

COSMOLOGICAL NARRATIVE IN THE SYNAGOGUES OF LATE ROMAN-BYZANTINE
PALESTINE

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in
partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department
of Religious Studies.

Chapel Hill
2020

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ABSTRACT

Bradley Charles Erickson: *Cosmological Narrative in the Synagogues of Late Roman-Byzantine Palestine*
(Under the Direction of Jodi Magness)

The night sky provided ancient peoples with a visible framework through which they could view and experience the divine. Ancient astronomers looked to the night sky for practical reasons, such as the construction of calendars by which time could evenly be divided, and for prognosis, such as the foretelling of future events based on the movements of the planets and stars. While scholars have written much about the Greco-Roman understanding of the night sky, few studies exist that examine Jewish cosmological thought in relation to the appearance of the Late Roman-Byzantine synagogue Helios-zodiac cycle. This dissertation surveys the ways that ancient Jews experienced the night sky, including literature of the Second Temple (sixth century BCE – 70 CE), rabbinic and mystical writings, and Helios-zodiac cycles in synagogues of ancient Palestine. I argue that Judaism joined an evolving Greco-Roman cosmology with ancient Jewish traditions as a means of producing knowledge of the earthly and heavenly realms.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to my adviser, Dr. Jodi Magness, and committee members, Drs. Zlatko Pleše, David Lambert, Jennifer Gates-Foster, and Maurizio Forte. Dr. Magness in particular provided critiques, suggestions, and encouragement throughout the writing and editing process. Without Dr. Magness, this project would not have been realized. I am fortunate to have worked with Dr. Magness and such a distinguished committee.

The research for this dissertation was made possible through a number of fellowships from the Carolina Center for Jewish Studies, the Digital Innovation Lab, and the Research Laboratories of Archaeology at the University of North Carolina at Chapel Hill. Apart from these organizations, I would have been unable to travel or afford the equipment needed to perform the digital analysis in this dissertation.

I also wish to thank Shua Kisilevitz and the Israel Antiquities Authority for providing me access to a number of archaeological sites where I was given the opportunity to make photogrammetric models.

A number of additional professors provided advice and served as sounding boards for my theory and methodology, including Drs. Joseph Lam, Erin and Robert Darby, Lauren Leve, and Bart Ehrman. I am thankful for their aid.

Perhaps the greatest thanks go to my parents and wife. My late father, Randy Erickson, and mother, Shannon Erickson, provided unyielding encouragement throughout my academic studies. Though my father passed away during my second year of graduate work at UNC, his

memory often provided the needed reassurance to keep working. I thank my wife for daily asking, “How was writing today?” and providing the motivation to finish.

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Chapter 1: Introduction

1.1 The Present Study

To date, depictions of a Helios-zodiac cycle have been discovered in the floor mosaics of nine ancient Palestinian synagogues: Na'aran, Beth Alpha, Huseifa, Susiya, Yafi'a, Hamath Tiberias, Sepphoris, Wadi Hamam, and Huqoq, with a tenth synagogue—En Gedi—that has names of the zodiac and months inscribed on its mosaic floor. While each Helios-zodiac cycle possesses unique features, the general appearance consists of a central medallion of the solar deity Helios surrounded by the cosmic iconography of Oceanus, a crescent moon, and stars.¹ A concentric circle, divided into twelve sections or medallions, surrounds the central medallion with each section containing a sign of the zodiac. The medallion and zodiac wheel are inscribed in a square panel with personifications of the seasons in the four interstitial corners.

The present study examines the appearance of the Helios-zodiac cycle in Late Roman-Byzantine Palestinian synagogues and the *cultural milieu* in which they were created.² The

¹ Oceanus is often depicted as a series of waves out of which Helios emerges on his journey across the sky. The crescent moon, when depicted, is always in the waxing-crescent lunar phase except for Beth Alpha, where the moon is portrayed as a waning crescent. The stars that surround Helios likely depict a heavenly backdrop, but in some synagogues discussed in Chapter 3, a larger, distinct star next to Helios may depict the morning star Phosphorous/planet Venus.

² In this dissertation, I use the term Late Roman to denote the fourth-fifth centuries, and the term Byzantine to denote the sixth-early seventh centuries in Palestine. Unless otherwise stated, all dates refer to the Common Era.

primary goals are (1) to identify narratives of Jewish cosmological thought/practice, (2) to contextualize the synagogue Helios-zodiac cycles with Jewish cosmological thought/practice and comparable Greco-Roman material, and (3) to examine archaeoastronomical evidence for synagogue orientation and the appearance of the Helios-zodiac cycle. I demonstrate that these synagogue congregations combined Greco-Roman astronomical knowledge with Jewish traditions to create uniquely Jewish cosmological narratives. In other words, Jews were active participants in the development of what is often viewed as Greco-Roman astronomy.

I build my argument by examining Jewish and Greco-Roman literary sources and material culture. To arrive at the conclusion, special attention is given to Greco-Roman astrological and astronomical sources, especially Helios-zodiac designs found in Mithraea and zodiac astrology boards. In my concluding chapter, I consider why Helios-zodiac cycles are found in ancient Palestinian synagogues but not in contemporary Christian churches.

In the remainder of this chapter, I provide a brief description of astronomical and astrological terminology used throughout the work, summarize the history of synagogue scholarship noting my dissertation's contribution to the field, present the digital methodology behind my work, and outline the chapters following the introduction.

1.2 Terminological Considerations

Throughout this study, I use the terms astronomy and astrology in a technical sense. Astronomy is the predictable, mathematical motion of celestial objects whereas astrology is the influence upon/by celestial objects on people and earthly events. The dual distinction of astronomy and astrology is made by Ptolemy of Alexandria, a first-century astronomer. In the introduction to his astrological treatise, *Tetrabiblos*, Ptolemy writes,

Of the means of prediction through astronomy, O Syrus, two are the most important and valid. One, which is first both in order and in effectiveness, is that whereby we apprehend the aspects of the movements of sun, moon, and stars in relation to each other and to the earth, as they occur from time to time; the second is that in which by means of the natural character of these aspects themselves we investigate the changes which they bring about in that which they surround.³

In this study, I operate with Ptolemy's vocabulary for describing the study of the sky, although not all ancient astronomers/astrologers made such clear distinctions. Astronomy refers to the mechanical motions of celestial bodies, including the sun, moon, planets, stars, and comets. Astrology refers to the influence that these movements have on the earth.

The celestial zodiac, in a technical sense, is composed of twelve 30-degree divisions of the night sky that form a 20-degree band through which the sun, moon, and planets appear to move throughout the year. The ecliptic, which occupies the center of the 20-degree zodiac band, creates an imaginary plane that sits co-planar to the Earth's orbit of the sun. The movement of the earth around the sun gives the impression that the sun, moon, and planets all move within 10 degrees to either side of the ecliptic, hence the 20-degree band. The twelve discrete sections of the zodiac are named after constellations that fall within each respective zodiac region. Some zodiac constellations, however, take up more space than their 30-degree division.

1.3 History of Scholarship

Louis-Hugues Vincent and Charles Clermont-Ganneau discovered the first Helios-zodiac

³ Ptolemy of Alexandria, *Tetrabiblos*, trans. Frank Egleston Robbins, LCL 435 (Cambridge, Mass: Harvard University Press, 2015), 1.1.

cycle in the synagogue of Na'aran in 1921.⁴ Eliezer Sukenik brought a second Helios-zodiac cycle to light in 1928 in the mosaic floor of the Beth Alpha synagogue. Concerning the discoveries at Na'aran and Beth Alpha, Sukenik wrote:

We see here pictorial expression of belief in the influence of the planets on the affairs of this world. Even Judaism could not withstand this universal influence which permeated all religions and peoples in the ancient world...even the sages of Israel were addicted to it.⁵

Sukenik believed the synagogue Helios-zodiac cycle demonstrated an acceptance of astrological practice/thought in Judaism. In support of his argument, Sukenik referenced the existence of astrological discourse in Josephus, rabbinic literature, and *piyyutim*.⁶ Sukenik did not, however, offer an interpretation of the Helios-zodiac cycle within the larger framework of the Beth Alpha mosaic floor nor did he explain how the Helios-zodiac cycle was viewed by synagogue congregants.

Erwin Goodenough was the first scholar to consider the Helios-zodiac cycle as indicative of Jewish practice. In a multi-volume work published from 1953—1968, Goodenough argued that the Helios-zodiac cycle was one set among many symbols that evidenced a Hellenized,

⁴ See Vincent and Pierre Benoit, "Un Sanctuaire dans la Région de Jéricho: La Synagogue de Na'arah," *Revue Biblique* 68, no. 2 (April 1961): 161-177; Vincent, "Le Sanctuaire Juif D' 'Aïn Douq," *Revue Biblique* 16, no. 3/4 (October and July 1919): 442-443; Vincent, "La Synagogue de Noarah," *Revue Biblique* 30, no. 4 (October 1921): 579-601; Clermont-Ganneau, "New Hebrew Mosaic Unearthed by Turkish Shell: Palestine Campaign Echo," *Times (of London)*, Friday, October 10, 1919.

