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Famous Astronomers: Nicolaus Copernicus

The Earth Moves

Aira Astralis

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Conclusion

This free sample contains the Introduction and Chapter 1. The complete book contains the full contents above.

Introduction

In the spring of 1543, an old man lay dying in a corner of northeastern Europe, in a cathedral town on the shore of a cold lagoon. His life's work, a book that had been written, rewritten, worried over, and nearly abandoned across more than three decades, was at that moment coming off a press in Nuremberg. The story, told for centuries and still told, is that a copy was placed in his hands on the last day of his life, so that the man who moved the Earth did not leave the world before seeing what he had set in motion. Whether the scene happened exactly so, the historians now gently doubt. What nobody doubts is the outcome. Nicolaus Copernicus took the Earth from its fixed throne at the center of the universe and set it wandering among the planets, and the modern world, in more ways than the obvious one, dates from the shock.

The book was called De revolutionibus orbium coelestium, On the Revolutions of the Heavenly Spheres, and it is a strange object for so mighty a reputation. It is long, technical, and mathematical, modeled deliberately on the great astronomy of antiquity, and it asks the reader to master circles, epicycles, and tables before delivering its revolution. Its author was not a rebel professor but a church administrator, a canon of a cathedral chapter in the remote province of Warmia, who spent his days managing grain, rents, lawsuits, and defenses against the Teutonic Knights, and his spare hours, of which there were few, on the stars. The story of the revolution, in other words, is not the story the imagination expects, and this book tells it whole.

Copernicus was a polymath of the kind the sixteenth century could still produce. He took a doctorate in canon law and studied medicine; he earned his living as an administrator, diplomat, and physician, twice governing a chapter's estates and once helping organize the defense of a castle in a war; he wrote an economic treatise whose principle, that bad coinage drives out good, is quoted in the money markets to this day. Astronomy was, professionally speaking, his hobby. The chapters that follow give all of him: the canon and the economist alongside the astronomer, because the full portrait is the honest one, and because the way his astronomy was made, in the margins of an administrative life, tells us something about how revolutions actually get made.

The science chapters set out the theory itself, as clearly as a book for general readers can. What Copernicus proposed, in outline, was a double motion of the Earth: a daily rotation, which carries the heavens around us, and an annual circuit of the Sun, which carries the planets' wanderings. The Sun waits, fixed, at the middle of things; our own globe is demoted to a planet among planets; and the whole received architecture of the cosmos, more than a thousand

years of authority, is turned inside out. The chapters explain what the old world-picture was, what the new one claimed, how the new one answered the old objections, and why the argument took another century and a half, through Brahe, Kepler, Galileo, and Newton, to finish what he had begun.

The book also follows the afterlife, because the afterlife is half of the story. De revolutionibus was not an instant thunderclap; it was read slowly, used as tables, argued about in taverns and classrooms, defended by a scattered band of mathematicians, denounced by a dinner-table Martin Luther, gently sabotaged by an unauthorized preface, and eventually placed on the Index of forbidden books, from which it emerged, corrected, into a changed world. The chapters trace this long reception from Nuremberg to the trial of Galileo, and forward to the nineteenth century, when the parallax measurements finally answered the last honest objection to the moving Earth.

Closer to our own day, the record turns physical and forensic.

The reader should also be told what kind of book this is: the fourteenth volume of the Famous Astronomers series, and the portrait of a life rather than a treatise on its science. The mathematics is explained where it is needed, and no prior knowledge is assumed; the primary sources are named in the text so the reader can follow them; the manuscript this paragraph closes has been checked against the standard editions of the documents and the modern biographies, and the legends, in every case, are marked as legends the moment they appear. A series about astronomers owes its subjects exactness, and this volume pays its own account in that coinage.

For two centuries the grave of Copernicus was lost, the subject of searches and false hopes beneath the floor of Frombork Cathedral, until an archaeological campaign in 2005 found a skull, and a detective story of DNA matching put the old canon's bones back together with his name. He was reburied in 2010, in the same cathedral, before an audience that included the descendants of every side of the argument his book had started. The chapters tell that story too, as the closing movement of a life that has never quite ended.

The reader is asked to keep one idea in view throughout, because it is the reason the subject repays the effort.

A word on the evidence, before the story begins, because the subject attracts legends the way a lighthouse attracts birds. Everything in this book rests on documents: the registers of the universities he attended, the account books of the chapter he served, his own annotated books and working notes, the letters of the small circle around him, and the vast scholarly literature that two

centuries of historians have built from them. Where the record is legend, the deathbed scene, the stories of his poverty, the neat quarrels the schoolbooks once staged, the chapters say so and give the document instead. The man deserves the treatment he gave the ancients, and this book tries to give it.

Copernicus made his claim with the instruments and mathematics of the early sixteenth century, which were not sufficient to prove it; he was answering a question of harmony and economy, whether one arrangement could be simpler than another, rather than a question of demonstration. That a claim so under-armed could, in time, conquer the whole architecture of the universe is the central puzzle the chapters address. The answer lies partly in the claim, partly in the man, and mostly in the long human campaign that grew from both.

