L&
W

Copernicus

HEAVY

TYPEFACE

EXTRABOLD

SPECIMEN

BOLD

OLDSTYLE

SEMIBOLD

DECIPHER

MEDIUM

NOTATION

BOOK

APERTURE

HEAVY 45/44

Nicolai Copernici de hypothesibus motuum coelestium a se constitutis commentariolus

BOOK ITALIC 31/32

I often considered whether there could perhaps be found a more reasonable arrangement of circles.

MEDIUM 16/20

Neque enim ita mihi mea placent, ut non perpendam, quid alii de illis iudicaturi sint. Et quamvis sciam, hominis philosophi cogitationes esse remotas à iudicio vulgi, propterea quòd illius studium sit veritatem omnibus in rebus, quatenus id à Deo rationi humanæ permissum est, inquirere, tamen alienas prorsus à rectitudine opiniones fugiendas censeo. Itaque cum mecum ipse cogitarem. quàm absurdum existimaturi essent illi quàm absurdum existimaturi essent illi.

EXTRABOLD 36/37

The Origins of the Heliocentric Theory

MEDIUM & EXTRABOLD 9/12

Nicolaus Copernicus was a Renaissance polymath, active as a mathematician, and astronomer, who formulated a model of the universe that placed the Sun rather than Earth at its center. In all likelihood, Nicolaus Copernicus developed his model independently of Aristarchus of Samos, an ancient Greek astronomer who had formulated such a model some eighteen centuries earlier.

The publication of Copernicus's 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, triggering the Copernican Revolution and making a pioneering contribution to the Scientific Revolution.

Early History & Education
Copernicus was born and died in Royal Prussia, a semiautonomous and multilingual region that had been part of the Kingdom of Poland since 1466. A polyglot and polymath, he obtained a doctorate in canon law and was a physician, classics scholar, mathematician, astronomer, translator, diplomat, and economist. In 1517 he derived a quantity theory of money—a key concept in economics—and in 1519 he formulated an economic principle that later came to be called Gresham's law.

In the winter semester of 1491–92 Copernicus, as "Nicolaus Nicolai de Thuronia", matriculated together with his brother Andrew at the University of Kraków. Copernicus began his studies in the Department of Arts in the heyday of the Kraków astronomical-mathematical school, acquiring the foundations for his subsequent mathematical achievements. According to a later but credible tradition, Copernicus was a pupil of Brudzewski, who by then was a professor of Aristotelian philosophy but taught astronomy privately outside the university; Copernicus became familiar with Brudzewski's widely read commentary to Georg von Peuerbach's *Theoricæ novæ planetarum* and almost certainly attended the lectures of Bernard of Biskupie and Wojciech Krypa of Szamotuły, and probably other astronomical lectures by Jan of Głogów, Michał of Wrocław, Wojciech of Pniewy, and Marcin Bylica of Olkusz.

Mathematical Astronomy
Copernicus's Kraków studies gave him a thorough grounding in the mathematical astronomy taught at the university (arithmetic, geometry, geometric optics, cosmography, theoretical & computational astronomy) and a comprehensive knowledge of the philosophical and natural-science writings of Aristotle (De coelo, Metaphysics) and Averroes, stimulating his interest in learning and making Copernicus conversant with humanistic culture. He broadened the knowledge that he took from the university lecture halls with independent reading of books that he acquired during his Kraków years; to this period, probably, also date his earliest scientific notes, now preserved partly at Uppsala University. At Kraków Copernicus began collecting a large library on astronomy; it would later be carried off as war booty by the Swedes during the Deluge in the 1650s and is now at the Uppsala University Library.

An Initial Outline of a Heliocentric Theory
Some time before 1514, Copernicus wrote an initial outline of his heliocentric theory known only from later transcripts, by the title (perhaps given to it by a copyist), *Nicolai Copernici de hypothesibus motuum coelestium a se constitutis commentariolus*—commonly referred to as the *Commentariolus*. It was a succinct theoretical description of the world's heliocentric mechanism, without mathematical apparatus, and differed in some important details of geometric construction from *De revolutionibus;* but it was already based on the same assumptions regarding Earth's triple motions. *Commentariolus,* which Copernicus consciously saw as merely a first sketch for his planned book, was not intended for printed distribution. He made only a very few manuscript copies available only to his closest acquaintances, including, it seems, several Kraków astronomers with whom he collaborated in '15–'30 in observing eclipses. Tycho Brahe would include a fragment from the *Commentariolus* in his own treatise, *Astronomiae instauratae progymnasmata,* published in Prague in 1602, based on a manuscript that he had received from the Bohemian physician & astronomer Tadeáš Hájek, a friend of Rheticus. *The Commentariolus* would then appear complete in print for the first time only in 1878.

HEAVY

In early historic times, astronomy only consisted of the observation and predictions of the motions of objects visible to the naked eye. 28/32

In some locations, early cultures assembled massive artifacts that may have had some astronomical purpose. In addition to their ceremonial uses, these observatories could be employed to determine the seasons, an important detail for crop planting. 22/25

Before tools such as the telescope were invented, early study of the stars was conducted using the naked eye. As known civilizations developed, most notably in Egypt, Greece, Persia, India, China, Central America, and Mesopotamia, astronomical observatories were assembled and ideas on the nature of the Universe began to develop. 17/20

The Earth was first believed to be the center of the Universe with the Sun, with the Moon and the stars rotating around it. This is known as the geocentric model of the Universe, or the Ptolemaic system, named after Ptolemy. A particularly important early development was the beginning of mathematical and scientific astronomy, which began among the Babylonians, who laid the original foundations for the later astronomical traditions that developed in many other civilizations. Following the Babylonians, significant advances in astronomy were made in ancient Greece and the Hellenistic world. 13/16

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HEAVY 24/27

The cosmos, and our understandings of the reasons for its existence and significance, are studied in cosmology—a broad discipline covering scientific, religious or philosophical aspects of the cosmos and its nature.

SEMIBOLD 13.5/18

Eastern and Western thought differed greatly in their understanding of space and the organization of the cosmos. The Chinese saw the Cosmos as empty, infinite, and believed it was intertwined with the Earth. Western ideas—based on the ancient Greeks' understanding of the cosmos—believed in a multi-planar divided cosmos that was finite and filled with air. Europeans viewed the cosmos as a divinely created, spatially finite, bifurcated cosmos, so divided into sublunary and superlunary realms. All objects above the lunar disc were believed to be stable, with heavenly bodies believed to be made out of a refined substance called quintessence. This was understood to be a completely crystalline, transparent substance that held all of the superlunary spheres in perfect order.

MEDIUM & MEDIUM ITALIC 8.5/12

One way both the Chinese and the Europeans, along with countless other ancient societies, related to the cosmos. This was through meaning, placed on celestial bodies, that were observed moving above the Earth. The Chinese had a very complex astronomical understanding of the stars and the cosmos that influenced everything from their art and architecture to their myths and science. This was true of the Greeks and Romans, whose 48 constellations, including the zodiac signs and the constellation of Orion, have been passed down to modern Western cultures. These were likely passed down to them from ancient Babylonian and Egyptian astronomers. Copernicus is said to have been inspired by the fecund sun deity of neoplatonic thought, which may have initially inspired his vision of a heliocentric universe.

The common universal view of the cosmos, generally regarded as the foundation of modern astronomy, shifted as Nicolaus Copernicus positioned the Sun as the center of the Universe.