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*Cleomedes' Lectures on Astronomy: A Translation of The
Heavens* (review)

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Plato's theorizing.

This book contains a virtuoso display of what might be termed analytic Platonism, and as such it may help clarify one's thinking about Forms. It does not, however, advance our understanding of Plato's metaphysics very much.

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C. BOWEN and ROBERT B. TODD, intro. and trans. *Cleomedes' Lectures on Astronomy: A Translation of The Heavens*. Berkeley/Los Angeles/London: University of California Press, 2004. Pp. xvi + 238. US \$17.95, Can. \$25.95. ISBN 0-521-81586-X.

With *Cleomedes' Lectures on Astronomy: A Translation of The Heavens*, Alan C. Bowen and Robert B. Todd (hereafter B/T) have produced an exemplary and eminently useful translation, the first in English, of an important late Stoic pedagogical text on astronomy. By design this collaborative effort, based on Todd's 1990 Teubner of Cleomedes' *Caelestia* (Greek *Meteora*), is intended both for "a varied readership ... most of whom will not know the ancient languages" and especially for those whose interests lie in later Stoic philosophy, in ancient mathematical astronomy, or in the history of ancient astronomy proper (xii). Enhanced and enriched by an expansive introduction and a comprehensive running commentary on the translated text, this finely produced and affordable volume also features a substantial array of appended explanatory materials supplementary to the translation proper. Taken together, these features render the work a model of what a modern translation of an ancient technical work ought to be.

To appreciate fully the significance of the *Caelestia* a familiarity with the foundational concepts and background information provided in B/T's very detailed and lucidly organized Introduction (1–18) is essential. Divided into three sections, it will reward the patient reader's attention when encountering the translation itself. The first section, "Cleomedes' Date" (1–4), shows how the text's internal evidence is absolutely paramount. For example, in the absence of any external biographical data for its author, information drawn from *The Heavens* itself, both philosophical and astronomical, can establish only that Cleomedes

was most likely active at some time during the first two centuries C.E. and that he was a professional teacher of Stoicism who delivered lectures on its basic tenets. Understood in this light, then, *The Heavens* is hardly the strictly astronomical treatise it was long thought to be but rather should be considered "the presentation of ancillary material within a larger exposition of Stoicism" (3).

The second and by far longest part of the Introduction, "Cleomedes and Posidonius" (5-17), demonstrates in great detail that the larger exposition of central Stoic doctrines assumed and referenced in the *Caelestia* can now be properly correlated specifically with the theories of Posidonius regarding astronomy, particularly as these are expounded in fragment F18EK (Edelstein/Kidd). The theoretical dependence of the *Caelestia* upon a Posidonian model is evidenced in several ways. First, there is the incorporation of "a hierarchical relation between ... physical theory and astronomy" wherein the former, encompassing the realm of matter, cause and teleology, is assumed to be foundational for the latter, which uses mathematical means to draw conclusions about the observed heavenly bodies. Astronomy, however, ultimately must "adopt and follow" the principles conceptually established by physical theory (6). The second explicit linkage is found in epistemology and methodology. On the one hand, Posidonius overtly discounts visual observation as the sole basis for establishing theoretical principles and marks such activity with the derogatory term "hypothesis," wishing to eliminate that kind of supposition from the process of scientific reasoning. Cleomedes, on the other hand, is less hostile to the role of astronomical observation, although he does express concern about how the *uncritical* use of observation may lead to false theories (8).

B/T next (9-11) demonstrate how the Stoic concept of the criterion of truth (*phantasia kataleptike*, "cognitive presentation") likely influenced several of Cleomedes' specific arguments about a variety of astronomical topics (8-9). The key term *kriterion* figures prominently in Cleomedes' argumentation against an uncritical reliance on sense perception alone for ascertaining fact and, in the case of sight especially, in his charge that astronomical observation can be misleading if taken at face value because of the effects of distance and similar visual distortions. Thus, even though what we have of Cleomedes is essentially a technical tract, such philosophically grounded reflections on epistemology and methodology, appearing in only one section of Cleomedes' work (I.5.1-6), do "offer a basis for how far the other arguments in the *Caelestia* for astronomical and cosmological theses extend ... and, in particular, how the Stoic criterion should be interpreted in this context of constructive argumentation" (9-11).

