

Biographical Encyclopedia of Astronomers

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Chrysippus of Soli

Born Soli (near Mersin, Turkey), circa 280 BCE

Died Athens, (Greece), 207 BCE

Chrysippus' chief astronomical contribution was his cosmology, which served as the dominant paradigm until the time of astronomer Ptolemy (*circa* 150).

Chrysippus was born under the rule of Ptolemy II (the Greek king of Egypt); but his family was Cilician (a Semitic people), and he learned Greek before he moved (at about 20) to Athens. There he studied philosophy under the Stoic scholar Cleanthes (the name "Chrysippos," meaning "gold-steed," may translate his native name). From 232 BCE until his death, Chrysippus was scholar of the Stoa, one of the four major schools of philosophy in Athens.

Chrysippus wrote extensively on Stoic philosophy. 90% of all Stoic writings in the third century BCE were by him—covering astronomical topics in such works as *On the Kosmos*, *On Motion*, *On Nature*, and *On the Void*, through which he standardized Stoic doctrines. (His writings are now preserved solely in extracts.)

Chrysippus' cosmology held that the *kosmos* is cyclic, beginning as fire, which then, through successive condensations, transmutes in turn to air, then water, then earth, and cycles back again through successive dissolutions; the fire at the end of a cycle is the origin of the following cycle. His *kosmos* possessed two fundamental principles: (1) passive and qualityless matter acted upon by (2) the supreme god who imposes form and function on matter to generate the *kosmos*. Outside the spherical *kosmos* is boundless and uniform void, so that one cannot speak of the *kosmos* as other than central and stationary in the void. During its fiery phase, the *kosmos* expands into (but does not fill) this void. Four elements compose the *kosmos* in spherical shells: fire around air around water around earth, and the *kosmos* maintains its coherence despite their internal motions because they have bounded natural motions and places (Zeno, the founder of Stoicism, had followed Greek tradition in placing the Earth at the center of the *kosmos*.) Moreover, the *kosmos* is alive, sentient, and even rational (a view derived from Plato's *Timaeus*, which Chrysippus supported by recourse to teleological arguments). The *kosmic* center of thought (*hegemonikon*) he placed in the peripheral *aithêr* (a type of fire, according to Chrysippus), and the *kosmic* soul he found in the *pneuma* (a mixture of fire and air) that pervaded the whole *kosmos* and caused its coherence and organic unity.

His picture of the structure of the *kosmos* was that the *aether* rotates in a spherical shell around the spherical Earth; the *aether* is composed of nested spherical shells, the outermost of which contains the innumerable fixed stars. Inside that are found, in order, Saturn, Jupiter, Mars, Mercury, Venus, the Sun, and the Moon. This order, apparently advocated by Plato (in *Republic* 10, *Timaeus*, and *Epinomis*), Aristotle left to the "mathematicians" (in *On Heaven*) or may have followed (in *Metaphysics*), as did most astronomers in the 4th and 3rd centuries BC.

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