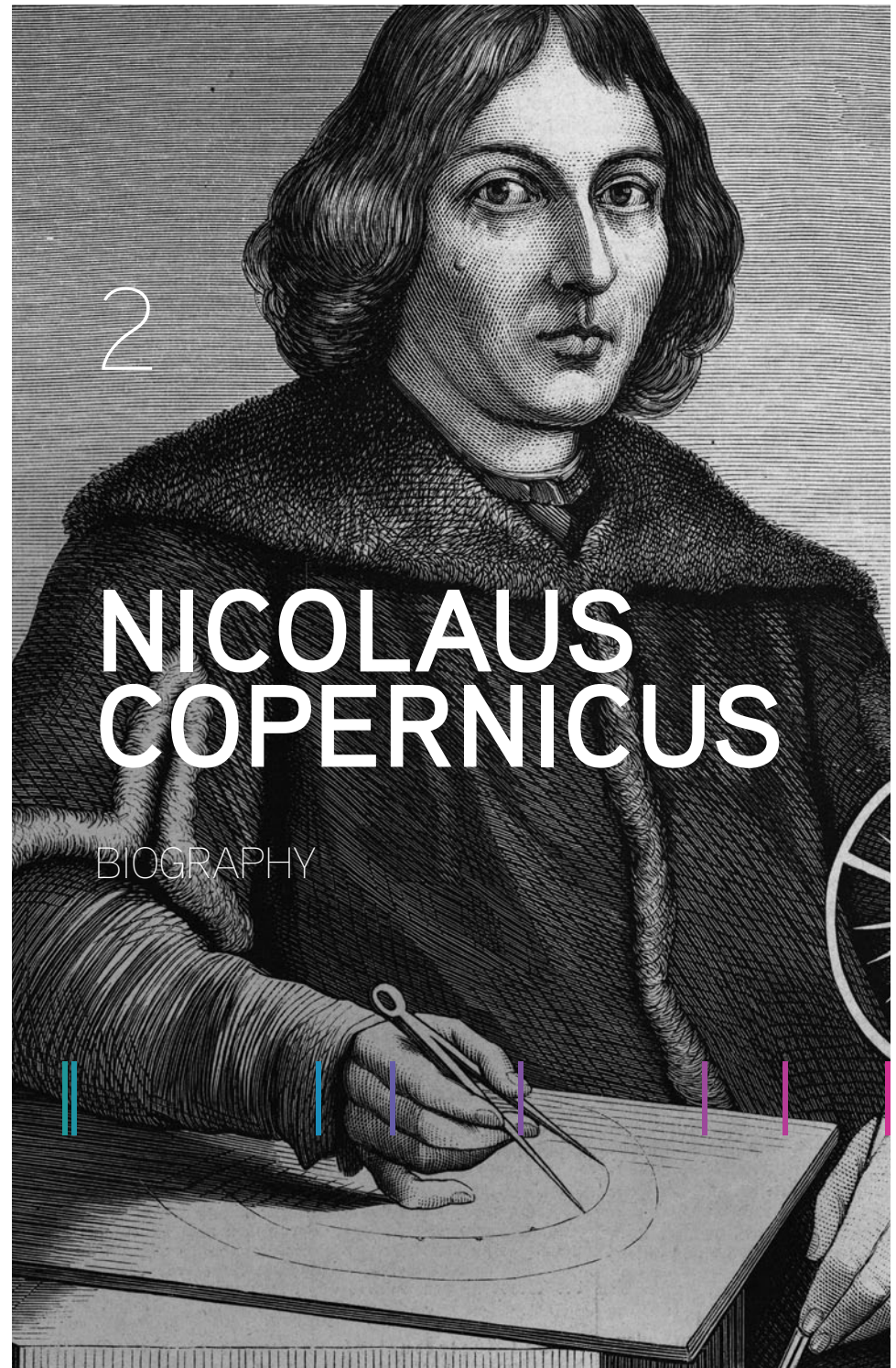


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# NICOLAUS COPERNICUS

BIOGRAPHY



BIG HISTORY PROJECT



# NICOLAUS COPERNICUS

A SUN-CENTERED VIEW  
OF THE UNIVERSE

**Born**  
February 19, 1473  
Torun, Poland

**Died**  
May 24, 1543  
Frombork, Poland

By Cynthia Stokes Brown

In the middle of the 16th century a Catholic, Polish astronomer, Nicolaus Copernicus, synthesized observational data to formulate a comprehensive, Sun-centered cosmology, launching modern astronomy and setting off a scientific revolution.

## Renaissance man

Have you ever heard the expression “Renaissance man”? First coined in the early 20th century, the phrase describes a well-educated person who excels in a wide variety of subjects or fields. The Renaissance is the name for a period in European history, the 14th through the 17th centuries, when the continent emerged from the “Dark Ages” with a renewed interest in the arts and sciences. European scholars were rediscovering Greek and Roman knowledge, and educated Europeans felt that humans were limitless in their thinking capacities and should embrace all types of knowledge.

Nicolaus Copernicus fulfilled the Renaissance ideal. He became a mathematician, an astronomer, a church jurist with a doctorate in law, a physician, a translator, an artist, a Catholic cleric, a governor, a diplomat, and an economist. He spoke German, Polish, and Latin, and understood Greek and Italian.

## Family and studies

You might guess that Copernicus’s parents must have been extremely wealthy to provide him with such an education. While that was the case, the family history was a bit more complicated. Nicolaus was born on February 19, 1473, in Torun, in the approximate center of what is now Poland. His father, named Nicolaus Koppernigk, was a copper merchant from Krakow, and his mother, Barbara Watzenrode, was the daughter of a wealthy Torun merchant. Nicolaus was the youngest of four children; he had a brother and two sisters. His father died when he was 10 and his mother at about the same time. His mother’s brother adopted Nicolaus and his siblings and secured the future of each of them.