⁵ Sukenik, *The Ancient Synagogue of Beth Alpha: An Account of the Excavations Conducted on Behalf of the Hebrew University, Jerusalem* (Piscataway, NJ: Georgias Press, 2007), 56.

⁶ Sukenik, *Beth Alpha*, 56-57.

mystical form of Judaism which arose in opposition to the “literary” rabbinic Judaism of late antiquity.⁷ Goodenough’s interpretation was significant as it complicated the traditional view of the mid-twentieth century that a single form of rabbinic Judaism was practiced throughout ancient Palestine.⁸

Goodenough’s theory was challenged by several scholars. The most direct argument against Goodenough’s thesis was made by Ephraim Urbach, who used material culture and rabbinic literature to argue that rabbinic Judaism had become diverse enough for the rabbis to allow figured images—such as Helios—in synagogues.⁹ Michal Avi-Yonah argued against Goodenough’s interpretation of the synagogue Helios-zodiac cycle and suggested that it represents a calendar of the 24 priestly courses from 1 Chron 24.¹⁰ Avi-Yonah further argued that the Helios-zodiac cycle is compatible with rabbinic *halakha* and is not indicative of non-rabbinic Judaism.¹¹ Rachel Hachlili, a student of Avi-Yonah’s, supports a calendrical interpretation of the Helios-zodiac cycle. Hachlili interprets each zodiac sign within the cycle as a month while Helios and the moon depict a day-night cycle.¹² Hachlili argues for a regional

⁷ Goodenough, *Jewish Symbols in the Greco Roman Period: Abridged Edition*. Edited by Jacob Neusner (Princeton, NJ: Princeton University Press, 1988), 59-62.

⁸ Goodenough, *Jewish Symbols*, 12-13.

⁹ Urbach, “The Rabbinical Laws of Idolatry in the Second and Third Centuries in the Light of Archaeological and Historical Facts,” *Israel Exploration Journal* 9, nos. 3-4 (1959): 149-165, 229-45.

¹⁰ Avi-Yonah, “The Caesarea Inscription of the Twenty Four Priestly Courses,” in *The Teacher’s Yoke: Studies in Memory of Henry Trantham* (Waco: Baylor University Press, 1964), 55-56.

¹¹ Avi-Yonah, “Caesarea,” 57.

¹² Hachlili, *Ancient Synagogues - Archaeology and Art: New Discoveries and Current Research*

typology of synagogue Helios-zodiac motifs, suggesting they originated from an “Antioch school” of design that used similar images to depict an agricultural calendar.¹³

Beyond the calendrical school of thought, Gideon Foerster—another of Avi-Yonah’s students—understands the Helios-zodiac cycle to have served as a visual guide to liturgical prayer in the synagogue.¹⁴ Ehud Netzer and Ze’ev Weiss have offered a symbolic interpretation of the Helios-zodiac cycle in the Sepphoris synagogue, suggesting that it represents God’s creative power within a larger narrative of redemption.¹⁵

Another school of thought interprets the figure of Helios as a divine being. Morton Smith suggested that Helios represents an angelic figure who occupies the fourth level of heaven in 2 Enoch, *Sepher Ha’Razim*, and the Greek Apocalypse of Baruch.¹⁶ Jodi Magness has argued that Helios is the “super-angel” Metatron found in 3 Enoch, the Babylonian Talmud, and the Apocalypse of Zerubbabel based on a contextual analysis with Late Roman-Byzantine art, architecture, and literature.¹⁷ Luce Wadeson has argued that Helios represents Elijah in the

(Leiden: Brill, 2014), 236.

¹³ Hachlili, “The Zodiac in Ancient Jewish Synagogal Art: A Review,” *Jewish Studies Quarterly* 9, no. 3 (2002): 236.

¹⁴ Foerster, “The Zodiac in Ancient Synagogues and Its Place in Jewish Thought,” *Eretz Israel* 19 (1988): 231-233.

¹⁵ Netzer and Weiss, *Power and Redemption: A Synagogue Mosaic from Sepphoris* (Jerusalem: Israel Museum), 35-37.

¹⁶ Smith, “Helios in Palestine,” *Eretz-Israel* (1982): 209-210.

¹⁷ Magness, “Heaven on Earth: Helios and the Zodiac Cycle in Ancient Palestinian Synagogues,” *Dumbarton Oaks Papers* 59 (2005): 31-32.

divine chariot.¹⁸ Martin Goodman has suggested that Helios is the God of the Jews, arguing that in any other context, such representation of a divine being would be interpreted as the central deity of the people who occupied the building.¹⁹

Debates on the nature and interpretation of the Helios-zodiac cycle reflect a larger chronological debate within synagogue studies. In the early twentieth century, Heinrich Kohl and Karl Watzinger suggested the second–third centuries as a logical period for the construction of monumental Galilean synagogues. They argued that Galilean Judaism during this period flourished under the guidance of Rabbi Judah Ha-Nasi.²⁰ Sukenik, following his excavation of Beth Alpha, added a second synagogue type—apsidal synagogues—comparable to churches built in the Late Roman-Byzantine period.²¹

Avi-Yonah synthesized the work of Kohl, Watzinger, and Sukenik and argued for a threefold typology.²² Avi-Yonah identified synagogues with basilica design and three-door, Jerusalem-facing facades as “early” (Galilean) synagogues dating to the second-to-third

¹⁸ Lucy Wadeson, “Chariots of Fire: Elijah and the Zodiac in Synagogue Floor Mosaics of Late Antique Palestine,” *ARAM* 20 (2008): 1-41.

¹⁹ Goodman, “The Jewish Image of God in Late Antiquity,” in *Judaism in the Roman World: Collected Essays* (Boston: Brill, 2006), 205-218.

²⁰ Kohl and Watzinger, *Antike Synagogen in Galilaea* (Osnabrück: Otto Zeller, 1975), 138.

²¹ Sukenik, *Ancient Synagogues in Palestine and Greece* (London: British Academy, 1934), 27-37.

²² Avi-Yonah, “Synagogue,” *Encyclopedia of Archaeological Excavations in the Holy Land* (Englewood Cliffs, N.J.: Prentice-Hall, 1978), 1129-1138; Avi-Yonah, “Synagogue Architecture in the Classical Period,” in *Jewish Art: An Illustrated History*, ed. Cecil Roth (New York: McGraw-Gill, 1961), 155-190.

centuries.²³ Following this early style of synagogue architecture was a “transitional” (broadhouse) that exhibited features from the “early” and “late” synagogues. Avi-Yonah dated the “transitional” synagogue to the third-to-fourth centuries.²⁴ This was followed by the “late” synagogue, dating to the fifth-to-sixth centuries, which include features such as a forecourt, narthex, and a Jerusalem-facing apse, similar to contemporary churches.²⁵

Avi-Yonah’s typology was widely accepted until the excavation of the Capernaum synagogue in the 1960s, when thousands of fourth and fifth-century coins were discovered in sealed contexts beneath the floor and in the foundations.²⁶ Because the Capernaum synagogue is a basilica without an apse, and it has a three-door, Jerusalem-facing facade, it should be an “early” synagogue dating to the second-to-third centuries. Stanislaw Loffreda, one of the excavators who published the Capernaum synagogue, cites Avi-Yonah’s strict adherence to the synagogue typology in the face of contrary evidence at Capernaum.²⁷ Avi-Yonah argued that even though the Capernaum synagogue contained material suggesting a Late Roman date, its overall architectural design indicates it belongs to the second-to-third centuries.²⁸

Though the Capernaum synagogue excavation brought Avi-Yonah’s typology into

²³ Avi-Yonah, “Synagogues,” 1129-1130; “Synagogue Architecture,” 158-173.

²⁴ Avi-Yonah, “Synagogues,” 1130-1131; “Synagogue Architecture,” 173-175.

²⁵ Avi-Yonah, “Synagogues,” 1131-1132; “Synagogue Architecture,” 175-176.

²⁶ Virgilio Corbo, *La Sinagoga di Cafarnaon*, 126-139; Stanislaw Loffredo, “The Late Chronology of the Synagogue of Capernaum,” *Israel Exploration Journal* 23, no. 1 (1973): 37.

²⁷ Loffredo, “Late Chronology,” 37.