Chapter 1: The Discovery of Nicolaus Copernicus

Nicolaus Copernicus was born on 19 February 1473 in Torun, a merchant city on the Vistula River in Royal Prussia, then part of the Kingdom of Poland, and his birthplace, a tall brick burgher's house on the market square, still stands and draws pilgrims. The family name was Kopernik, and both his mother's family and his father's had come from Silesia, settling in Torun in the previous century as the town grew rich on the trade of the river. His father, also named Nicolaus, was a wholesale merchant, a dealer in copper among other goods, and the family was prosperous, civic, and ambitious in the way of successful townspeople everywhere: connected, busy, and mindful of standing.

The father died when Nicolaus was about ten, and the decisive figure of the boy's life thereupon entered it: his mother's brother, Lucas Watzenrode the Younger, a rising churchman who took the orphaned children under his protection and thereafter directed their fortunes with energy. The uncle was a determined, able, somewhat overbearing man, wealthy by inheritance, learned by inclination, and hostile by long family tradition to the Teutonic Knights, the military religious order that ruled much of the Baltic coast and had ceded Torun to Poland in 1466. In 1489, against the preference of King Casimir IV, Watzenrode was elected Bishop of Warmia, the province in which Copernicus would spend his life, and from that moment the family's future was secure.

The education the uncle arranged was the best available, and its sequence shaped everything. In 1491, aged eighteen, Nicolaus went to the Academy of Krakow, one of the great universities of northern Europe, and there he studied mathematics and astronomy, the subjects the academy was famous for, absorbing the technical astronomy of the day at an institution where the tables and instruments of the medieval tradition were taught with unusual seriousness. No degree from Krakow is recorded, but the stamp of the place stayed on him: his earliest astronomical notes are annotated in the Krakow manner, and the mathematical foundation of his life's work was laid in those four years.

In 1496 he went to Italy, to the University of Bologna, to study canon law, The Italy he entered was the Italy of the high Renaissance, and the date of his first Roman visit is fixed by an event: the jubilee year 1500, when Rome filled with pilgrims and the city's intellectual life was on display for all of Europe. A later account reports that he lectured on mathematics, to a considerable audience, in the city that season, and whether or not the lecture was as public as the report says, the visit belongs to the record of his formation: the young canon-

to-be standing in the capital of his church, in the era of its greatest artists, learning the Rome that his book's dedication would one day address. the law of the church, the standard preparation for a career in the hierarchy his uncle had in mind.

At Bologna he lodged with and assisted the astronomer Domenico Maria Novara, one of the leading figures of the age in planetary theory and a man known for questioning the ancient authorities. Novara's influence was direct and formative: on 9 March 1497, the twenty-four-year-old student and his teacher observed the Moon pass in front of the bright star Aldebaran, a timing observation that revealed errors in the accepted theory of the Moon's motion, and the lesson, that Ptolemy could be checked and found wanting, was never forgotten. It was at Bologna, too, that Copernicus joined the German Nation, the student organization of German-speakers of every allegiance, a detail his later biographers would make much of, since the question of his language and loyalty would be fought over by nations that did not yet exist.

While still a student, in 1497, he had been appointed a canon of the Cathedral of Warmia chapter at Frauenburg, now Frombork, the position that would support him for life, though the appointment's income was initially modest. He continued his Italian studies with typical stubbornness: a period in Rome around 1500, where by a later account he lectured on astronomy to a considerable audience; then Padua, where he studied medicine, and where he signed his name in the registers as Nicolaus Copernik and later, in the humanist fashion, Coppernicus; and finally

Ferrara, where on 31 May 1503 he passed his examinations and received the doctorate in canon law, the formal completion of the curriculum his uncle had prescribed.

The years in Italy made him. He came home with the best legal training in

Europe, medical knowledge, fluency in Latin and reading Greek, and an astronomer's craft learned from the greatest teacher he could have found. His Greek studies deepened in these years, working from Theodorus Gaza's grammar and the writings of Bessarion and Lorenzo Valla, and the turn toward the ancient sources would matter enormously: his revolution would be conducted, in large part, as a restoration, an attempt to recover what the ancients had really said and to correct what they had got wrong.

In 1503 he returned home and joined his uncle's household and court at

Heilsberg, The world he was born into deserves one paragraph of scene-setting, because it was vanishing even as he grew up in it. Torun of the 1470s was a print town as much as a trade town: its presses were among the earliest

in the Baltic, its burghers bought books, and the city's boys grew up within reach of the new learning that Gutenberg's invention was carrying across Europe. The Kopernik household stood in the middle of that crossing: copper from the east, Latin from the schools, and, in the generation after his birth, printed books on the market square.

The revolution of the heavens would be made by a man perfectly placed to receive the revolution of the press, and the connection was no accident: his book, when it came, was a printer's book. the bishop's residence, serving as secretary and physician. For seven years he ran the bishop's correspondence, practiced medicine, managed business, and watched his uncle govern, a masterclass in administration from a master of it. The bishop's death in 1512 freed him from service but also removed his protector, and he moved to Frombork, the chapter's seat, where he would live the remaining thirty-one years of his life.

What he had assembled by then is worth listing plainly, because nothing in it announced a revolutionary: a canon's income and duties, a doctor's skills, an administrator's training, and a private astronomical conviction, already formed, that the Earth must move.

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ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.