This maternal uncle, Lucas Watzenrode, was a wealthy, powerful man in Warmia, a small province in northeast Poland under the rule of a prince-bishop. Since 1466 Warmia had been part of the kingdom of Poland, but the king allowed it to govern itself. Watzenrode became the prince-bishop in Warmia when Copernicus was 16. Three years later he sent Copernicus and

his brother to the University of Krakow, where Copernicus studied from 1492 to 1496. He was in his first year at the university when Columbus sailed to a continent that was then unknown in Europe. Copernicus changed his last name, Koppernigk, to its Latin version while at the university, since scholars used Latin as their common language.

At Krakow Copernicus studied mathematics and Greek and Islamic astronomy. After studying at Krakow, Copernicus’s uncle sent him to Italy, where he studied law at the University of Bologna for four years, and then medicine at the University of Padua for two years. These were two of the earliest and best European universities and Copernicus had to travel two months by foot and horseback to reach Italy.

At these universities, Copernicus began to question what he was taught. For example, his professors at Krakow taught about both Aristotle’s and Ptolemy’s views of the Universe. However, Copernicus became aware of the contradictions between Aristotle’s theory of the Earth, the Sun and the planets as a system of concentric spheres and Ptolemy’s use of eccentric orbits and epicycles. Even though his professors believed that the Earth was in the center of the Universe and it did not move, Copernicus began to question those ideas. While at the University of Padua, there is some evidence that he had already developed the idea of a new system of cosmology based on the movement of the Earth.

Copernicus returned to Warmia in 1503, at age 30, to live in his uncle’s castle and serve as his secretary and physician. He stayed at this job, which gave him free time to continue his observations of the heavens, until 1510, two years before his uncle’s death.