Another important section of the Introduction takes up the question of how Cleomedes incorporated various proofs and counter-arguments (*apodeixeis*, “demonstrations,” and *ephodoi*, “procedures”) into the *Caelestia* (11–15). These terms themselves refer to the overall process of systematic reasoning used by Cleomedes to arrive at the axiomatic underpinnings of an argument. Such an “independently identifiable truth or principle” comprises both observational and non-observational premises to arrive at conclusions, sometimes in combination with additional data drawn from non-astronomical (e.g., geographical) data and hypotheses (11–12). Cleomedes also incorporates a variety of actual procedures (*ephodoi*) into his investigations and his conclusions. B/T delineate the range of these approaches and draw special attention to Cleomedes’ applications of how similar observational data may be used in “another way” (and “in conjunction with other premises”) to estimate and then validate conclusive results (13). They also recount in considerable detail how Cleomedes applies a “criterion of *truth*” to the role of individual premises, observational or otherwise, in the process of drawing conclusions while still maintaining a link with the cognitive preference inherent in Stoic epistemology (14–15). Overall, B/T conclude that “the Stoic criterion is adapted in the *Caelestia* to a program of establishing astronomical and cosmological matters” (15).

B/T conclude the central portion of the Introduction with a recapitulation of their theories about the influence of Posidonian Stoicism on the *Caelestia* (15–17). Foremost is Posidonius’s prescription for astronomy in F18EK that “presuppose[s] an independently established cosmic structure” and posits a sound and consistent theoretical basis for the procedures involved in attempting to ascertain (astronomical) truths (15). Posidonius’s interest in logic and mathematics, moreover, finds expression in the *Caelestia* with Cleomedes’ application of “inferential procedures” used, for example, to explain the spherical shape of the Earth and the size of the Sun (16). Thus, B/T conclude that the *Caelestia* is “a remote tribute by a minor Stoic to the ideas of a major predecessor,” without whose work “astronomy would never have been included in Cleomedes’ program of Stoic teaching” (17).

The brief final section of the Introduction (“Text and Translation,” 17–18) outlines the technical aspects of the English translation, explaining, among other things, the numbering system used for the text, the standardization of measurements, and the method of transliterating the original Greek.

One hundred forty-six pages (19–165) are devoted to the English translation of the two books of the *Caelestia* and to the comprehensive footnote-based commentary that accompanies them. The work’s present division into books is part of its original structure and represents two

lecture courses (*skholai*) by Cleomedes; the chapter divisions date from Renaissance editions of the text and are based on more or less logically cohesive material (20, 165). In this edition each book is preceded by a single-page, chapter-by-chapter outline summarizing its basic contents, a feature added by B/T for the benefit of the modern reader.

The two books of the *Caelestia* present a comprehensive overview of the physical astronomy of Cleomedes' day. Book One (19–95) comprises eight chapters. In it are found expositions of the composition of the universe and relationship of the Earth to the heavens (I.1), of the fixed stars and planets in their courses (I.2), of the spherical nature of the Earth (I.5) and its place at the center of the universe (I.6), and of the effects that solar motion through the Zodiac has on terrestrial seasons, zones and day length (I.3, 4). The final two chapters (I.7, 8) are linked conceptually in their treatment of the methods of ascertaining the size and circumference of the Earth.

The seven chapters of Book Two (97–165) focus chiefly upon various aspects of solar and lunar astronomy. Two are devoted to the Sun and its size (II.1–2) while Chapter 3 assesses the size of the moon and that of other celestial objects. Three chapters treating lunar illumination, phases and eclipses (II.4–6) are followed by a brief chapter on lunar and planetary movements (II.7) that also serves as a conclusion to the whole work. It is in this final chapter, too, that Cleomedes explains that the material in his two *skholai* do not “comprise the writer's actual doctrines” but rather derive from the works of others, particularly those of Posidonius (165).

As might be expected, much of the material here is—and was intended by the author to be—highly technical, laying down specific astronomical concepts as foundational to Stoicism. Yet there are a number of sections that offer especially engaging reading for a modern audience. One of these is Cleomedes' discussion of the planets (I.2). In one section (39–41), for example, the author describes the motions of the planetary bodies and their positions in relation to the fixed earth while explaining the epithets commonly joined to their names (e.g., Mars as *Puroeis*). Similarly, the discussion of the spherical shape of the Earth and of the cosmos (I.5), though replete with highly refined calculations, nevertheless makes for interesting reading because of its incorporation of geographical evidence linked to observable celestial features such as certain constellations (66–70).