²⁸ Avi-Yonah, “Synagogue Architecture,” 165.

question, some archaeologists, such as Gideon Foerster, rejected evidence contrary to Avi-Yonah's typology.²⁹ Carol and Eric Meyers have argued in favor of Avi-Yonah's synagogue typology based on their excavations of "Galilean type" synagogues at Khirbet Shem'a, Meiron, Gush Halav, and Nabratein, which they date to the second–third centuries.³⁰ Magness has argued for a later date for each of the Meyers's synagogues, re-dating them to the fourth or fifth century based on site stratigraphy, ceramics, and numismatics.³¹ Magness has further questioned the validity of using presumed regional earthquake dates for dating destruction layers.³² Uzi Leibner recently published the excavation report of Wadi Hamam and argued that the Wadi Hamam synagogue is a "Galilean type" synagogue dating to an earlier period. Leibner

²⁹ See Foerster, "Notes on Recent Excavations at Capernaum," in *Ancient Synagogues Revealed*, ed. Lee I. Levine (Jerusalem: Israel Exploration Society, 1981), 57-59.

³⁰ See Eric Meyers, M., A. Thomas Kraabel, and James F. Strange, *Ancient Synagogue Excavations at Khirbet Shema', Upper Galilee, Israel 1970-1972* (Durham, NC: Duke University Press, 1976); Eric Meyers, Strange, and Carol Meyers, *Excavations at Ancient Meiron, Upper Galilee, Israel, 1971-72, 1974-75, 1977* (Cambridge, Mass: American Schools of Oriental Research, 1981); Meyers, Meyers, and Strange, *Excavations at the Ancient Synagogue of Gush Halav* (Winona Lake, Ind: Eisenbrauns, 1990); Eric Meyers, Gabriela Bijovsky, and Carol Meyers, *Excavations at Ancient Nabratein Synagogue and Environs* (Winona Lake, Ind: Eisenbrauns, 2009).

³¹ See Magness, "Synagogue Typology and Earthquake Chronology at Khirbet Shema', Israel." *Journal of Field Archaeology* 24, no. 2 (1997): 211-20; Magness, "The Ancient Synagogue at Nabratein." *Bulletin of the American Schools of Oriental Research*, no. 358 (2010): 61-68; Magness, "A Response to Eric M. Meyers and James F. Strange," in *Judaism in Late Antiquity, Part III: Where We Stand: Issues and Debates in Ancient Judaism, Volume 4: The Special Problem of the Synagogue*, eds. Edited by Alan J. Avery-Peck and Jacob Neusner (Leiden: Brill, 1999), 79–91; Magness, "The Question of the Synagogue: The Problem of Typology," in *Where We Stand: Issues and Debates in Ancient Judaism* (Leiden, The Netherlands: Brill, 2001): 1-48.

³² See Magness, "Synagogue Typology and Earthquake Chronology, 219.

discounts any evidence that might suggest a Late Roman date.³³

Magness, in a review of the Nabratein synagogue report, summarizes what is at stake in the synagogue typology.³⁴ If there is an early “Galilean type” synagogue, it means that post-Constantinian monumental Christian churches were inspired by synagogue architecture and art. If monumental synagogues were first constructed in the fourth century, it would mean that monumental synagogues developed alongside monumental churches or that synagogues were influenced by church architecture.

The current study supports a Late Roman-Byzantine (fourth–seventh century) date for the synagogues at Na’aran, Beth Alpha, Huseifa, Susiya, Hamat Tiberias, Sepphoris, Wadi Hamam, Yafia, En Gedi, and Huqoq. At Beth Alpha, an inscription mentioning the emperor Justin indicates that the mosaic was laid in the sixth century, either during the reign of Justin I (r. 518-527) or Justin II (r. 565-574).³⁵ The remaining synagogues are not so easily dated. In Chapter 3, I survey the remains of each synagogue containing a Helios-zodiac cycle to establish their dates. The synagogue dates are important to the present study for two reasons: (1) I argue that the depictions of Helios, the zodiac, and the seasons reflect similar literary descriptions and artistic

³³ For example, Leibner says because 14 of 568 sherds of “Byzantine pottery” were found while digging shovel-test probes, the low occurrence of Byzantine pottery can be discounted. Leibner, *Khirbet Wadi Hamam: A Roman Period Village and Synagogue in the Lower Galilee*, Qedem Reports 13 (2019), 8. For a critique of the Wadi Hamam excavation report, see Jodi Magness, Review of “Khirbet Wadi Ḥamam, A Roman-Period Village and Synagogue in the Lower Galilee, edited by Uzi Leibner,” *Journal for the Study of Judaism* 50, 3: 427-430.

³⁴ See Magness, *The Archaeology of the Holy Land: From the Destruction of Solomon's Temple to the Muslim Conquest* (Cambridge: Cambridge University Press, 2012), 308-309.

³⁵ See Sukenik, *Beth Alpha*, 57-58.

portrayals of the Late Roman period and (2) I argue that the architecture of certain synagogues may have been intentionally aligned with astral phenomenon in a fashion similar to public basilicas and Late Roman churches.

Aside from the issue of the Helios-zodiac cycle, a limited number of studies have been conducted on Jewish engagement with astronomy and astrology. The first scholar to consider seriously ancient Jewish use of astronomy and astrology was James Charlesworth. In 1977, Charlesworth responded to an article written by Manfred Lehmann in which Lehmann had argued for a normative ancient Jewish practice, and that any use of astrology was a minor sectarian phenomenon.³⁶ In contrast, Charlesworth believed that Greco-Roman astrological thought permeated Judaism and was not relegated to sectarian groups.

While Charlesworth rightly considered evidence of Jewish use of astronomy and astrology as indicative of practice, he viewed Jewish astronomy and astrology as wholly borrowed from Greco-Roman sources.³⁷ In this study, I argue that Judaism developed its own astronomical and astrological narratives in the same fashion as Greco-Roman astronomy and astrology—by building on what others believed while integrating new ideas to make astronomical and astrological knowledge distinctly unique.

The most prolific area of scholarship dealing with Jewish astronomy and astrology relates

³⁶ Lehman, “New Light on Astrology in Qumran and the Talmud,” *Revue de Qumrân* 8, no. 4 (32) (1975): 599-602; and James Charlesworth, “Jewish Astrology in the Talmud, Pseudepigrapha, the Dead Sea Scrolls, and Early Palestinian Synagogues,” *Harvard Theological Review* 70, no. 3 (July - October 1977), 183.

³⁷ Charlesworth, “Jewish Astrology,” 183-200.

to the calendrical and horoscopic texts found among the Dead Sea Scrolls. In 1957, Józef T.

Milik dedicated a paragraph to a scroll that mentioned zodiac signs:

Un genre littéraire bien connu par les tablettes babyloniennes est celui des horoscopes. Deux colonnes fragmentaires de la grotte 4 indiquent les signes du zodiaque se référant aux divers jours du mois.³⁸

Beyond mentioning the scroll's existence, however, Milik did not offer further interpretation.

Over the past twenty years, scholars have begun to address the astrological texts from Qumran. Mathias Albani believes the Qumran community did not practice horoscopic astrology, although astrological texts were kept in the community's literary collection.³⁹ Helen Jacobus has provided the most thorough analysis of calendrical and astrological texts in the Dead Sea Scrolls. She shows that the Qumran community was concerned with astrological practices and that certain scrolls provided a template for interpreting the impact celestial and natural phenomenon had on an individual's life.⁴⁰

Outside of Qumran and the Dead Sea Scrolls, Kocku von Stuckrad has surveyed a range of Jewish and Christian texts, arguing that both traditions joined extant astrological practices with religious identities.⁴¹ Annette Yoshiko Reed has written about the tension between

³⁸ Milik, *Dix Ans de Découvertes dans le Désert de Juda* (Paris: Éditions du Cerf, 1957), 38.

³⁹ See Albani, "Horoscopes in the Qumran Scrolls," *The Dead Sea Scrolls After Fifty Years*, vol. 2, eds. James VanderKam and Peter Flint (Leiden: Brill, 1999), 317-319; Albani, "Horoscopes," *Encyclopedia of the Dead Sea Scrolls*, ed. Lawrence Schiffman and James VanderKam (Oxford: Oxford University Press, 1994), 370-373.

⁴⁰ Jacobus, *Zodiac Calendars in the Dead Sea Scrolls and Their Reception* (Leiden, The Netherlands: Brill, 2015); "4Q318: A Jewish Zodiac Calendar at Qumran?" In *Studies on the Texts of the Desert of Judah* 90 (Leiden: Brill, 2010).

⁴¹ See Stuckrad, *Das Ringen um die Astrologie: Jüdische und christliche Beiträge zum antiken*

Josephus's dual portrayal of Abraham as a Chaldean "scientist" and the progenitor of Judaism who rejects astrology. Reed argues that Josephus's cultural context led him to celebrate Abraham's contribution to ancient wisdom while rejecting Jewish engagement with first-century Greco-Roman astrology.⁴²

A largely unexplored method for analyzing Jewish astronomy and astrology and the appearance of the Helios-zodiac cycle in the synagogue is archaeoastronomy, which contextualizes material culture with how past cultures understood phenomena in the sky. The field of archaeoastronomy was born in 1963 when Gerald Hawkins presented his findings of the alignment of Stonehenge orthostats and ground depressions with celestial phenomena in the journal *Nature*.⁴³ While Hawkins used the term "astro-archaeology," the term "archaeoastronomy" has become normative as it places emphasis on the archaeological method of such studies.⁴⁴

In this study, I perform a basic archaeoastronomical analysis of synagogues known to have contained Helios-zodiac cycles, looking primarily at the relation of their architecture to the

Zeitverständnis (New York: Walter de Gruyter, 2000), and "Jewish and Christian Astrology in Late Antiquity—A New Approach," *Numen* 47/1 (2000): 1–40.

