

The Role of Astronomy in Greek and Roman Religion

A Senior Thesis

submitted in partial fulfillment of the requirements for the degree of Bachelor of Arts in Classical
and Medieval Studies at Cleveland State University, Cleveland, Ohio.

by

Betsy McCall

August 1997

(student's signature)

(date)

(thesis advisor's signature)

(date)

(CLM Director's signature)

(date)

At the close of the twentieth century, we sometimes forget the deep-rooted connection between astronomy and religion.¹ We have managed to separate ourselves from all of nature and declare mastery over it. We are unimpressed by the change of seasons: we only complain about the pot holes and the cold, but our lives continue seemingly unaffected, in sharp contrast to the difference between life and death that they could mean to primitive peoples. Comet Hale-Bopp made the news for a week, but it did nothing to change our view of ourselves or the world around us.² It was only a curiosity. But the pictures of Earthrise from the moon have still not faded from recent memory, and the announcement of possible evidence for past life on Mars caused CNN to call out the theologians to tell us how this would alter our religious beliefs. We are reminded of the ancient brotherhood between religion and astronomy. Astronomy and Religion grew up together as human civilizations developed all over the world, and like all siblings, they have not always seen things eye to eye.

This conflict, as well as our modern prejudices, are reflected in the way we have chosen to look at the development of religion and astronomy in the Classical world. Historians of science and astronomy tend to regard religion as a force to be overcome. They recall the hostility of the Catholic Church in the seventeenth century and seem to presume religion is like this everywhere and at all times. The astronomer-priests of Babylon are left as curious enigmas rather than as a part of a larger continuum. Historians of religion regard the influence of astronomy with equal curiosity. We are familiar with the influence of religion on astronomy, but surely religion itself is above such influence. Yet neither is operating in a vacuum. The

¹ Religion is defined by the Oxford English Dictionary as, in part: “recognition on the part of man of some higher unseen power as having control of his destiny, and as being entitled to obedience, reverence, and worship.” (OED, 2nd ed., Vol. XIII, pg. 568-9, def. 5.a.) However, for the purposes of this paper, I will include philosophy whether or not it meets this definition.

development of each was thoroughly intertwined through the Classical period. The unnatural division common since the rise of Christianity in the West has colored our approach to each.³

In truth, we still see the remnants of this ancient connection between religion and astronomy. Besides CNN, astronomers name the planets and their moons, asteroids, and at times land formations on these worlds after these long dead religions. The moons of Jupiter are named for characters in his drama: lovers, cup-bearer, nurse, and so forth. The asteroids are freer still.⁴ On Mars we have Olympus Mons, appropriately the tallest volcano in the Solar System. Astronomers also keep the names of stars and constellations from the Classical world (usually in their Latin form) in the northern hemisphere. We still speak of constellations named for Perseus and Andromeda, Centaurs and Virgins. Today, this is but tradition and we can see where the tradition has been eroded. There were spacecraft named Apollo and Gemini, beside others named Mariner, Viking, Voyager and Pathfinder; the moons of Uranus are characters from the literature of William Shakespeare and Alexander Pope; the comets are named for their discoverers; most alien landscapes are named for great men and women (carefully avoiding living religions or political figures)—so while the largest “continent” on Venus is Aphrodite Terra, the highest peak (as tall as Mt. Everest) is called Maxwell Mons for a woman scientist.

Despite this, astronomy still has the power to move us in a seemingly religious way. Religion cannot escape it. The notion of the Big Bang 15-or-so billion years ago challenges any literal interpretation of the Bible, but also leaves the notion of a Creator open to either interpretation—both absence and presence have been made from the modern cosmological view.

² We will ignore, for a moment, the Heaven’s Gate cult, which clearly felt a little stronger about it than most.

³ Beck, Roger. “Cosmic Models: Some Uses of Hellenistic Science in Roman Religion”. The Sciences in Greco-Roman Society, Timothy Barnes, ed. Edmonton, Alberta: Academic Printing and Publishing © 1994, pg. 99.

Even our modern obsession with UFO's (beginning in 1947) has been interpreted with religious symbolism,⁵ and clearly some believers are as convinced with their otherworldly connection to the cosmos as are/were believers in astrology or any other recognized religion. Pictures of Earth from space gave everyone pause, and forced us to realize how tied to each other we were, and the fragility of Earth. Seeing Earth as a planet for the first time changed us profoundly, in a way reminiscent of a religious experience.

When we think of early religious thought in primitive cultures, we naturally think of nature religions, but nature and astronomy are difficult to separate even at this level. Our distinctions are somewhat arbitrary. Clearly, bear totems have little to do with astronomy, but if part of their mystical nature is related to their hibernation cycles, this is an indirect link to the astronomical, for the seasons which lead to the bear's winter sleep are caused by astronomical rhythms, and it does not take too much of a stretch for even illiterate people to make this connection. The basic rhythms of our everyday lives, day and night, are linked inextricably to cosmic events. As mundane and trivial as this seems, we need not begin at such an ordinary level. The basic elements of early astronomy are the sun, moon, and the stars. The sun and moon figure prominently in many early religions, often as the most significant gods worshipped.⁶ The development of an agricultural society—a necessity for the development of civilization—requires the development of a certain amount of basic astronomy.⁷ Without it, one would not know when it is best to plant or harvest. Following the rising and setting of prominent groups of

⁴ There are so many, however, astronomers are running out of names from Greek, Latin, or any other source.

⁵ Little, Gregory L. The Archetype Experience: Resolving the UFO mystery and the Riddle of Biblical Prophecy Using C.G. Jung's Concept of Synchronicity. Moore Haven, FL: Rainbow Books © 1984.

⁶ North, John. Norton History of Astronomy and Cosmology. NY: W.W. Norton and Co. © 1995, pg. 6.