Other parts of the work also appeal to readers whose interests may lie outside the strict confines of ancient astronomy. Those drawn to the nexus of ancient science and philosophy, for instance, will appreciate Cleomedes' opening exposition on the nature of the universe (I.1). The chapter ranges from a basic definition of the cosmos (“a construct

formed from the heavens, the Earth, and the natural substances within them," 21) to the role of Nature in delimiting it (22), and thence to a lengthy analysis of the concept of the void (*kenon*) (22–31). Along the way Cleomedes refutes Aristotelian claims about the void, at one point calling the school's position "simplistic" (28). Similarly, the whole of Chapter 7 stands as an important philosophical digression that pits the methodology of Posidonius against that of Eratosthenes in determining the Earth's circumference, a procedural contest in which Cleomedes ultimately sides with the latter (discussed by B/T on 13–14).

Nor does Book Two disappoint in its integration of lively philosophical debate with scientific exposition. At the outset (II.1), the author launches a direct and sustained attack upon the Epicureans, whose assertions that sense perception alone proves sufficient to ascertain truth he rejects and mocks with obvious relish. For example, in addressing the Epicurean claim that the Sun's apparent larger size when rising and setting is a result of its actual ascent and descent, Cleomedes states flatly that "this involves utter ignorance [*apaideusia*]" (100) and goes on to give a lengthy and scientifically sophisticated explanation for the whole question of the Sun's size that takes up much of the entire chapter (100–122). Here, among many other carefully considered points, Cleomedes rightly claims that "we see [the Sun] at the horizon through air that is denser and damper ... and in this way the Sun appears larger to us" (100–101). He also refutes in detail the Epicureans' assertion that the Sun is the size it appears to be by recounting the very power of the Sun in its multiple roles as a source of illumination and heat and as a sustaining force for terrestrial life (119–121). To this he adds that Epicurus himself was blind to the realities of the natural world and that the act of uncovering "the truth of what exists" cannot be ascertained by such "pleasure-loving fellows" (121–122). The chapter ends with Cleomedes comparing Epicurus to Homer's Thersites in the former's boastfulness and assertions of philosophical superiority (124–126) and with his final tirade against the "evil degenerate" founder of Stoicism's rival school, who "has nothing to do with astronomy, much less philosophy" (126).

Like the main text, the back matter of the volume is also rich in information. Immediately following the text of *Caelestia* proper is a series of twenty-five sequentially arranged figures, some subdivided further into individually lettered illustrations, that demonstrate schematically a variety of astronomical topics covered in the lectures (167–192). A lone but lengthy appendix (193–204), consisting of B/T's translation of Posidonius fr. 18EK, accompanied by copious introductory and explanatory material, affords the reader additional information pertinent to the main body of Cleomedes' work. The remainder of the volume is made up of a glossary of terms referenced in the translation, consisting essen-

tially of English terms with their transliterated Greek originals (205–209); a bibliography (211–221); a one-page listing of “Passages from Cleomedes in Collections of Texts” (223); a comprehensive general index (225–230); and an *Index Locorum* (231–238).

This fine volume is remarkably free of errors or editorial oversights. Nevertheless, a few are worthy of mention, though none will cause the reader any great distraction. For example, there is a missing pagination reference in the introduction to the Bibliography (211), where “pp. O-O” should read “pp. 231–38.” In the glossary, there is no transliterated Greek entry for “sympathy” though it appears in the English text (I.1.13), is explained in a note as an important term “in Stoic cosmobiology” (22 n. 8), and appears in the *Index Verborum* of Todd’s 1990 Teubner (114). Additionally, for the sake of currency, Viré’s 1992 edition of Hyginus’s *De astronomia* might properly have supplanted the earlier edition of Le Beouffle (1983) cited in the text (39 n. 7) and in the *Index Locorum* (234). Lastly, while B/T have essentially produced a comprehensive and accurate English translation of Todd’s Greek edition, including an impressive array of its citations, readers should be aware of differences in the two. For example, on *Caelestia* II.1.2–3 neither Todd’s citation of Cicero *De finibus* I.20 (44) nor the extended reference to Diogenes Laertius on Epicurus are in B/T’s text (99 n. 2). Moreover, the reference there in B/T to Lucretius 5.564–73 is slightly inconsistent with Todd’s (“V 564–574”).

One final word about B/T’s book warrants inclusion. The cover shows Tom Diana’s (!) rather grainy photo of “the Moon during a partial eclipse, May 25, 1994,” a truly fitting image for a work that devotes a substantial amount of discussion to that body and to its observed appearance (II.3–6). Prominent in the photo itself at the upper right of the Moon’s surface is Mare Crisium, to the north of which—and readily visible by an observer with almost any kind of optical aid—lies the 126 km crater named for the author of the *Caelestia*. It would be interesting to discover whether anyone associated with the production or publication of this excellent edition was aware of that fact.

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