⁴² Reed, "Abraham as Chaldean Scientist and Father of the Jews: Josephus, 'Ant.' 1.154-168, and the Greco-Roman Discourse about Astronomy/Astrology," *Journal for the Study of Judaism in the Persian, Hellenistic, and Roman Period* 35, no. 2 (2004): 119-58.

⁴³ Hawkins, "Stonehenge Decoded," *Nature* 200 (1963): 306–308.

⁴⁴ For a discussion of the use of the term archaeoastronomy, see José Celdrán, "Foreword," in *Archaeoastronomy in the Roman World*, eds. Giulio Magli et al. (Switzerland: Springer, 2019), i-xvi.

sun. My methodology for conducting this analysis is presented in the next section. A step-by-step explanation of the digital portion of the archaeoastronomical analysis can be found in the appendix together with links to access the digital data.

1.4 Digital Methodology

The digital portion of the current study tests for the archaeoastronomical alignment of the synagogue with astral phenomenon. To accomplish this archaeoastronomical analysis, I conducted the following procedure:

1. Created 3D models of the eight synagogues containing Helios-zodiac cycles.
2. Imported each model into the open-source planetarium software Stellarium.
3. Oriented and positioned each synagogue with its correct latitude, longitude, and elevation.
4. Simulated the night sky for a given year when the synagogue would have stood.

A major component of the first step—creating 3D models—was rendering images of each synagogue’s mosaic floor to test for astronomical alignment with the Helios-zodiac cycle iconography. Because no holistic, high-detailed images existed for any of the mosaic floors, I made photogrammetric models of accessible synagogues.⁴⁵ Photogrammetry is a process by which an object or space can be spatially mapped with two-dimensional data. For the accessible synagogues, I created scalable 3D models of synagogue remains from which the mosaic floor

⁴⁵ For the methodology of creating the synagogue photogrammetric models, see Bradley Erickson, "Synagogue Modeling Project Report: A Multifaceted Approach to 3D, Academic Modeling," in *Ancient Manuscripts in Digital Culture: Visualisation, Data Mining, Communication*, eds. Hamidović David, Clivaz Claire, and Savant Sarah Bowen, Marguerat Alessandra (Boston: Brill, 2019): 261-76.

could be exported as a texture. These textures were then imported to the 3D models and the planetarium software. The accessible synagogues for which I made photogrammetric models include Beth Alpha, Hammath Tiberias, Sepphoris, and Huqoq. The Na'aran synagogue was reburied following excavation, and the synagogues at Huseifa and Susiya were inaccessible during my research trips to Israel. Portions of the surviving mosaic of the Wadi Hamam synagogue are currently displayed in the Israel Museum and the synagogue itself has been reburied. For inaccessible synagogues (i.e. Na'aran, Huseifa, Susiya, Yafia and Wadi Hamam) I relied on published photographs and drawings of the mosaic floor instead of creating my own.

The results of the digital study offer new insights into synagogue architecture and the Helios-zodiac cycle. For example, the Beth Alpha synagogue is only preserved to a variable height of 0.55—1.65 m. If there was a window in the back of the apse wall between 3.5—4.5 m above ground level, the sunlight through this window would have struck the Helios medallion on the winter solstice. I discuss the archaeoastronomical analysis in detail in the third chapter where I analyze each synagogue individually.

1.5 Chapter Summaries

The remaining chapters consist of the following:

In chapter two, I survey Jewish literature dealing with astronomical and astrological knowledge. I subdivide my survey into the following categories: historical, calendrical, astrological, and cultic. The survey shows that ancient Judaism had a range of concerns in dealing with the cosmos.

In chapter three, I survey Late Roman-Byzantine (fourth–seventh century) Palestinian synagogues containing Helios-zodiac cycles. I describe each aspect of the Helios-zodiac cycle,

including the direction of its progression (i.e. clockwise or counter-clockwise) and how each zodiac sign within the cycle aligns with the season under which it sits. Special attention is given to the dating of each synagogue and to the orientation of the building's architecture as it relates to the movement of the sun. In this chapter, I use astronomical data generated from each synagogue's geo-coordinates, orientation, and archaeological remains. I also contextualize the iconography of the Helios-zodiac cycle with contemporary literature, such as the descriptions of Helios, Oceanus, and the Horai (seasonal goddesses) in the third-to-fourth century Greek epic *Dionysiaca*.

In chapter four, I analyze the wider context of how Helios-zodiac cycles were used in the Greco-Roman world including in domestic structures, cultic settings, Mithraea, and astrology boards.

In the concluding chapter, I argue that the synagogue Helios-zodiac cycle represents a *thema mundi*—the location of the cosmos at the moment of creation—with emphasis on the Temple Mount as the axis of the cosmos. I contextualize my argument with evidence of cosmic veneration in Judaism, Christianity, and Greco-Roman religious traditions.

We now turn to the survey of Jewish engagement with astronomical and astrological knowledge.

Chapter 2: Literary Landscape of Ancient Jewish Astronomy and Astrology

In this chapter, I survey the literary landscape of ancient Jewish engagement with astronomical and astrological narrative. The survey includes texts from the Hellenistic through Rabbinic periods of Mesopotamia, Palestine, and Egypt. The goal of this survey is not to be exhaustive but to display the range of beliefs as well as the development of those beliefs that ancient Jews held about the cosmos. This chapter is a necessary prolegomenon to a discussion of the appearance of zodiac imagery in ancient synagogues. We can only begin to understand the narratives embodied by synagogue zodiacs by first understanding through extant literature how the zodiac and night sky were perceived by ancient Jews. I have broken the literary survey into four sections: historical, calendrical, astrological, and cultic.¹ While each section contains its own short introduction explaining its necessity and setting the stage for the discussion of the texts therein, I provide a summary of the argument made in each section below.

In the historical section, I outline three traditions that herald Enoch, Seth, and Abraham, respectively, as the fathers of astronomical knowledge. I argue that once astronomical knowledge, likely inherited from Babylon, was established in Judaism, it was important for Hellenistic and Roman Jewish authors to view one of their own ancestors as the progenitor of that knowledge.

¹ These four divisions are my own to better organize the discussion. Certain texts contained within one section could just as easily be discussed in a separate section.

In the calendrical section, I survey the varied means of reckoning calendars in ancient Mesopotamia, Greece, and Egypt to argue that the calendrical tradition and thus the means of interpreting the night sky were inherited dually from Babylon and Egypt. I also examine the different calendrical systems at play in ancient Judaism, notably the solar calendar shared by *I Enoch*, *Jubilees*, and the Dead Sea Scrolls (DSS).

In the astrological chapter, I examine pseudepigrapha, DSS, rabbinic literature, and the *Sepher Ha-Razim* to trace different methods of ancient Jewish views of how the movements of the sky affected/were affected by the earth.

In the cultic section, I examine descriptions of the temple and temple implements as reflecting cosmic heavenly realities in the writings of Philo and Josephus.

In the conclusion to the chapter, I synthesize the many currents of ancient Jewish astronomical and astrological thought to set the stage for the discussion of the use of cosmological narrative in ancient synagogues. We now turn to the first category of astronomical and astrological thought: the Hellenistic to Early Roman Jewish concern of establishing a patriarchal figure as the father of cosmic knowledge.

2.1 Historical

Though many ancient historians did not engage with astronomical or astrological practices directly, they did discuss where and how these practices began. Diodorus Siculus, a first-century BCE Greek historian, argued that astrology originated in Egypt and was further

developed in Babylon once Egyptians moved and brought their practices to Chaldea.² The first-century BCE Roman statesman Cicero referred to astrology as originating in Babylon and being an inferior practice to that of astronomy.³ In *Natural Histories*, the first-century historian Pliny the Elder suggested that the Greek Titan Atlas invented astrology or that astrology was discovered in the kingdom of Egypt or Assyria and brought to Greece.⁴

A key feature of Greco-Roman astronomy and astrology is that cosmological knowledge is gained through observation. In ancient Jewish thought, it is not through observation but direct revelation that humans gain knowledge of the cosmos, with the exception of one story from Josephus regarding Abraham, which I discuss below.