⁷ Pannekoek, Anton. A History of Astronomy. NY: Interscience Publishers © 1961, pg. 23.

stars, the changing position of the setting and rising sun on the horizon, and/or the reckoning of time with a rough lunar calendar, all require the understanding that nature exhibits certain patterns that can be followed.⁸ Nature can be fickle here on Earth, however, and propitiating the gods is the only way to ensure that the god of the sun does what he is supposed to do.

The Western astronomical tradition has its deepest roots in the civilization that embraced the Nile. The recorded history of the Nile extends back three millennia before the Common Era.⁹ This is attributable in large part because the people of the Nile Flood Plain were able to establish a reasonably accurate lunar calendar based on the flooding of the Nile. The coincident rising of the brightest star in the heavens, the Dog Star Sirius, with the annual flooding of the Nile which was the central feature of their agricultural civilization, and permitted them a series of predictable events upon which to base a regular calendar and an impetus for religious thought.¹⁰ The Egyptians were the first to develop a calendar of 365 days based on these notions.¹¹ It was a calendar that permitted historians to date accurately most of the events from the Mediterranean to the Middle East for that period for anyone who came in contact with them. While a calendar has a profound impact on a culture—it is extremely important for prosperous agriculture, both for planting crops and setting dates for sacrifices related to various nature gods correctly—the calendar was not the only astronomical influence on Egyptian religion. The pyramids, built to house the bodies of the pharaohs in the life-after-death, are oriented toward solar phenomena and

⁸ North, John., pg. 36-7.

⁹ Ibid., pg. 7.

¹⁰ Allen, Richard Hinckley. Star Names: Their Lore and Meaning. NY: Dover Publications, Inc. © 1963, pg. 123-4.

¹¹ North, John., pg. 13.

certain stars. And while some would argue that we cannot know the true intentions of the builders, the apparent orientations of these socio-religious monuments is thought-provoking.¹² The geometry and astrology developed by the Egyptians in their celestial worship would later come to greatly effect the development of Hellenistic thought.

The Babylonian civilization developed on another flood plain—this time of the Euphrates. The Babylonians were more closely connected to city life than the Egyptians, and the most prominent feature of their cities was the ziggurats, remains of which can still be found in the Middle East. These terraced buildings served as temples to the patron deities of the king and city, but also were used as astronomical observatories.¹³ The relationship between astronomy and Babylonian religion has perhaps been treated in the greatest depth because of the seemingly unusual juxtaposition of astronomer and priest in one.¹⁴ The astronomer-priests making observations of the sky developed a sophisticated system capable of determining the motion of the planets and their closest approaches,¹⁵ cycles of eclipses,¹⁶ and a calendar.¹⁷ One reason they worked so tirelessly was also that they developed a system of astrology—applied only to kings and the state, never to individuals—and whose efficacy was dependent upon their belief that the deities they worshipped were represented in the planets.¹⁸ Their observations and mathematical

¹² Ibid., pg. 8-10.

¹³ Rogers, Frances. 5000 Years of Stargazing. Philadelphia & NY: J.B. Lippincott Company © 1964.

¹⁴ Jones, Alexander, “The Place of Astronomy in Roman Egypt”, The Sciences in Greco-Roman Society, Barnes, Timothy D., ed. Edmonton, Alberta: Academic Printing and Publishing © 1994, pg. 46-7.

¹⁵ Pannekoek, pg. 54.

¹⁶ O’Neil, W. M. Early Astronomy from Babylonia to Copernicus. Sydney University Press © 1986, pg. 25.

¹⁷ North, John., pg. 25.

¹⁸ Ibid., pg. 30.

methods, when discovered by the Greeks in Asia Minor, would have a profound impact on the development of Greek astronomy and Hellenistic religion.¹⁹

The Middle East and Eastern Mediterranean were not alone in the development of this pairing between religion and astronomy, though they had the greatest influence on Greek and Roman thought. The Chinese independently developed a sophisticated astronomy/astrology quite different from the West, for the benefit of their emperors, and also inspired by the need to understand their early nature-based gods they placed in the sky.²⁰ In the New World, the Aztecs in particular developed a highly sophisticated astronomy in connection with their religious beliefs focused on the planet Venus,²¹ to whom they dedicated their human sacrifices.²² In addition to these, the remnants of other vanished civilizations speak of a surprisingly advanced astronomy probably associated with religion: e.g. the mysterious Anasazi,²³ and the monument builders of the British Isles.²⁴

The union of astronomy and religion requires a certain amount of flexibility. Careful observation of things we know so little about is bound to bring uncomfortable discoveries. Astronomy was becoming a science, and science seems to demand change. Religion was becoming more codified, particularly as the state exerted more control over the priestly class. Astronomy and religion began to contradict one another and religions had to decide whether they

¹⁹ O'Neil, W.M., pg. 50-1.

²⁰ Pannekoek., pg. 86-94.

²¹ North, John., pg. 156.

²² Ibid.

²³ Rogers, Frances., pg. 15.

²⁴ Ibid., pg. 18.

would accommodate the new information or to adapt the new information to the accepted tradition.²⁵²⁶ This is the dilemma that has faced all religions as scientific thought generally has come to demand the rejection of many traditional beliefs. As one of the oldest sciences,²⁷ astronomy was the first to come under this influence.

The earliest Greek writers left to us are Homer and Hesiod, and it is here that our information about early Greek religion and astronomy begins. Homer's Iliad and Odyssey are well-known for their relevance to Greek religion and their view of an anthropomorphic pantheon: a starting point for the changes in this literal view yet to come. These works also give us a glimpse into early Greek astronomical thought.^{28 29} Homer makes reference to such objects as the Morning and Evening Star (still considered different objects), the Dog Star,³⁰ the Pleiades and some prominent constellations, including Orion and the Great Bear (a.k.a. "the Big Dipper") in the Iliad. The Odyssey repeats many of the same, adding Boötes to the list.³¹ Homer's mention of these objects and the way that he does so tells us something about his view of them and knowledge of them. There are mentioned in a poetic context, of course, and are described as

²⁵ Allen, Reginald E., ed. Greek Philosophy: Thales to Aristotle, 3rd ed. NY: Maxwell Macmillan International © 1991, pg. 3.