## Life as a canon

Copernicus’s uncle arranged for him a secure life as a church canon. A canon was a member of a group of canons, called a chapter, who together were responsible for administering all aspects of a cathedral. Canons were encouraged, but not required, to take full orders as a priest. They could



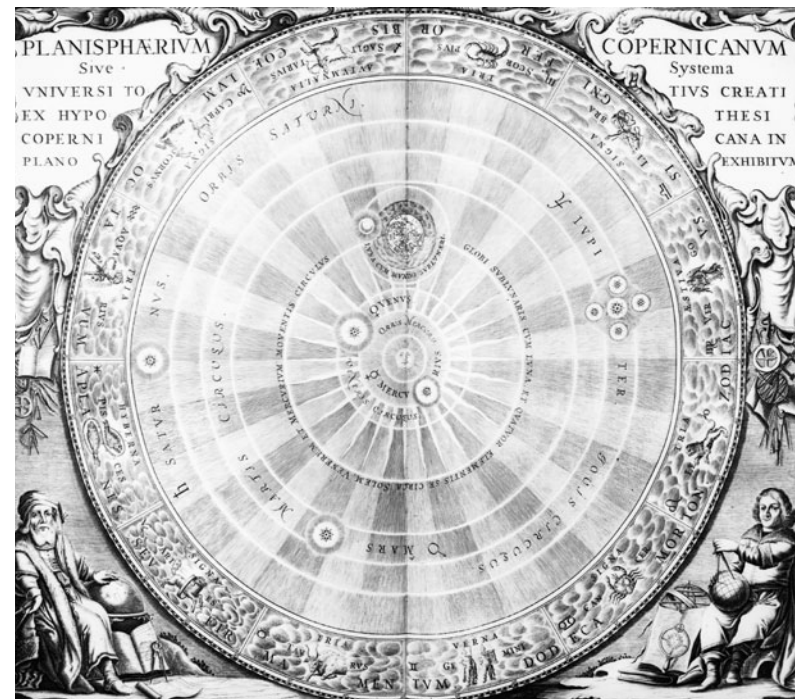
take minor orders, but even minor orders included a vow of celibacy. It is not clear whether Copernicus was ever ordained as a priest. It may be that he took only minor orders, enough to be a canon.

Due at least in part to the influence of his uncle, Copernicus was elected in 1497 a canon of the cathedral in Frombork (known as Frauenburg at the time), a town in Warmia on the Baltic Sea coast. Copernicus did not assume his position there until 1510, when he took a house outside the cathedral walls and an apartment inside a tower of the fortifications. He had many duties as canon, including mapmaking, collecting taxes and managing the money, serving as a secretary, and practicing medicine. He led a half-religious, half-secular life and still managed to continue his astronomical observations from his tower apartment. He conducted these with devices that looked like wooden yardsticks joined together, set up to measure the angular altitude of stars and planets and the angles between two distant bodies in the sky. He had a simple metal tube to look through, but no telescope had yet been invented.

By 1514 Copernicus had written a short report that he circulated among his astronomy-minded friends. This report, called the *Little Commentary*, expounded his heliocentric theory. He omitted mathematical calculations for the sake of brevity, but he confidently asserted that the Earth both revolved on its axis and orbited around the Sun. This solved many of the problems he found with Ptolemy's model, especially the lack of uniform circular motion.

In 1520 the Teutonic Knights, a German Catholic military order that had Christianized the pagans in this area and controlled a large area along the Baltic Sea, attacked Frombork. They burned the whole town except for the cathedral. Soon, however, the Polish king drove the Knights out of Warmia, and the canons worked to rebuild the town.