Three extant traditions claim Jewish forefathers as the progenitors of astronomical knowledge. In the books of *1 Enoch* and *Jubilees*, the figure of Enoch is presented as having received visions of the movements of the heavenly bodies and subsequently passing that knowledge on to his descendants. In one section of Josephus' *Antiquities of the Jews* (*Antiquities*) and certain Gnostic traditions, Seth is identified as the person to whom God

² Diodorus Siculus, *The Library of History*, trans. C.H. Oldfather, LCL 279 (Cambridge, MA: Harvard University Press, 2015), 1.81.6.

³ Cicero never defines the terms “astronomy” and “astrology,” though based on context, they are similar to Ptolemy’s definition discussed in Chapter 1 wherein “astronomy” is the movement of the stars and “astrology” is the effect those movements have on the earth. Cicero, “On Divination,” in *On Old Age, On Friendship, On Divination*, trans. W.A. Falconer, *Loeb Classical Library 154* (Cambridge, MA: Harvard University Press, 2015), 2.87.

⁴ Pliny the Elder, *Natural History*, trans. H. Rackham, *Loeb Classical Library 330* (Cambridge, MA: Harvard University Press, 2015), 1.57.

another.⁸ The LXX is not the only work to interpret Enoch as having been transported to heaven instead of dying. In *Antiquities*, Josephus says that “Enoch lived 365 years and then returned to the divinity, whence it comes that there is no record in the chronicles of his death.”⁹ He does not discuss Enoch beyond this reference to the Genesis genealogy.

During the Hellenistic period, a literary tradition developed around the figure of Enoch. *1 Enoch* states that Enoch had visions of heaven and even traveled between the heavens.¹⁰ The text of *1 Enoch*, however, does not indicate what happened to Enoch following his visionary journeys. In two further Enochic works that rely on material from *1 Enoch*, which are often titled *2 Enoch* and *3 Enoch*, Enoch is brought to heaven to reside there permanently.¹¹ *3 Enoch*, which dates to the fifth century, tells the story of a figure named Rabbi Ishmael the High Priest who visits heaven and sees Enoch, who has been transformed into Metatron and serves as the messenger of God.¹²

⁸ All LXX references from Detlef Fraenkel and Alfred Rahlfs, *Septuaginta: Vetus Testamentum Graecum*. (Göttingen: Vandenhoeck & Ruprecht, 2004).

⁹ It is also apparent that Josephus used the LXX and not the Tanakh because when the number of years of a patriarch’s life differs between the two texts, Josephus uses the dates found in the LXX. Josephus, *Jewish Antiquities: Volume 1: Books 1-3*, trans. H. St. J. Thackeray, Loeb Classical Library 242 (Cambridge, MA: Harvard University Press, 2014), 1.85-86.

¹⁰ “1 Enoch,” in *The Old Testament Pseudepigrapha*, trans. E. Isaac, ed. James Charlesworth, vol. 1 (Peabody, MA: Hendrickson Publishers, 2013).

¹¹ “2 Enoch,” in *The Old Testament Pseudepigrapha*, trans. F. I. Andersen, vol. 1 (Peabody, MA: Hendrickson Publishers, 2013); “3 Enoch,” in *The Old Testament Pseudepigrapha*, trans. P. Alexander, vol. 1 (Peabody, MA: Hendrickson Publishers, 2013).

¹² 3 En 4.

The book of *1 Enoch*, in addition to being the first known work of the Enochic literary body, is part of a corpus of Genesis-expansion literature that includes *Jubilees* and the *Genesis Apocryphon*.¹³ Fragments of all three works were found among the DSS, which included the only extant—albeit partially preserved—copy of the *Genesis Apocryphon*.¹⁴ In the *Genesis Apocryphon*, Lamech confronts his wife Bethonosh and blames her pregnancy on the Watchers.¹⁵ After Bethonosh assures Lamech that he is the real father, Lamech expresses his doubts to his father Methuselah. Lamech asks Methuselah to visit Methuselah’s father Enoch. The narrative implies that Enoch would be able to settle Lamech’s questioning because Enoch possessed sacred knowledge of all history, including the siring of Lamech and Bethonosh’s

¹³ Both *Jubilees* and the *Genesis Apocryphon* appear to reference *1 Enoch*. See Jub 4:17-25 in *The Old Testament Pseudepigrapha*, trans. O. S. Wintermute, ed. James Charlesworth, vol. 2 (Peabody, MA: Hendrickson Publishers, 2009); 1Q20, *The Dead Sea Scrolls: Study Edition: 1Q1-4Q273*, eds. Florentino García Martínez and Eibert J. C. Tigchelaar, vol. 1 (Grand Rapids, MI: Eerdmans, 2005).

¹⁴ On the *Genesis Apocryphon* scroll (1Q20), Hebrew letters were used to number different sections. Only the headings of *pe*, *‘ayin*, and *tsadeh* remain, suggesting that sixteen sections are missing from the beginning and an unknown number of sections are missing from the end of the work. For a discussion of the discovery and translation of the text, see Géza Vermès, “*Genesis Apocryphon: 1Q20*,” in *The Complete Dead Sea Scrolls in English* (New York: Penguin Press, 1997), 48-49.

¹⁵ The Watchers are a group of fallen angels introduced in Genesis 6:4, where they are called הַנְּפִלִים (i.e. the fallen ones). The LXX calls them γίγαντες (i.e. giants). In 4QEnoch ar (=4Q202) Col. IV, line 6, they are called יַעֲרִיאַ in Aramaic, translating to “ones who watch.” A group of angelic beings called watchers are also discussed in the Aramaic portion of Daniel 4. For the Aramaic DSS Enochic texts, *DSS Study Edition: Volume 1*, 399-443.

child.¹⁶ The remainder of the Enochic portion of the *Genesis Apocryphon* was not preserved but seems to have included an exchange between Methuselah and Enoch.

Jubilees is a Hellenistic work, the oldest of which is a partially preserved DSS that dates to the end of the second century BCE.¹⁷ In *Jubilees*, Moses receives instruction over the course of forty days and forty nights on Mount Sanai concerning the division of time and the past and future history of Israel. *Jubilees* is an expansion of Exodus 24:18 in which Moses enters the cloud of God on Mount Sinai and is said to have stayed there for forty days and forty nights. In the revelatory narrative of *Jubilees*, Enoch is said to be the first human to learn writing and the accurate movement of the heavenly bodies.¹⁸ The author of *Jubilees* states that Enoch wrote about the signs of heaven in a book to establish a calendar.¹⁹ The book that Enoch is cited as writing in *Jubilees* is most likely “The Astronomical Book of Enoch,” which is one of the five sections within the larger work of *1 Enoch*. While *1 Enoch* is preserved most completely in Ethiopic manuscripts dating to the fifteenth–eighteenth century, four fragmentary Aramaic scrolls of “The Astronomical Book of Enoch” were discovered at Qumran.²⁰ “The Astronomical Book of Enoch” is concerned primarily with establishing a 364-day solar calendar. The

¹⁶ Because of Lamech’s assumption of Enoch’s all-encompassing knowledge, it is likely that the author of the *Genesis Apocryphon* was aware of 1 Enoch, making 1 Enoch the earlier of the two works.

¹⁷ 19 Jubilees scrolls have been identified in five caves at Qumran. Vermès, *Complete Dead Sea Scrolls*, 507.

¹⁸ Jub 4:17.

¹⁹ Jub 4:17.

²⁰ 4Q208, 4Q209, 4Q210, and 4Q211. *The Dead Sea Scrolls Study Edition: Volume 1*, 431-443.

calendrical component of *1 Enoch* is discussed in greater detail in the following section on the calendrical use of Jewish astronomy.

At least two historians of antiquity were also aware of the Enochic tradition of cosmological revelation. The first-century Greek-born Roman freedman Alexander Polyhistor, quoted in Eusebius' *Preparation for the Gospels*, said that the Greeks believed Atlas invented astrology. Polyhistor argued, however, that Atlas was really Enoch and that God had revealed all astrological wisdom to him.²¹

The Enochic tradition of heavenly knowledge is concerned primarily with the use of an accurate calendar as well as a correct understanding of past and future historical events. *Jubilees*, *1 Enoch*, and the *Genesis Apocryphon* all display evidence of being written by one or more marginalized groups who claimed their knowledge was correct, in opposition to perceived counternarratives. An example of this is the schismatic use of the 364-day solar calendar discussed in *1 Enoch* and *Jubilees*, contrary to the lunisolar calendar of the Second Temple priesthood. In the Enochic tradition, Enoch is a divine figure who reveals the mystery of the heavens to Israel, without whom Israel would have no knowledge of the cosmos.

²¹ Eupolomus, in *The Old Testament Pseudepigrapha*, trans. F. Fallon, ed. James Charlesworth, vol. 2 of (Peabody, MA: Hendrickson Publishers, 2009), 861-872.