²⁶ Lindsay, Jack. Origins of Astrology. NY: Barnes & Noble © 1971, pg. 100.

²⁷ North, John., pg. XXV.

²⁸ Pannekoek., pg. 95.

²⁹ Genuth, Sara Schechner. "Astronomical Imagery in a Passage of Homer" Journal for the History of Astronomy, 1992, 23: 293-298.

³⁰..

... éj t' çst.r' TMpessÚmenon ped...oio, Ój ·ç t' Ñpèrhj elsin, çr...zhloi d. op aÙga^ fa...nontai pollo·si met' çstrçsi nuktÏj çmolgù: Ón te kÚn' 'Wr...wnoj TMp...klhsin kal.ousi. lamprÏtatoj m°n Ó g' TMsti, kakÏn d. te sÁma t tuktai, ka... te f_rei pollÏn puretÏn deilo·si broto·sin:" (Homer. Iliad, Vol. I-II, trans. A.T. Murray. Cambridge, Mass.: Harvard University Press © 1993, XXII 26-31.)

³¹ Pannekoek., pg. 95.

the mythological characters they represent, effective because of their familiarity. Homer's use of them is also in their practical sense,³² reflecting their dual nature for primitive peoples.

Hesiod's astronomical information leans for more to the practical, giving the rules of the sky for the agrarian lifestyle of the Greek people.^{33 34} The stars and constellations he cites are much the same as Homer's, and they replay their mythological dance in the sky.³⁵ Hesiod is not an astronomical writer, rather he describes Greek religion and cosmological views. It should not be unexpected that such practical astronomy should occur in a mythological work. Farmers depend on the calendrical function of these simple observations, and sailors on the directional function. As powerful as these forces are for their existence, it is not difficult to understand their proper place in mythology. The state of Greek religion and astronomy in the time of Homer and Hesiod was basically primitive and metaphorical. The culture's knowledge of astronomy was in broad strokes only. Religious festivals were dependent on that meager knowledge, however, for the timing of their festivals, and this was important to get right for the gods would not be kind if worshipped at an improper time. Astronomy was practical, even in its relationship to religion, but imagination was beginning to develop. The spillover from the more advanced civilizations to their south and east had not yet reached them.

³² Homer. Odyssey of Homer, trans. Richard Lattimore. NY: Harper Perennial © 1967, V 271-7.

³³ Lindsay., pg. 64.

³⁴ "Plhifdwn 'Atlagen wn TMpitellomenfwn rcesq' em»tou, erÒtoio d' dusomenfwn. " (Hesiod. Hesiod, Homeric Hymns, Epic Cycle, Homerica, trans. Hugh G. Evelyn-White. Cambridge, Mass.: Harvard University Press © 1995, pg. 31, l.383-4.)

³⁵ « . . .
eât' n Plhifdej sq noj Ôbrimon 'War...wnoj feÚgousai p...ptwsin TMj ðeroeid a pÒnton, d' tÒte panto...w
n en mwn qu...ousin çÁtai:" (Ibid., pg. 49 l.619-21.)

One major feature connected with early religions is the prominence of the gods of the sun and moon. Early Greek religion was no exception. Though the major god of the Greeks was already Zeus,³⁶ the Greeks came to most closely identify themselves with Apollo, one of the sun gods. One indication of the influence of the sun and moon on Greek religion is the multiplicity of gods and goddesses for these two bodies.³⁷ Each object has a handful of deities dedicated to it or to aspects of it. The sun itself is represented by Helios, but also Apollo, Eos, Phaëthon (the son of the sun), and their descendants who include Circe and Medea,³⁸ play significant roles throughout Greek myth. They would appear as characters in the epic tales of Homer, and in the moral lessons in the myths of Phaëthon and the chariot,³⁹ and of Icarus and Daedalus.⁴⁰ The moon is treated no differently in the person of Selene, as well as Artemis, Hera,⁴¹ Hecate,⁴² Semele,⁴³ Niobe⁴⁴ and others.⁴⁵ These goddesses and their descendants played equally significant roles and the myths concerning them slowed their importance and a symbolic

³⁶ A nature-god connected to thunderbolts and whose name is derived from an Indo-European root related to “sky” but whose presence is not astronomical.

³⁷ Kerényi, Karl. Tochter der Sonne (Goddesses of the Sun and Moon: Circe, Aphrodite, Medea, Niobe), trans. Murray Stein. Irving, TX: Spring Publications © 1979.

³⁸ Ibid.

³⁹ Graves, Robert. The Greek Myths. Mt. Kisco, NY: Moyer Bell Limited © 1988, 42.2.

⁴⁰ Ibid., 29.2.

⁴¹ Ibid., 12.6.

⁴² Meyer, Marvin W., ed. The Ancient Mysteries: A Sourcebook. NY: Harper & Row, Publishers © 1987.

⁴³ Graves., 14.c.

⁴⁴ Kerényi., pg. 61.