By 1531 the bishop-prince of Warmia believed that Copernicus had a mistress, Anna Schilling, whom he called his housekeeper. The next bishop-prince worked persistently to force Copernicus to give up his companion. Lutheran Protestantism was springing up nearby, as cities, dukes, and kings renounced their loyalty to the Catholic Church. The Catholic Church responded by trying to enforce more obedience to its rules. However, Copernicus and Schilling



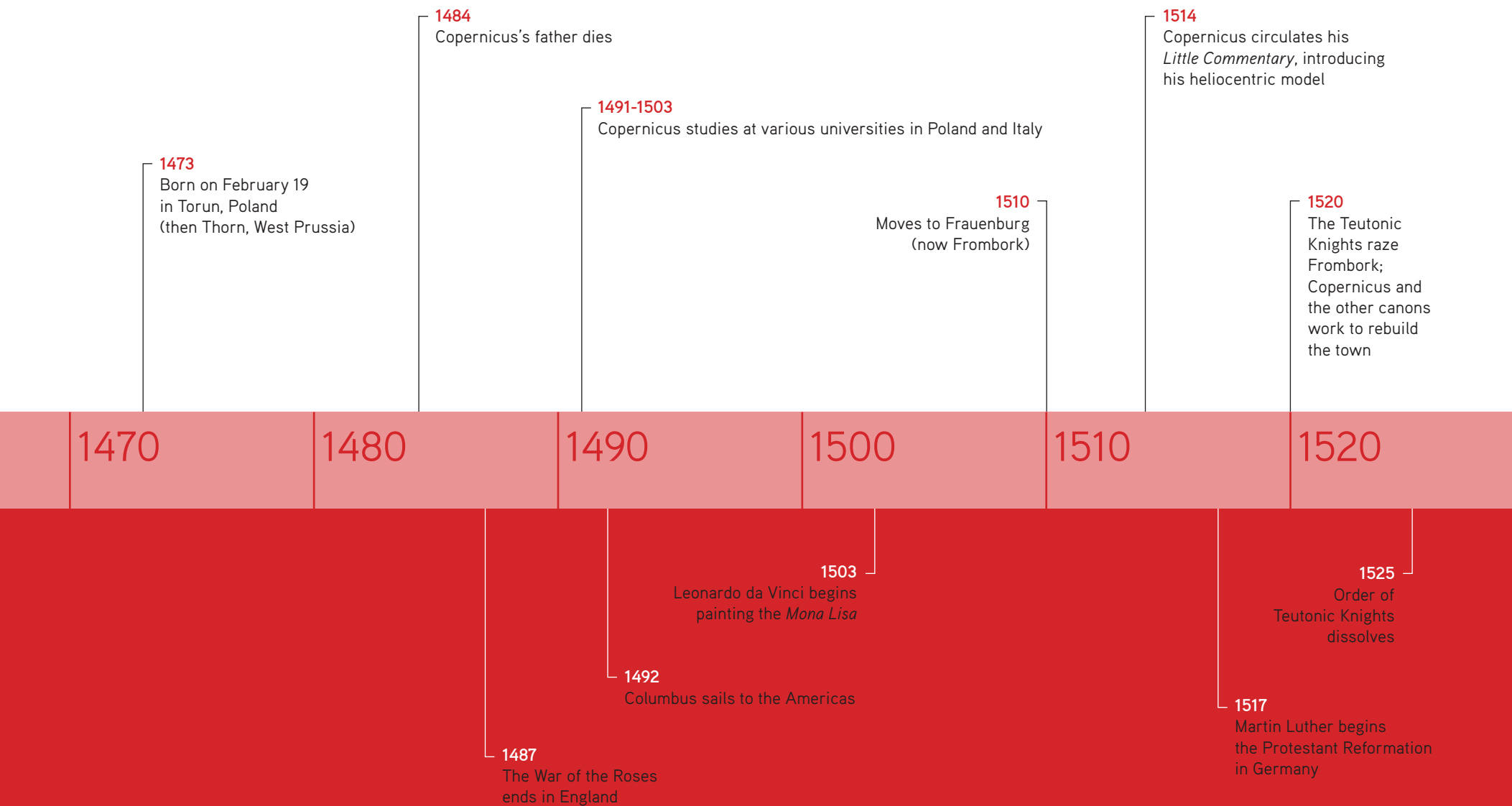
The Copernican model from the *Harmonica Macrocosmica* atlas by Andreas Cellarius

managed to keep seeing each other, although not living together, until much later when she moved to the city of Gdansk.