2.1.2 Sethian Tradition

Like Enoch, Seth is briefly mentioned in the Genesis 5 genealogy of Adam to Noah.²² In Genesis 5, Seth is the first son of Adam. In Genesis 4, Seth is introduced following Cain's genealogy, in which Seth is labeled as Adam and Eve's third son and born as a replacement for Abel.²³ It is likely that the Cainite (Genesis 4) and Sethian (Genesis 5) genealogies from Adam were separate traditions eventually joined together, with the Genesis 5 genealogy being a later priestly addition to the Pentateuch during the Persian period.

In *Antiquities*, Josephus claims that Adam predicted the world would be consumed by fire and flood at different times. Though Josephus as author attributes the prophecy to Adam in *Antiquities*, the character of Adam in Josephus' writing never makes such a statement. It is likely that Josephus was drawing from the pseudepigraphic, Hellenistic work the *Life of Adam and Eve*.²⁴ In the narrative, Eve gathers her children following the death of Adam and tells them that the archangel Michael had informed her and Adam that the world would be judged first by water and then by fire.²⁵ Eve instructs her children to inscribe everything they had seen and heard from

²² Gen 5:3-8. Seth is also mentioned in the genealogy of Adam to Noah in 1 Chron 1:1.

²³ In Gen 4, Seth is introduced at the end of Cain's genealogy as the third son of Adam and Eve.

²⁴ Josephus is likely drawing on the Hebrew or Aramaic text on which the Latin translation of the *Life of Adam and Eve* was based. For a discussion of the recension and translational history of the *Life of Adam and Eve*, see M.D. Johnson, "The Life of Adam and Eve: A New Translation and Introduction," in *The Old Testament Pseudepigrapha*, vol. 2, 249-252.

²⁵ *Life of Adam and Eve* 49:3.

her and Adam on two tablets.²⁶ One tablet was to be made of stone to survive a judgment of water and the second tablet was to be made of clay so it could survive judgment by fire. The *Life of Adam and Eve* concludes with a statement that Seth made and preserved these tablets.²⁷

In *Antiquities*, Josephus says that Seth constructed two pillars that contained “all wisdom of the heavens and the order of the cosmos.”²⁸ Josephus says these pillars were erected in Egypt and that the pillar made of stone still exists to this day, implying that the pillar of clay was destroyed by the Genesis flood.²⁹

A second-to-fourth century Gnostic tradition heralded Seth and Noah’s wife Norea as the progenitors of the human race. In the fourth century, the church historian Epiphanius of Salamis described this gnostic group as “Sethian Gnostics,” arguing that they had originated in Egypt, and attributed seven literary works to Seth. While Epiphanius does not list their names, two works discovered at Nag Hammadi are relevant to this discussion. The first is *Revelation of*

²⁶ Andrei Orlov has argued for the existence of an Enochic “two tablets” tradition and has suggested that Josephus borrowed Enoch’s achievements and attributed them to Seth. While Orlov’s argument demonstrates that later Christian Enochic traditions joined the two patriarchal stories, there is no evidence that Josephus borrowed from Enochic legends. The DSS fragment 4Q203 7 and 8 mention “two tablets” and a “second tablet,” but the name of the author of the tablets is not preserved. It is just as likely that these fragments of *1 Enoch* refer to Seth rather than to Enoch. Andrei A. Orlov, “Overshadowed by Enoch’s Greatness: ‘Two Tablets’ Traditions from the Book of Giants to Palaea Historica,” *Journal for the Study of Judaism* 32 (2001): 137–158; *Life of Adam and Eve* 50.

²⁷ *Life of Adam and Eve* 51.

²⁸ Josephus, *Ant.* 1.70.

²⁹ Josephus, *Ant.* 1.69-71.

Adam.³⁰ In this work, Adam is 700 years old when he reveals secret cosmological wisdom to his son Seth.³¹ *Revelation of Adam* ends with the statement that Seth passed on Adam's revelation to his descendants.

A second Gnostic text is *The Three Tablets of Seth*. This text purports to be the work of Dositheus, a Gnostic leader, who reads from Seth's tablets and relates their teachings to a group described as "the elect."³² The tablets consist of a set of seven cosmological hymns. While *The Three Tablets of Seth* suggests that Seth authored three tablets whereas the previously described traditions mention two, it is significant that Seth is again viewed as inscribing sacred, esoteric wisdom on tablets for future generations.

Each Sethian tradition claims Seth as the purveyor of divine knowledge. Though Seth learned this knowledge from his parents who in turn learned it from God, it is Seth who recorded and preserved the knowledge for future generations. Seth and Enoch share in a revelatory tradition through which God has revealed the structure and movement of the cosmos.

³⁰ Also known as *The Apocalypse of Adam*. See "Revelation of Adam," in *The Nag Hammadi Scriptures*, ed. and trans. Madeleine Scopello and Marvin Meyer (New York: Harper Collins, 2007), 343-356.

³¹ In the LXX, Adam is said to have lived 930 years, bearing Seth at the age of 230 and then living for another 700 years. In the Tanakh, Adam lives for 930 years, bearing Seth at the age of 130 and then living another 800 years. The author(s) of *Revelation of Adam* most likely drew from the LXX tradition and either interpreted the text to mean Adam lived a total of 700 years or that Adam is relating this divine mystery 230 years prior to his death.

³² *Three Tablets of Seth* in *The Gnostic Scriptures*, ed. and trans. by Bentley Leyton (New York: Doubleday, 1987). 118.17-18.

2.1.3 Abrahamic Tradition

Elsewhere in *Antiquities*, Josephus claims that while living in Chaldea, Abraham was the first to make the monotheistic declaration that God is one.³³ He argues that Abraham deduced the principle of monotheism through observing the irregularities of the movements of the sun, moon, and celestial entities.³⁴ Because these bodies moved irregularly yet in set, regular patterns, Abraham argued that a greater being must control celestial movement.³⁵ Josephus says that the Chaldeans rose against Abraham's teachings, and Abraham was forced to re-settle in Canaan.³⁶

When a famine struck Canaan, Abraham was forced to travel to Egypt. While in route to Egypt, Abraham declared that Egypt was a land of great learning. Abraham said that he would convert to Egyptian religious practices if he determined their practices to be better than his own, or he would convert the Egyptians to monotheism if his practice proved better. Abraham eventually found favor both with the king of Egypt and the Egyptian intelligentsia. Josephus explains that Abraham taught the Egyptians "arithmetic" (ἀριθμητικὴν) and "astronomy"

³³ Although Abraham was known as Abram in the Pentateuch while in Chaldea, Josephus refers to him interchangeably as Abram and Abraham.

³⁴ Josephus, *Ant.* 1.155-156.

³⁵ Josephus considers shifting celestial patterns as phenomenon that change from day-to-day, such as the time of sunset or the apparent length of lunar phases. These irregular patterns, however, take place within larger set patterns, such as the perceived rotation of the sun around earth once in a 365.25-day period. If a higher power controls the regular patterns, it must mean that the irregular patterns contained therein are also controlled by that same power.

³⁶ Josephus cites the ancient historians Berosus, Nicolaus of Damascus, and Hecataeus as support for the claim that Abraham was skilled in celestial sciences. Josephus, *Ant.* 1.157-160.

(ἀστρονομία), about which they had no prior knowledge. Josephus adds parenthetically that the Egyptians, following Abraham's teaching, taught arithmetic and astronomy to the Greeks. It is important for Josephus to portray Abraham as bringing cosmological knowledge to Egypt because in doing so, Josephus lays claim to all Greco-Roman astronomical knowledge as originating in Judaism.³⁷

Josephus was not the only ancient author to discuss Abraham as the forefather of celestial wisdom. In *Preparation of the Gospels*, Eusebius quotes Polyhistor who quotes from Eupolomus' *Concerning the Jews of Assyria*. In the description, Eupolomus writes that Abraham taught the Egyptian priests at Heliopolis science and astrology, recounting that Abraham had learned the practices from the inherited teachings of Enoch while in Babylon.³⁸

It is possible that Josephus discusses Abraham's astronomical interests as a way of controlling the Abrahamic narrative. If other authors identified Abraham as a Chaldean astrologer, Josephus may have wanted to recast Abraham as concerned only with the movement of celestial objects and not the influence those objects had on the world. This could also account for why Josephus's Abraham is the only figure in Jewish literature who learns about the cosmos through observation. Whereas God revealed the order of the heavens to Enoch and Seth, Abraham learns about cosmic order through observation. If Josephus wants to cast Abraham as a

³⁷ Josephus, *Ant.* 1.165-168.

³⁸ Eupolomus, *The Old Testament Pseudepigrapha*, vol. 2, 861-872; Eusebius of Caesarea, *Praeparatio Evangelica*, trans. E.H. Gifford (1903), 9.17.

Greco-Roman philosopher, one way to do that is to depict Abraham as an observer of the stars to contradict counter-narratives that portrayed Abraham as a Chaldean astrologer.³⁹

It is of note that Josephus's story of Abraham and the discovery and teaching of astronomy contradicts Josephus's earlier story concerning Seth. If Seth learned all celestial wisdom and wrote that wisdom on two tablets—one of which Josephus said was still visible in his day — how could Abraham discover that same material generations later? Josephus never accounts for this discrepancy and likely included two separate cosmological discovery traditions in his writings.