⁴⁵ Indeed, Graves seems to think nearly all Greek goddesses are moon goddess.

relationship to the sun: Artemis was the twin of Apollo; Semele was the mother of Dionysus.⁴⁶

With the transition to the Hellenistic age, the role of the moon goddesses would become more prominent still in magical rites and astrology.⁴⁷

One unusual aspect of Greek religion not paralleled elsewhere was the presence of a Muse of Astronomy, Urania. The presence of Urania can tell us about the Greeks' perception of astronomy by looking at her place in Greek religion. The Muses were nine in number and companions of Apollo. The other eight were responsible for the arts, from poetry to music (taking its name from them). Including astronomy with these other artistic pursuits is to suggest that astronomy was also perceived as an art, possibly because the Greek at this time had no conception of the difference between art and science, but clearly they did not perceive astronomy as being similar to animal husbandry, for example. Her connection with astronomy is sometimes overlooked in favor of her artistic influence. Herodotus, for example, named the books of his history after each of the Muses, and nothing particularly astronomical occurs in Urania's book. Urania is also sometimes associated with Aphrodite.⁴⁸ In later traditions she also came to be associated with the constellations Pisces⁴⁹ and Virgo.^{50 51} Romantic, seventeenth century astronomers seem to have made been far more enamored of her than the Greeks.⁵²

⁴⁶ Graves., 14.c.

⁴⁷ Luck, Georg. Arcana Mundi: Magic and the Occult in the Greek and Roman Worlds. Baltimore: Johns Hopkins University Press © 1985, pg. 26.

⁴⁸ Graves.

⁴⁹ Jobs, Gertrude. Outer Space. NY: Scarecrow Press © 1964, pg. 231.

⁵⁰ Allen, R.H., pg. 402.

⁵¹ Jobs., pg. 276.

⁵² Ibid., pg. 193.

Before the wholesale importation of other cultures from the Middle East, the cosmology of early Greek religion was typically limited to the realm of their experience. The world extended no further than their sailing ships or traders had gone. It was a flat disk surrounded by Ocean,⁵³ readily represented on Achilles shield, and they explained strange things in terms of this: e.g. Aethiopians were burned by the sun because they lived too close to the edge of the world.⁵⁴ There were various creation myths involving Ocean, Chaos or Uranus that were typical of primitive cosmologies. Only with the introduction of Mid-East culture, particularly from Babylon, did the cosmologies of the Greeks begin to develop some distinctiveness.⁵⁵

The role that stars and constellations had in Greek religion is bound up in the junction of agriculture, astronomy and sailing and their roles in that religion. The earliest stars and constellations recognized by Homer and Hesiod were the ones most bound up in sailing and farming, and are the easiest to recognize. Even today, Orion's belt and sword are easy to spot; the Great Bear (Big Dipper to Americans) winds around the pole all year and never sets;⁵⁶ the Hyades (now the V-shaped head of Taurus)⁵⁷ and the Pleiades (a cluster of seven stars closely packed distinguishable on a clear night far away from city lights)⁵⁸ stand out among the stars even when seen among the far greater number they would have seen than we. It's a natural part of the human condition to see patterns in nature and to explain them with story. That myths are

⁵³ Homer, *Iliad*.

⁵⁴ *Ibid*.

⁵⁵ Allen, R.E., ed., pg. 1.

⁵⁶ Allen, R.H., pg. 419.

⁵⁷ *Ibid.*, pg. 386-9.

⁵⁸ *Ibid.*, pg. 391-403.

commemorated in the sky should not surprise us, nor should we be surprised at what the Greeks placed there: Orion the hunter, Taurus the bull, Aries the ram, Delphinus, and the Great Bear; creatures familiar to sailors and farmers who spent their lives looking at the stars and trying to figure out their meanings. As Greek culture became more literate and more sophisticated, more stars and constellations were named, often over-lapping and reflecting different traditions.⁵⁹ The arrangement of these constellations and their names were either dictated by mythology (the grouping of Perseus, Andromeda, Cassiopeia and Cepheus side-by-side)⁶⁰ or mythology dictated by observation (the confusion between the Orion and Hercules constellations,⁶¹ or the perhaps trivial mythological explanation for the Milky Way).⁶²

As described in early writers, the gods were real, anthropomorphic deities with great powers and human appetites who manipulated mankind when it suited them, gods who needed to be propitiated so as not to take their wrath out on a hapless human. Astronomy was becoming more sophisticated in the Greek world and the movements of the planets were discovered against the background stars probably with influence from Babylon. This movement was believed to manifest the existence of the divine,⁶³ and they came to be named for major Greek gods.⁶⁴ The brightest was named for Zeus. The red one for the god of War. The evening star for Aphrodite.

⁵⁹ Ibid., pg. 26.

⁶⁰ Ibid., pg. 142.

⁶¹ Ridpath, Ian. Star Tales. NY: Universe Books © 1988, pg. 96.

⁶² Allen, R.H., pg. 474.

⁶³ Lindsay., pg. 128.

⁶⁴ The Roman equivalents would be adopted in the Roman world to which we are heirs.

The quickest, which never strayed far from the sun, for Hermes. The slowest for time himself.⁶⁵

The planets were named because of their relationship to different aspects of the gods, and when later de-personified and applied to astrology, they would still keep the aspects once associated with their namesakes.⁶⁶ This discovery of the motions of the planets and naming them for the gods was the first step away from traditional, early Greek religion, for associating the gods with the planets helped to regularize them, apply rules to them, and to de-personify them, eventually leading to their abstraction into the symbols they represent in Plato⁶⁷ and in astrology.⁶⁸

Babylonian astronomy reached its peak around the 700's B.C.E. Soon after, changes came to Greek religion and astronomy beginning in the Greek colonies on the coast of Asia Minor, especially in the free-thinking city of Miletus.⁶⁹ The Milesian philosophers were the first to challenge the religiously accepted view of the cosmos, and put in its place ideas reasoned from a more-or-less scientific method—methods adopted from the practice of astronomy. Historians of science and philosophy look to Thales and his students as the originators of these new ideas in the western world,⁷⁰ but they were only continuing in the footsteps of earlier astronomers to understand the world they perceived and to make sense of it.⁷¹ The startling wonder of the ideas

⁶⁵ Ptolemy. Almagest. Great Books of the Western World, Vol. 16: Ptolemy, Copernicus, Kepler, ed. Robert Maynard Hutchins, trans. R. Catesby Taliaferro. Encyclopedia Britannica, Inc. © 1952.

