

Copernicus by Leo Rosten

¹OF ALL MAN'S efforts to unriddle the unknown, astronomy—our earliest science—longest remained enlocked with religion. Men based calendars on the moon, read the skies to plant crops, used tars ton guide them over deserts or the fearful seas. From Babylon to Peru, our ancestors saw divinity in the heavens, traced gods and mythological beasts amidst the constellations, and thought the moon made lunatics. Philosophers, like astrologers, sought clues to fate in the firmament.

²In one of history's greatest reaches of the mind, Nicolaus Copernicus revolutionized astronomy and extended numberless frontiers of the human intellect. But he was no martyr; nor did he lead the stupendous revolution that bears his name. Born in 1473, on the Vistula, he latinized his Polish name, Kopernik, to Copernicus. His uncle, who became a bishop, guided Nicolaus's studies and made him a church canon. Copernicus moved into a tower of Frauenburg cathedral's fortified wall and, following contemporary custom, leavened his life with a pretty housekeeper. His duties were more administrative than theological. He drew up defense plans, commanded a fortress, was admired for his courage as a soldier. But his one abiding passion was mathematics.

³In those days, astronomy was the queen of sciences. For 14 centuries, the great celestial scheme devised by Claudius Ptolemy of Alexandria, around 150 A.D., had encompassed all of man's knowledge of the universe: Heaven was a hard, crystal dome in which the stars were truly fixed; the seven then-known planets (he included the sun and the moon), imbedded in their own glassy globes, wheeled around the earth, along with the stars, in stately circles. (The Greeks had venerated the circle as the perfect form.) Ptolemy's tables charted celestial movements, explained the

recurrence of the equinox and its puzzling precession, tabulated 1,022 stars visible to the naked eye, predicted eclipses of sun and moon. His explanation of heaven's machinery was a triumph of order and ingenuity.

⁴But some heavenly bodies act so oddly—seeming to move ahead, pause, slip back, then spurt ahead again—that the Greeks named them "planets," or wanderers. Ptolemy explained their strange orbits by placing a planet on the rim of an imaginary circle. The center of this circle rotated on another imaginary circle. Later astronomers added still more circles and epicycles to explain the planets' erratic courses.

⁵Now, Copernicus approached Ptolemy with great respect—and piety. After all, the holy Church and the infallible Aristotelians supported an earth-centered, man-centered cosmos. But Ptolemy's theory did not explain certain phenomena, and Copernicus was troubled by Ptolemy's departure from the purity of the circles through a subterfuge, the "equant"—a point off the center of a circle.

⁶Ancients like Aristarchus of Samos had suggested that the *earth* moves, but omniscient Aristotle had "proved" this wrong, and Ptolemy thought any swift terrestrial motion preposterous: Why, the terrific speed of such movement would tear pieces off our earth. And if we turned eastward, would not winds always blow westward? And how could birds, returning to their nests, ever find them again? But Copernicus asked this question: Ptolemy had made the *entire celestial sphere* whirl around us (and at far greater speed than any earth motion); why had the universe not been torn asunder? The answer led to unimaginable consequences.

⁷Before 1514, Copernicus suggested that the *sun* is at the center of the universe, and that we and the other planets circle around

it. Churchmen and astronomers urged him to publish his theory. He did not. He spent over 30 years wrestling with technicalities, postulating new circles that (we see now) were unneeded. Copernicus was not an astronomer. He made occasional but not continuous observations. He used crude instruments he fashioned himself. He did not question old, imprecise records. From his tower, he made under 40 observations in a lifetime long enough for thousands. He remained trapped by ancient fictions the medieval world sanctified: He never surmounted those “perfect,” fatal circles to discover the one crucial detail—that planetary orbits are not circular but oval, i.e., ellipses. (Copernicus actually wrote “ellipse” in one place in his manuscript—though not about planetary orbits—then deleted the entire paragraph. So great is the power of preconception.)

⁸Copernicus could not answer many of the questions his theory raised. His work was so unresolved that he might never have published anything if not for an extraordinary disciple, Rheticus. *De Revolutionibus Orbium Coelestium* (“Concerning the Revolutions of the Heavenly Spheres”) appeared in 1543, after Copernicus suffered a stroke. The book was placed beside him; he caressed it before he died.

⁹*De Revolutionibus* is painfully difficult for laymen to read—except for the elegant dedication to Pope Paul III. It develops its complex argument carefully, building one proposition upon another; yet it founders on anomalies. Copernicus calls gravity a “natural predisposition” of parts that “unite in their wholeness,” and enlists the pious howler that immobility is “nobler and more divine than... instability.” And yet, how tremendous was his achievement! He specified the rotation of the earth, its slight wobbling, its sweep around the sun, the course of the moon and planets. (Like a jockey overtaking others on a racetrack, we see planets move forward, “pause” and slip

back as we pass them, then rush ahead when seen from the opposite side of the turn.) He destroyed the sacrosanct distinction between our world and the rest of the universe by treating gravity as a universal law.

¹⁰Did he suspect the titanic implications *beyond* astronomy of his sun-centered system? Probably not. The heliocentric cosmos would end man’s egocentric consolations. For if our earth is but another planet, and mere satellite to the sun, is man really God-favored? And where is heaven? (From the sun’s position, we already *are* in heaven.) Where is the theologians’ “ninth sphere” empyrean? Where, indeed, is “up”? Even more: Medieval men believed medieval knowledge to be both absolute and *complete*. Geometry had been explained forever by Euclid; physics, by Aristotle; cosmology, by Ptolemy; reason and faith, by Aquinas; creation, by Holy Scripture. And now...the Copernican model would dethrone man and earth, and all the medieval certitudes.

¹¹For 50 years, Copernicus’s opus made scant difference. Astronomers thought it technically brilliant but the work of a madman, contrary to God’s word and universal truth. The Catholic Church did not ban the book until 1616 (nor permit books to mention the earth’s motion until 1822). Luther called Copernicus a fool, because Joshua had commanded the *sun* to stand still.

¹²The Copernican scheme is an innocent foreshadowing of the universe we envisage today—our sun but a puny star in one of numberless galaxies—Andromeda has 150 billion stars; our closest galaxy is 150,000 *light-years* away. But the Polish cleric took that gigantic leap of the mind that would end the suffocations of medievalism. He opened many doors he never passed through. Kepler and Galileo made the Copernican revolution; Copernicus made it possible.

—LEO ROSTEN

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