The three traditions discussed in this section reflect two distinct methods of relating to the stars. The first is an esoteric method in which knowledge of the cosmos must be learned through revelation. For Seth, Eve passed on the teaching that she and Adam received directly from God. This teaching was recorded on tablets that served as a medium of knowledge in Judaism and Gnosticism. In Enochic tradition, the angel Uriel revealed to Enoch the movements of the planets and stars as well as calendrical time. Enoch returned to earth, teaching his revelation, which by the time of the writing of *Jubilees* had become a distinct work of its own. In future developments of the Enochic tradition, Enoch no longer resided on earth but in heaven, where he became a divine, mediating figure.

³⁹ For a discussion of Josephus' portrayal of Abraham as a Greco-Roman philosopher, see Louis H. Feldman, "Abraham the Greek Philosopher in Josephus," *Transactions and Proceedings of the American Philological Association* 99 (1968): 144-45, 151-52.

Josephus' story of Abraham discovering monotheism through the movement of the sky is the only occurrence of a Jewish forefather learning about the divine through observing the stars. Josephus' goal in telling this story was likely to combat Hellenistic and Greco-Roman narratives that portrayed Abraham as an astrologer.⁴⁰

2.2 Calendrical

In this section, I briefly analyze the calendars of Babylon, Egypt, and Greece to show how they influenced the calendrical systems of ancient Judaism. I argue that the Jewish priesthood and civil authorities leading up to the First Jewish Revolt and the Rabbinic class that developed following the revolt maintained a lunisolar calendar that had originally developed in Babylon. Evidence of this exists in the descriptions of calendrical time in the Hebrew Bible, references to Babylonian months in the Elephantine Papyri, and descriptions of festival dates in rabbinic literature. I argue that a competing Jewish solar calendar developed under Ptolemaic influence in the third century BCE in opposition to the lunisolar calendar observed by the Jerusalem temple authorities and the Seleucids. The chapter begins with a survey of the calendars and calendrical systems of the ancient Near East followed by an analysis of the solar calendars of ancient Judaism.

⁴⁰ The term "Chaldean" was synonymous with the practice of astrology in antiquity. See Tamsyn Barton, *Ancient Astrology* (New York: Routledge, 1994), 9-10. Annette Reed, "Abraham as Chaldean Scientist and the Father of the Jews: Josephus, 'Ant.' 1.154-168, and the Greco-Roman Discourse about Astronomy / Astrology," *Journal for the Study of Judaism in the Persian, Hellenistic, and Roman Period* 35.2 (2004): 124-127.

2.2.1 Babylonian Calendar

By the end of the second millennium BCE, the Babylonian calendar had become institutional throughout much of the ancient Near East, having been adopted by the Middle Assyrian Empire and continuing to be used by the Neo-Assyrian Empire, the Neo-Babylonian Empire, the Achaemenid Empire, the Seleucids, the Hasmoneans, the Parthians, and the Nabateans.⁴¹ This calendar was lunar and consisted of twelve months of either 29 or 30 days with a thirteenth intercalated lunar month added every two-to-three years to bring the lunar year into conjunction with the seasons of the solar year.⁴² Before the calendar became fixed in the sixth century BCE, a scholarly class of scribes and priests advised the king on when to end the current month and begin the next one.⁴³ Because the New Moon can appear to last for up to three days, it was not until the first sliver of the waxing crescent moon appeared that the New

⁴¹ Mark Cohen, *The Cultic Calendars of the Ancient Near East* (Bethesda, MA: CDL Press, 1993), 13, 207; Sacha Stern, *Calendars in Antiquity* (Oxford: Oxford University Press, 2012), 71-72.

⁴² 12 months x 29.5 days = 354 days in a lunar year. The lunar year falls behind the solar year by 10.75 days a year (365 - 354). Prior to the 6th c. BCE, intercalations were ordered by the king. One example is King Hammurabi of the First Babylonian Dynasty (c. 18th c. BCE) ordering that the next month will be deemed a “second Ulul” (i.e. the sixth month of the Babylonian calendar) instead of the beginning of Tašritú (i.e. the seventh month). These intercalations were ordered the month before they occurred since the beginning of the following month was tied to the appearance of the New Moon. For Hammurabi, see Britton and Walker, “Astronomy and Astrology in Mesopotamia,” in *Astronomy before the Telescope* (London: British Museum Press), 45; Stern, *Calendars*, 95. For the division of the year, see Wayne Horowitz, “Sundays in Mesopotamia,” in *Living the Lunar Calendar*, ed. Jonathan Ben-Dov et. al. (Oxford: Oxbow Books, 2012), 9; Robert Chadwick, “The Origins of Astronomy and Astrology in Mesopotamia,” *Archaeoastronomy* (1984): 91.

⁴³ Simo Parpola, “Part 2 A: Introduction and Appendixes,” in *Letters from Assyrian Scholars to the Kings Esarhaddon and Assurbanipal* (Kevelaer: Butzon and Becker, 1971), 12-15.

Moon could be noted officially. There are scribal reports of cloudy weather obscuring the observation of the moon.⁴⁴ In one such case, a scribe advised the king to wait to declare the first day of the next month until correspondence was received from observers elsewhere in the kingdom.⁴⁵

The post-dictive nature of the pre-fixed Babylonian calendar meant that the calendar was written month-to-month based on observation.⁴⁶ An equivalent modern Babylonian calendar would mean that the month of July could not be declared until the month of June had officially ended. The calendar, then, did not create a standardized future demarcation of time into which events could be planned but instead served to organize past and presents events.

Until the sixth century BCE, the king was the ultimate authority determining when months ended and began, resulting in a fluid calendar that had no fixed means of determining month length or intercalation.⁴⁷ During the reign of Darius I in the sixth century BCE, the Babylonian calendar became fixed, meaning that the future dates of months were known before lunar observations were made. Under the direction of his scribes, Darius I developed a 19-year fixed calendrical cycle with pre-determined intercalatory months that continued to be used by the Seleucids and Parthians.⁴⁸ The significance of the 19-year cycle cannot be overstated. The fixed

⁴⁴ Stern, *Calendars in Antiquity*, 79.

⁴⁵ Parpola, *Letters from Assyrian Scholars*, no. 119; Stern, *Calendars*, 80.

⁴⁶ Mark Cohen, *The Cultic Calendars of the Ancient Near East* (Bethesda: CDL Press, 1993), 4.

⁴⁷ Stern, *Calendars in Antiquity*, 80-81.

⁴⁸ Stern, *Calendars in Antiquity*, 105, 119.

calendar allowed festivals and civic events across the empire to be scheduled on expected dates instead of awaiting the declaration of the month by the king.

During the Persian period (ca. fifth century BCE) Jews in Egypt seem to have used the Babylonian calendar as evidenced in the Elephantine Papyri. Many non-Jewish documents in the Elephantine Papyri contain both Babylonian lunar dates and local Egyptian solar dates.⁴⁹ (The Egyptian solar calendar is discussed below). Jewish documents from Elephantine, however, reference only Babylonian dates.⁵⁰ It is likely that because the Babylonian calendar was the standard of the Persian Empire, when the Elephantine Jews wrote to Persian officials in Babylon, Yehud, and Samaria, they only employed dates that would have been used in those regions. The Jews of Elephantine likely knew the Egyptian solar calendar, though to what extent they may have used it is unknown.

Jews continued to use the Babylonian lunar calendar throughout the Early Roman and Rabbinic periods, although the solar-based Julian calendar was introduced to the Roman Empire in the first century BCE. Evidence of the Babylonian calendar's continued use is evident in references in Philo of Alexandria, Josephus, and the New Testament.⁵¹ By the Amoraic period (ca. third–fifth century), the Jewish lunar calendar had been fixed to the solar year so that the

⁴⁹ Sacha Stern, “The Babylonian Calendar at Elephantine,” *Zeitschrift Für Papyrologie und Epigraphik* 130 (2000): 159-161.

⁵⁰ Two notable documents that do so are requests to rebuild the destroyed Jewish temple at Elephantine. See B20 and B21 in Bezalel Porten et al., *The Elephantine Papyri in English: Three Millennia of Cross-Cultural Continuity and Change*, 2011.

⁵¹ Sacha Stern, *Calendar and Community: A History of the Jewish Calendar, 2nd Century BCE to 10th Century CE* (Oxford: Oxford University Press, 2001), 157-164.

observation of festivals and feasts could be planned to occur on a specific day in the future, regardless of where one might be.⁵² It is unclear if the rabbis used the 19-year Babylonian cycle or developed an independent cycle of their own as there are few references in Rabbinic literature concerning the calendar.