⁶⁶ Jones, pg. 39.

⁶⁷ Heath, Thomas. Aristarchus of Samos: The Ancient Copernicus: A history of Greek astronomy to Aristarchus together with Aristarchus' treatise on the sizes and distances of the sun and moon, a new Greek text with translation and notes. Oxford, England: Clarendon Press © 1913, pg. 140.

⁶⁸ Lindsay., pg. 73-4.

⁶⁹ Allen, R.E., pg. 1.

⁷⁰ Ibid.

⁷¹ Heath., pg. 33.

generated by the Milesian philosophers is how quaint some of their notions seem, next to others that are surprisingly familiar and unexpected in the seventh century B.C.E. Anaximander believed in other inhabited worlds.⁷² Anaxagoras thought the Milky Way was made of stars⁷³ and that the sun was a red-hot mass reflecting its light off the moon so that the moon seemed to shine.⁷⁴ But the real arguments of the Milesians were not these specifics only, but that by observing and by reasoning we could determine things about the world without requiring a god's intervention. This is what makes them scientists, because "The gods did it" was not enough any longer.

This new, curious way of thinking was not enough to start a wholesale war between religion and astronomy, however. Not yet. Pythagoras was bent on reuniting them in the religious brotherhood he founded, giving mathematics—a discipline developed to understand astronomy—a mystical place in it.⁷⁵ The religious brotherhood Pythagoras founded was incredibly secretive. None of his writings survive. Fortunately for posterity, this union proved unstable. Only after the order was divided did information about their studies and advances leak out. Pythagoras' mystical beliefs about numbers—the number ten in particular—even led him to reorder his astronomical model, proposing a counter Earth and a spherical Earth.⁷⁶ These ideas were later incorporated into scientific advancements, though some of his ideas were hardly based on sound scientific reasoning, but instead on the mystical requirements he imposed.

⁷² Ibid., pg. 29-30.

⁷³ Ibid., pg. 84.

⁷⁴ Ibid., pg. 82-3.

⁷⁵ Ibid., pg. 46.

⁷⁶ Alioto, Anthony M. A History of Western Science, 2nd ed. Englewood Cliffs, NJ: Prentice Hall © 1993, pg. 38-9.

Plato arrived on the scene at a time of transition for Greek religion and certainly did nothing to slow it. Nor does he neglect the subject of astronomy, but addresses it in varying degrees in at least four of his dialogues: the Phaedrus, the Republic, Laws, and the Timaeus.⁷⁷ The thrust of Plato's argument changes somewhat with time. At first he seems to find the notion of populating the stars with farming and sailing images demeaning to the heavens⁷⁸ and prefers thinking about astronomy to actual observation, which he would prefer to discard for its imperfection.^{79 80} This view however changes in later dialogues. Perhaps influenced by one of his students, the astronomer Eudoxus, these later works expound the view that astronomy is not only important, but essential for moral development⁸¹ and a prerequisite for theology.^{82 83} Plato's anti-materialist views would come to greatly influence the development of Western Christianity despite the exhortation to his students to determine the true motions of the planets with mathematics that would account for their apparent motions.⁸⁴ This exhortation would be well-heeded in Hellenistic astronomy using the philosophical approach of Plato's most well-known student and critic, Aristotle.

⁷⁷ Heath.

⁷⁸ Bulmer-Thomas, Ivor. "Plato's Astronomy" Classical Quarterly, 1984, 34: 107-112.

⁷⁹ Heath., pg. 136-8.

⁸⁰ Pannekoek., pg. 102.

⁸¹ Plato. The Republic, Books I-V & VI-X, trans. Paul Shorey. Cambridge, Mass.: Harvard University Press © 1994, VII 527D-531A.

⁸² Lindsay., pg. 97.

⁸³ Pingree, David. "The Teaching of the Almagest in Late Antiquity", The Sciences in Greco-Roman Society, Barnes, Timothy D., ed. Edmonton, Alberta: Academic Printing and Publishing © 1994, pg. 79.

⁸⁴ Heath., pg. 140.

Aristotle is a prominent figure in modern histories of astronomy. Whatever ambivalence Plato felt for astronomy, Aristotle shared none of it. He wrote copiously about astronomy and astronomical phenomena in the Physics, On the Cosmos, On the Heavens, and others. It is from Aristotle that Ptolemy receives the view of concentric spheres with earth at the center,⁸⁵ and from whom he takes his arguments for that belief, a belief not based on what we would consider good scientific reasoning, but on the perfection of the sphere adopted from Pythagoras. And it was in this perfect zone of the heavens that he placed the gods and declared proof of their existence.⁸⁶ Aristotle's philosophy would have a lasting effect on both the development of western science and western religion including Christianity, and particularly on religious expression in the Hellenistic era.

Beginning with the Milesians and continuing through Plato and Aristotle, the effects of Babylonian and Egyptian influences had been growing in Greek thought. With the conquests of Alexander the Great, the Greek world was brought into even close contact with these influences and what developed was a unique Hellenistic culture and religious experience.⁸⁷ One of the most significant developments of this clash of cultures was the expansion and codification of astrology. Babylonian astrology, as noted previously, was used only to predict the future for rulers and their kingdoms, but now developed into a kind of astral religion⁸⁸ that could predict

⁸⁵ Ptolemy. Almagest. Great Books of the Western World, Vol. 16: Ptolemy, Copernicus, Kepler, ed. Robert Maynard Hutchins, trans. R. Catesby Taliaferro. Encyclopedia Britannica, Inc. © 1952.

⁸⁶ Aristotle. On the Heavens. Aristotle in Twenty-Three Volumes, Vol. VI, trans. W.K.C. Guthrie. Cambridge, Mass.: Harvard University Press © 1986, pg. 133.