## A heliocentric theory

By 1532 Copernicus had mostly completed a detailed astronomical manuscript he had been working on for 16 years. He had resisted publishing it for fear of the ensuing controversy and out of hope for more data. Finally, in 1541, the 68-year-old Copernicus agreed to publication, supported by a mathematician friend, Georg Rheticus, a professor at the University of Wittenberg, in Germany. Rheticus had traveled to Warmia to work with Copernicus, and then took his manuscript to a printer in Nuremberg, Johannes Petreius,

# Timeline of Copernicus's life



During the time of Copernicus

1532

Copernicus completes *On the Revolutions of the Celestial Spheres* but waits before publishing it

1543

Dies in Frombork on May 24, shortly after publication of *On the Revolutions of the Celestial Spheres*

1530

1540

1550

1534

Pope Clement VII excommunicates Henry VIII of England

1542

Pope Paul III establishes Roman Holy Office of the Inquisition

1545–1563

Council of Trent: Roman Catholic Church resists Protestant movement, establishes *Index of Prohibited Books*

who was known for publishing books on science and mathematics. Copernicus gave his master work the Latin title *De Revolutionibus Orbium Coelestium* (translated to English as *On the Revolutions of the Celestial Spheres*).

In this work Copernicus began by describing the shape of the Universe. He provided a diagram to help the reader. In the diagram he showed the outer circle that contained all the fixed stars, much further away than previously believed. Inside the fixed stars were Saturn, then Jupiter and Mars, then Earth, Venus, and Mercury, all in circular orbits around the Sun in the center. He calculated the time required for each planet to complete its orbit and was off by only a bit.

Copernicus's theory can be summarized like this:

- 01 The center of the Earth is not the center of the Universe, only of Earth's gravity and of the lunar sphere.
- 02 The Sun is fixed and all other spheres revolve around the Sun. (Copernicus retained the idea of spheres and of perfectly circular orbits. In fact, the orbits are elliptical, which the German astronomer Johannes Kepler demonstrated in 1609.)
- 03 Earth has more than one motion, turning on its axis and moving in a spherical orbit around the sun.
- 04 The stars are fixed but appear to move because of the Earth's motion.

## Death and legacy

Legend has it that Copernicus, in a sickbed when his great work was published, awoke from a stroke-induced coma to look at the first copy of his book when it was brought to him. He was able to see and appreciate his accomplishment, and then closed his eyes and died peacefully, on May 24, 1543. Thus he avoided both scorn and praise.

Copernicus was thought to be buried in the cathedral at Frombork, but no marker existed. Some of his bones were finally identified there, with a DNA match from a strand of his hair found in a book owned by him, and in 2010 he was given a new burial in the same spot, now marked with a black granite tombstone.

The Roman Catholic Church waited seven decades to take any action against *On the Revolutions of the Celestial Spheres*. Why it waited so long has been the subject of much debate. In 1616 the church issued a decree suspending *On the Revolutions of the Celestial Spheres* until it could be corrected and prohibiting any work that defended the movement of Earth. A correction appeared in 1620, and in 1633 Galileo Galilei was convicted of grave suspicion of heresy for following Copernicus's position.

Scholars did not generally accept the heliocentric view until Isaac Newton, in 1687, formulated the Law of Universal Gravitation. This law explained how gravity would cause the planets to orbit the much more massive Sun and why the small moons around Jupiter and Earth orbited their home planets.

How long did it take for Copernicus's ideas to reach the general public? Does anyone nowadays still believe the apparent evidence before their eyes that the Sun moves around the Earth to set and rise? Almost everyone learns in childhood that, despite appearances, the Earth moves around the Sun.

Copernicus's model asked people to give up thinking that they lived in the center of the Universe. For him the thought of the Sun illuminating all of the planets as they rotated around it had a sense of great beauty and simplicity.



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Copernicus's view of the Solar System from the 1661  
*Harmonica Macrocoshmia* by Cellarius  
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