous astronomer Domenico Maria Novara da Ferrara and became his disciple and assistant.

Copernicus studied medicine in Padua. One of the subjects that Copernicus must have studied was astrology, since it was considered an important part of

a medical education. However, he appears never to have practiced or expressed any interest in astrology.

Having completed all his studies in Italy, Copernicus returned to Warmia, where he began work on his heliocentric theory. In 1512–15, he started intensive observational activity. The results of his observations of Mars and Saturn in this period, and especially a series of four observations of the Sun made in 1515, led to discovery of the variability of Earth's eccentricity and of the movement of the solar apogee in relation to the fixed stars.

## Heliocentrism

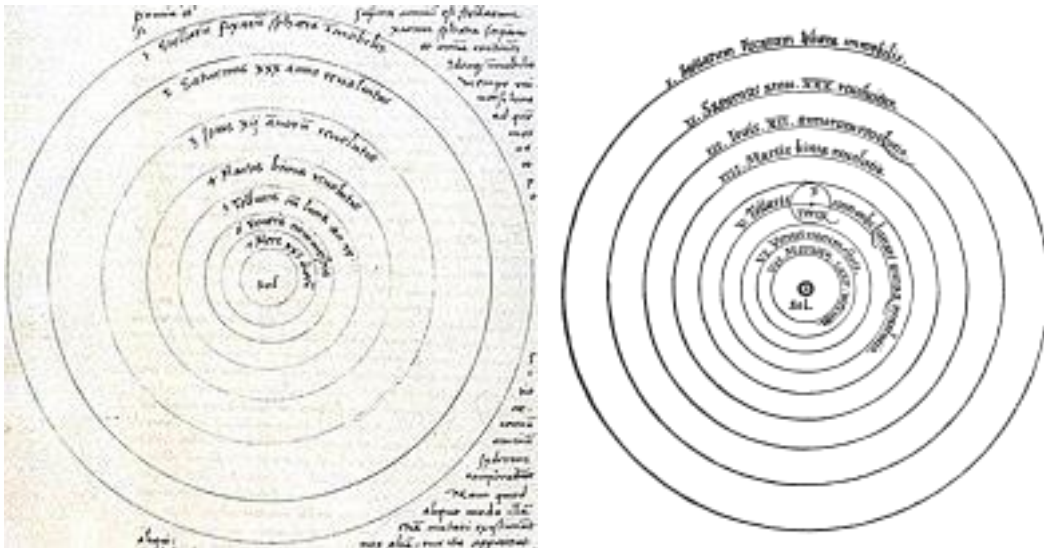


At about 1532 Copernicus had basically completed his work on the manuscript of *De revolutionibus orbium coelestium*; but despite urging by his closest friends, he resisted openly publishing his views, not wishing—as he confessed—to risk the scorn "to which he would expose himself on account of the novelty and incomprehensibility of his theses."

In 1543 Copernicus finally agreed to give *De revolutionibus* to his close friend, Tiedemann Giese, to be delivered to Rheticus for printing.

Copernicus died at age 70 on 24 May 1543.

## Heliocentric theory



Copernicus' major work on his heliocentric theory was *De revolutionibus orbium coelestium* (On the Revolutions of the Celestial Spheres), published in the year of his death, 1543. He had formulated his theory by 1510.

Copernicus' *Commentariolus* summarized his heliocentric theory. It listed the "assumptions" upon which the theory was based, as follows:

1. There is no one center of all the celestial circles or spheres.
2. The center of the earth is not the center of the universe, but only the center towards which heavy bodies move and the center of the lunar sphere.
3. All the spheres surround the sun as if it were in the middle of them all, and therefore the center of the universe is near the sun.
4. The ratio of the earth's distance from the sun to the height of the firmament (outermost celestial sphere containing the stars) is so much smaller than the ratio of the earth's radius to its distance from the sun that the distance from the earth to the sun is imperceptible in comparison with the height of the firmament.
5. Whatever motion appears in the firmament arises not from any motion of the firmament, but from the earth's motion. The earth together with its circumjacent elements performs a complete rotation on its fixed poles in a daily motion, while the firmament and highest heaven abide unchanged.
6. What appear to us as motions of the sun arise not from its motion but from the motion of the earth and our sphere, with which we revolve about the sun like any other planet. The earth has, then, more than one motion.

7. The apparent retrograde and direct motion of the planets arises not from their motion but from the earth's. The motion of the earth alone, therefore, suffices to explain so many apparent inequalities in the heavens.

Despite the near universal acceptance later of the heliocentric idea (though not the epicycles or the circular orbits), Copernicus's theory was originally slow to catch on.

The intellectual climate of the time "remained dominated by Aristotelian philosophy and the corresponding Ptolemaic astronomy. At that time there was no reason to accept the Copernican theory.

It was only a half century later with the work of Kepler and Galileo that any substantial evidence defending Copernicanism appeared.