⁸⁷ Martin, Luther H. Hellenistic Religions: An Introduction. NY: Oxford University Press © 1987.

⁸⁸ Luck., pg. 324.

the fates of everyone, based on the principle of cosmic sympathy.^{89 90} Despite this everyman approach, the mathematics necessary to the astronomy behind astrology would keep horoscope casting out of the hands of the average citizen and in the hands of specialized practitioners not unlike astrologer-priests.⁹¹ The astronomer Ptolemy was the first to codify the astronomical thought of his time in a complete treatise on the whole of the known universe. However, this was but the mathematical background for the predictive aspects of his model necessary for astrology, which he discusses in his four-part treatise on astrology Tetrabiblos. Astronomy, in the person of astrology, would have a profound influence on this age and would be adopted by Stoic philosophers, magicians and mystery religions alike.⁹²

The Hellenistic world was alive with religious experimentation, and besides such practices as astrology and magic, were the mystery religions.⁹³ The Mysteries of Demeter, Isis and Dionysus developed from the old gods of cultures now embracing the Hellenistic age.⁹⁴ Some of the mysteries like those of Demeter, were quite ancient, and had few astronomical ties.⁹⁵ The mysteries of Cybele and Mithras, with ancient roots in Persia and Syria, are examples of the kind of astronomical ties present throughout the Hellenistic period. Of the two, the more loosely connected were the Mysteries of Cybele. When the Carthaginian general Hannibal descended on

⁸⁹ Ibid.

⁹⁰ The concept of cosmic sympathy became extremely important in the Hellenistic practice of magic, which became highly attached to the moon goddesses from all over the Hellenistic world—something which often controlled many aspects of the magical rites, like timing (Luck).

⁹¹ Martin., pg. 434.

⁹² Luck.

⁹³ Meyer.

⁹⁴ Ibid., pg. 1-3.

⁹⁵ Ibid., pg. 17.

Italy, it was prophesied that bringing the Magna Mater (Cybele) to Rome would protect them and then they would be victorious over Hannibal.⁹⁶ This was done by bringing the large stone to Rome that was believed to be the Great Mother. What this stone was and why it was imbued with such power is not known, but speculations have been put forward that the stone was a meteorite.⁹⁷ This is not as unusual as it may seem at first and not unprecedented. A similar meteoric stone is at the center of the Islamic faith, carried over from the pagan religions of the area and still in the square at Mecca. The impact on a superstitious people's religious faith from a stone falling from heaven and certainly causing great destruction, is not difficult to associate with the presence of a god.

The mysteries of Mithras had a far deeper and far more prevalent debt to astronomy than this.^{98 99} This link to the astronomical is most evident in the mithraea.¹⁰⁰ The mithraea, the temples to Mithras, extended the symbology of the cosmos. They were dome-shaped or elliptical, often cut out of caves, in the shape of the heavens. Their icons bore images of the constellation Taurus and surrounding constellations.¹⁰¹ Mithras himself is often identified in the religious symbolism as both Orion and the Sun.¹⁰² The levels of initiation in the mysteries

⁹⁶ Ibid., pg. 114.

⁹⁷ Cumont, Franz Valery Marie. Astrology and Religion Among the Greeks and Romans. NY: Dover Publications © 1960.

⁹⁸ Meyer., pg. 200-1.

⁹⁹ Lindsay., pg. 114.

¹⁰⁰ Beck., pg. 112.

¹⁰¹ Martin., pg. 115-6.

¹⁰² North, J.D. "Astronomical Symbolism in the Mithraic Religion" Centaurus: International Magazine of the History of Mathematics, Science and Technology, 1990, 33: 115-148.

contained many of the astrological/astronomical symbols in the artwork remaining to us from the mithraea, particularly the same hunting metaphors prevalent in the constellations around Taurus.

The Romans, began much the same place as the Greeks. They had basically a primitive nature-based religion—though, they were somewhat more fond of personification, personifying such things as entryways and border markers. They came under the influence of western Greek colonies early, but did not interact much with the more eastern influences prominent in Greece until they conquered it, and then conquered Egypt, letting loose a flood of new, Hellenistic influence.¹⁰³ Cybele came to Rome at the close of the third century B.C.E. and by then, the Greek influence was quite strong. What can be said of Hellenistic Greeks was true, too, of the Romans. However, Roman connections between astronomy and religion were somewhat different than those of the Greeks, and some of the most significant ones played themselves out beginning in the Late Republic. Two of these specifically Roman connections involved Julius Caesar. At the time of Caesar's ambitious rise to power, the Roman calendar-making duties fell to the college of priests in Rome, calendar-making being an astronomical function. However, the system of a year with 355 days and adding a month whenever necessary proved too susceptible to corruption and the calendar had fallen off the seasonal year by several months.¹⁰⁴ Caesar seized this opportunity and bribed his way to an election as Pontifex Maximus. His reformed calendar—not of his own design—remained unchanged until the sixteenth century.¹⁰⁵ This calendar fix was really the last astronomical function left to the Roman priests.

¹⁰³ Crawford, Michael. The Roman Republic, 2nd ed. Cambridge, Mass.: Harvard University Press © 1992.

¹⁰⁴ Lindsay., pg. 231.

¹⁰⁵ Kamm, Antony. The Romans: An Introduction. NY: Routledge. © 1995, pg. 202-3.

The death of Caesar again brought Roman religion under the influence of astronomy, this time in the person of a comet.¹⁰⁶ In July the year Caesar died, Octavian returned to Rome to accept his inheritance and to hold funeral games for his uncle. In the western sky, two hours before sunset, a comet appeared, probably a previous visit of Comet Halley, visible even before the planet Venus, which would have joined it in the sky as the sun set.¹⁰⁷ The coincidences and probably with the encouragement of Octavian himself, were treated as a great religious sign and additionally, this sighting was interpreted somewhat differently than most comets.¹⁰⁸ Most comets were seen astrologically as quite sinister, typically as harbingers of death or famine.¹⁰⁹ Instead, this comet caused the Senate to deify Caesar, and thus begin a pattern of deifying emperors thereafter. The Senate was serious enough about this to build a temple to the deified Caesar in Rome.¹¹⁰ As nothing else, this was a direct causal relationship between an astronomical event and a shift in an earthly religion. Comets would not always receive such a reception. Even later emperors would fall victim to the ill-omens they were believed to represent.¹¹¹

Astronomical influence on religion was not limited to pagan religion, but as part of the fabric of the Hellenistic age, also effected early Christianity.¹¹² Some remnants of these early influences remain. The star of Bethlehem which is said to have foretold the birth of Jesus is one

¹⁰⁶ Ramsey, John T., and A. Lewis Licht. The Comet of 44 B.C. and Caesar's Funeral Games. Atlanta, GA: Scholars Press © 1997, pg. 12.

¹⁰⁷ Ibid., pg. 138.

¹⁰⁸ Ibid., pg. 61.

¹⁰⁹ Suetonius, Gaius Tranquillus. The Twelve Caesars, trans. Robert Graves, rev. Michael Grant. NY: Penguin Books © 1979, pg. 212.

¹¹⁰ Ramsey., pg. 56.

¹¹¹ Suetonius, pg. 212.

¹¹² Lindsay., pg. 349.

such example. The connection is further deepened by the presence of the Magi—astrologers—bringing gifts. Some modern astronomers have proposed several attempts at explanation, most involving the shifting of the date of Jesus' birth. All are speculation. However, the use of this legend as a sign of his work to come or favor from the divine is an example of the train of thought common at the time. Later Christianity also came to astronomy for some of its practice, if indirectly. The date of Christmas is celebrated around the time of the Winter Solstice, a time for festivals of the rebirth of the sun, adopted from pagan traditions, and then there is the date of Easter, based on the lunar calendar of the Jews and their date of Passover.¹¹³ Christianity, in the turmoil of persecutions, would come to power with the belief that pagan science, like paganism itself, should be eliminated. Christianity's victory would spell the death of astronomy (and much else) for more than a millennia.

The influence of astronomy and Greek and Roman religion was varied with time, intensity and outcome. The consequences of this influence was typically change. Change which sometimes benefited astronomy and religion both, and at times proved detrimental, but that this influence existed seems clear. We are a little like the Greeks, starrng at a planet wandering slowly against the background of fixed stars and wondering, what does this mean? In cultures with an awareness of the heavens, astronomy provokes the most varied and deepest reactions, and it is also plain to see that Western Christianity's divorce from astronomy is quite unusual and that for other religions, especially these ancient ones, they cannot be well-understood without understanding the influence of astronomy on them.

¹¹³ O'Neil., pg. 102-3.

Sources

Alioto, Anthony M. A History of Western Science, 2nd ed. Englewood Cliffs, NJ: Prentice Hall
© 1993.

Allen, Reginald E., ed. Greek Philosophy: Thales to Aristotle, 3rd ed. NY: Maxwell Macmillan
International © 1991.

Allen, Richard Hinckley. Star Names: Their Lore and Meaning. NY: Dover Publications, Inc.
© 1963.

Aristotle. On the Cosmos. Aristotle Vol. III, trans. D.J. Furley. Cambridge, Mass.: Harvard
University Press © 1992.

Aristotle. On the Heavens. Aristotle in Twenty-Three Volumes, Vol. VI, trans. W.K.C. Guthrie.
Cambridge, Mass.: Harvard University Press © 1986.

Aristotle. Physics. Aristotle: The Physics, Books I-IV & V-VIII, trans. Philip H. Wicksteed and
Francis M. Cornford. Cambridge, Mass.: Harvard University Press © 1996.

Barnes, Timothy D., ed. The Sciences in Greco-Roman Society. Edmonton, Alberta: Academic
Printing and Publishing © 1994.

Bulmer-Thomas, Ivor. "Plato's Astronomy" Classical Quarterly, 1984, 34: 107-112.

Cleomedes. De Motu Circulari Corporum Caelestium. ed. Robert Todd. Leipzig: BSB B.G.
Teubner Verlagsgesellschaft © 1990.

Crawford, Michael. The Roman Republic, 2nd ed. Cambridge, Mass.: Harvard University Press
© 1992.

Cumont, Franz Valery Marie. Astrology and Religion Among the Greeks and Romans. NY:
Dover Publications © 1960.

- Dicks, D.R. Early Greek Astronomy to Aristotle. Ithaca, NY: Cornell University Press © 1970.
- Genuth, Sara Schechner. “Astronomical Imagery in a Passage of Homer” Journal for the History of Astronomy, 1992, 23: 293-298.
- Graves, Robert. The Greek Myths. Mt. Kisco, NY: Moyer Bell Limited © 1988.
- Heath, Thomas. Aristarchus of Samos: The Ancient Copernicus: A history of Greek astronomy to Aristarchus together with Aristarchus’ treatise on the sizes and distances of the sun and moon, a new Greek text with translation and notes. Oxford, England: Clarendon Press © 1913.
- Hesiod. Hesiod, Homeric Hymns, Epic Cycle, Homeric, trans. Hugh G. Evelyn-White. Cambridge, Mass.: Harvard University Press © 1995.
- Homer. Iliad, Vol. I-II, trans. A.T. Murray. Cambridge, Mass.: Harvard University Press © 1993.
- Homer. Odyssey of Homer, trans. Richard Lattimore. NY: Harper Perennial © 1967.
- Hutchinson, Keith. “Why Does Plato Urge Rulers to Study Astronomy?” Perspectives on Science: Historical, Philosophical, Social, 1996, 4: 24-58.
- Hyginus. Poetica Astronomica. . Leipzig: BSB B.G. Teubner Verlagsgesellschaft © 1992.
- Jobs, Gertrude. Outer Space. NY: Scarecrow Press © 1964.
- Kamm, Antony. The Romans: An Introduction. NY: Routledge. © 1995.
- Kerenyi, Karl. Tochter der Sonne (Goddesses of the Sun and Moon: Circe, Aphrodite, Medea, Niboe), trans. Murray Stein. Irving, TX: Spring Publications © 1979.
- Lindsay, Jack. Origins of Astrology. NY: Barnes & Noble © 1971.
- Luck, Georg. Arcana Mundi: Magic and the Occult in the Greek and Roman Worlds. Baltimore: Johns Hopkins University Press © 1985.

Manilius, Marcus. Astronomicon, trans. G.P. Goold. Cambridge, Mass.: Harvard University Press © 1977.

Martianus Capella. De Astronomia, ed. James Willis. . Leipzig: BSB B.G. Teubner Verlagsgesellschaft © 1983.

Martin, Luther H. Hellenistic Religions: An Introduction. NY: Oxford University Press © 1987.

Meyer, Marvin W., ed. The Ancient Mysteries: A Sourcebook. NY: Harper & Row, Publishers © 1987.

Needham, Joseph, and Walter Pagel. Background to Modern Science. NY: The Macmillan Company © 1938.

Nicalacopoulos, P., ed. Greek Studies in the Philosophy and History of Science. Dordrecht: Kluwer Academic © 1990.

North, J.D. “Astronomical Symbolism in the Mithraic Religion” Centaurus: International Magazine of the History of Mathematics, Science and Technology, 1990, 33: 115-148.

North, John. Norton History of Astronomy and Cosmology. NY: W.W. Norton and Co. © 1995.

O’Neil, W. M. Early Astronomy from Babylonia to Copernicus. Sydney University Press © 1986.

Oxford English Dictionary, 2nd ed., Vol. XIII (Quemadero-Roaver), prep. J.A. Simpson, and E.S.C. Weiner. Oxford: Clarendon Press © 1989.

Pannekoek, Anton. A History of Astronomy. NY: Interscience Publishers © 1961.

Plato. The Republic, Books I-V & VI-X, trans. Paul Shorey. Cambridge, Mass.: Harvard University Press © 1994.

- Plato. Timaeus. Plato in Twelve Volumes, Vol. IX, trans. R.G. Bury. Cambridge, Mass.: Harvard University Press © 1989.
- Pr aux, Claire. La lune dans la pens e grecque. Bruxelles: Palais des Acad mies © 1970.
- Ptolemy. Almagest. Great Books of the Western World, Vol. 16: Ptolemy, Copernicus, Kepler, ed. Robert Maynard Hutchins, trans. R. Catesby Taliaferro. Encyclopedia Britannica, Inc. © 1952.
- Ptolemy. Tetrabiblos, trans. F.E. Robbins. Cambridge, Mass.: Harvard University Press © 1994.
- Ramsey, John T., and A. Lewis Licht. The Comet of 44 B.C. and Caesar’s Funeral Games. Atlanta, GA: Scholars Press © 1997.
- Ridpath, Ian. Star Tales. NY: Universe Books © 1988.
- Rogers, Frances. 5000 Years of Stargazing. Philadelphia & NY: J.B. Lippincott Company © 1964.
- Ronan, Colin A. Changing Views of the Universe. NY: Macmillan © 1961.
- Rougier, Louis. La religion astrale des pythagoriens. Monaco: du Rocher © 1984.
- Sesti, Giuseppe Maria. The Glorious Constellations: History and Mythology, trans. Karin H. Ford. NY: Abrams © 1991.
- Seutonius, Gaius Tranquillus. The Twelve Caesars, trans. Robert Graves, rev. Michael Grant. NY: Penguin Books © 1979.
- Simplicius of Cilicia. Corollarium De Loco. Ithaca, NY: Cornell University Press © 1992.
- Stahl, William Harris, and Richard Johnson with E.L. Burge. Martianus Capella and the Seven Liberal Arts, Vol. 1: The Quadrivium of Martianus Capella. NY: Columbia University Press © 1991.
- Taylor, A.E. A Commentary on Plato’s Timaeus. NY: Garland Publishers © 1987.

Thomas, Ivor, trans. Greek Mathematical Works, Vol. 1 & II. Cambridge, Mass.: Harvard
University Press © 1993.

Outline

I. Introduction

A. Thesis

B. A brief note on what is “religion”

C. History of Astronomy & Religion

1. Babylonia

2. Egypt

3. Elsewhere

a. China

b. New World

c. etc.

II. Astronomy in Greek Religion in the Classical Age

A. Early Greek Religion

1. Homer and Hesiod

a. gods of the sun and moon

b. Urania: the Muse of Astronomy

2. Before the Rise of Science

a. Cosmogies

b. Stars and Mythology

1. Stars

2. Constellations

3. Milky Way

c. The Planets and the Pantheon

B. The Effects of Philosophy

1. The Milesians

2. The Pythagoreans

3. Plato

a. Timaeus

b. The Republic

4. Aristotle
 - a. The Physics
 - b. On the Heavens
 - c. On the Cosmos

III. Astronomy in the Hellenistic Age

- A. Astrology
 1. Egyptian astrologers
 2. Ptolemy
- B. Mystery Religions
 1. Mysteries of Cybele
 2. Mysteries of Mithras

IV. Astronomy in Roman Religion

- A. Classical Roman Pantheon
 1. Greek Influence
 2. Hellenistic Influence
- B. Caesar and the Roman Emperors
 1. Comet of 44 B.C.
 2. Death Omens
 3. Julian Calendar

V. Conclusion

- A. Early Christian Astronomical Influences
 1. Star of Bethlehem
 2. Holidays
- B. Movement away from connections between Astronomy and Religion