While Jewish rulers, priests, and later rabbis relied on the Babylonian lunar calendar to reckon time, there is evidence of alternative solar calendars at use in Judaism that would have ensured the celebration of festival dates on specific days of the week. It is no coincidence that the earliest evidence of a Jewish solar calendar—*I Enoch*—appears while Palestine was under Ptolemaic rule. We now turn to the development of the civil solar calendar of Egypt.

2.2.2 Egyptian Calendars

As early as the third millennium BCE, the civil calendar of ancient Egypt was solar and based on the rising of the star Soth (i.e. Sirius) and/or the start of the annual flooding of the Nile.⁵³ The Egyptian year consisted of 12 months equally divided into 3 seasons. Each season's name related to the state of the Nile: *Akhet* ('Inundation'), *Peret* ('Emergence'), *Shemu* ('Low Water'). Each month consisted of 30 days with 5 epagomenal days added at the end of the year

⁵² Stern cites b. Betz 4b, where Rabbi Zeira claims the date of the New Moon is now fixed as well as additional statements about the celebration of festivals on specific days in both the Babylonian Talmud and the Jerusalem Talmud. See Stern, *Calendar and Community*, 170-175.

⁵³ For early date of Egyptian civil use of a solar calendar see Herbert Winlock, "The Origin of the Ancient Egyptian Calendar," *Proceedings of the American Philosophical Society* 83.3 (1940): 447-450. Winlock argues that Egyptian solar calendar was based on the appearance of the star Soth (Greek: Sirius), against Neugebauer who argued that the calendar was based on the annual flooding of the Nile; see Otto Neugebauer, "The Origin of the Egyptian Calendar," *Journal of Near Eastern Studies* 1.4 (1942): 396-403.

to bring the total numbers of days in a year to 365. The Egyptian month was further subdivided into ten, three-day periods known as *decans*. Each *decan* was associated with a rising constellation that would initiate the three-day period.⁵⁴ Because the Egyptian calendar did not observe a leap year, the solar calendar fell behind one day every four years, meaning that months would eventually fall out-of-sync with the Nilotic seasons.

During the second century BCE, Ptolemy III Euergetes issued the Decree of Canopus, which attempted to add a sixth epagomenal day once every four years to stop the drifting of months from their intended seasons.⁵⁵ Ptolemy's reform failed, as it appears to have been an attempt by Ptolemy to exert control over the Egyptian cultic and civil elite.⁵⁶ The Egyptian calendar continued as it had for millennia until the institution of the Julian calendar in Egypt by Augustus in the first century BCE.⁵⁷ Even after the Julian calendrical reform, which added a leap year to a 365-day solar calendar, the Egyptian calendar continued in use alongside the Julian calendar as evidenced by the later Coptic and Ethiopic calendars, which maintained the 365-day Egyptian solar calendar.

⁵⁴ *Decans* were used both to divide the sky into 10-degree sections, resulting in a total of 360 degrees, and to divide the calendars into 36 groups of days, resulting in 360 days to which the 5 epagomnal days were added.

⁵⁵ Marshall Clagett, *Ancient Egyptian Science: Calendars, Clocks, and Astronomy* (American Philosophical Society, 1989), 326-327.

⁵⁶ Stern, *Calendars in Antiquity*, 141.

⁵⁷ Stern, *Calendars in Antiquity*, 226-227.

While the Egyptian civil calendar was solar, there is evidence that a lunistellar calendar was maintained alongside it.⁵⁸ This lunistellar calendar, like the solar calendar, began its year with the rise of the star Soth (hence *luni-stellar*) and consisted of 354 days in a year, divided into 12 months of 29 or 30 days each.⁵⁹ Papyrus Carlsberg 9, which dates to the second century, lists a fixed intercalation for the lunar year in a 25-year cycle, where the first, third, sixth, twelfth, fourteenth, seventeenth, twentieth, and twenty-third year of each cycle contained a thirteenth intercalary month.⁶⁰ The second-century BCE Greek Rylands Papyrus inv. 666 also reflects this 25-year-cycle although it does not list the years for intercalation as does P. Carlsberg 9.⁶¹

The only evidence of a lunar calendar prior to the Ptolemaic period exists in a collection of papyri from the Twelfth Dynasty (twentieth–nineteenth century BCE). One papyrus (P. Berlin 10056) notes when priestly groups were assigned to work in the mortuary temple of Sesostiris II at Illahun.⁶² The document contains 6 divisions of 29 or 30 days, with an additional 6 intervals of 29 or 30 days of ellipsed time, suggesting the use of lunar-cycles to schedule priestly duties.⁶³

⁵⁸ Richard Parker, *The Calendars of Ancient Egypt* (Ann Arbor, MI: University Microfilms, 1976). 31.

⁵⁹ Parker, *Calendars*, 31.

⁶⁰ Parker, *Calendars*, 15, 30-32.

⁶¹ Parker surveys all Ptolemaic texts that include double dates (i.e. lunar and solar) to demonstrate that the lunar dates fit within the 25-year fixed luni-stellar cycle. More recently, Depuydt has argued that the Ryland papyri proves the existence of a fixed, 25-year-cycle lunistellar calendar by the 2nd c. BCE. See Parker, *Calendars*, 16-23; Leo Depuydt, *Civil Calendar and Lunar Calendar in Ancient Egypt*. (Leuven: Peeters Publishers, 1998), 151-152.

⁶² Depuydt, *Civil Calendars*, 147.

⁶³ For example: The first two of six date ranges are:

Jewish documents that argue for the observance of a solar calendar begin to emerge in the third century BCE, primarily *I Enoch* and *Jubilees* followed by the solar calendars contained within the DSS. These documents are discussed below, but it is significant that these texts began to emerge during a period of Egyptian hegemony. Before turning to *I Enoch*, it is important to cover the development of Greek calendars and their influence—or lack thereof—on Jewish calendars.

2.2.2 Greek Calendars

The available data suggest that prior to the fourth-third century BCE, ancient Greek cities maintained independent lunar calendars with the New Moon as the initiator of the month. While some cities observed the start of the month at the New Moon, other cities began their month when the first sliver of the Waxing Crescent moon became visible. Because Athens is the best documented ancient Greek city in terms of calendrical systems, I focus on the Athenian evidence. The Greek calendrical systems had little influence on the calendars of ancient Palestine except for the Seleucid calendar, which was a slightly altered Babylonian calendar with Macedonian instead of Babylonian month names.⁶⁴

I Shemu 26 — II Shemu 25

IV Shemu 25 — Year 31, I Akhet 19

The range between II Shemu and IV Shemu is not noted, but its absence from the list presumes its existence. Date ranges are taken from Parker, *Calendars*, 63-64 and Depuydt, *Civil Calendars*, 145–147.

⁶⁴ Stern, *Calendars in Antiquity*, 234.

Evidence of the Athenian use of the moon for reckoning time first appears in Aristophanes' comedy, *The Clouds* (ca. fifth century BCE). In this play, Selene (the moon) laments to the play's choral leader that though she is meant to keep time, the Athenians misuse her and the expected dates of festivals in heaven are not observed on the correct dates on earth. As a result, the gods show up for feasts and offerings only to leave hungry.⁶⁵ This brief excerpt, although comedic, suggests a key function of reckoning time was to ensure that festivals occurred simultaneously between the gods and humans. The Athenians, however, apparently added intercalary days and months that upset the calendar from what Aristophanes viewed as correct lunar reckoning.

At least four calendars were used in Athens. The first and earliest documented can be described loosely as a sidereal (i.e. stellar-based) agricultural calendar similar to Egypt's use of the star Soth. This calendar is only attested in Hesiod's *Work and Days* (ca. 700 BCE), but it likely continued as an agricultural calendar. In *Works and Days*, Hesiod instructs, "When the Atlas-born Pleiades rise, start the harvest—the plowing, when they set."⁶⁶ Hesiod continues to instruct farmers to perform certain tasks—such as chopping wood—based on when certain constellations and stars appeared in the night sky.⁶⁷ Hesiod also relates seasonal phenomenon,

⁶⁵ Aristophanes, *The Clouds*, in *Clouds, Wasps, Peace*, trans. Jeffrey Henderson, Loeb Classical Library 488 (Cambridge, MA: Harvard University Press, 1998), 607-626.

⁶⁶ Hesiod, *Works and Days*, in *Theogony, Works and Days, Testimonia*, LCL 57 (Boston: Harvard University Press, 2018), 383.

⁶⁷ Hesiod, *Works and Days*, 414.

such as the appearance of migratory cranes, as coinciding with the start of winter rains.⁶⁸ Hesiod does not list specific seasons in *Works and Days*, but in the *Theogony*, he names three goddesses (the Horae) who control the seasons and the seasonal weather: “Eunomia (Lawfulness), Diké (Justice), and blooming Eirene (Peace).”⁶⁹ The existence of three agricultural seasons is cited centuries later by Diodorus Siculus in the first century BCE and Pausanias in the second century.⁷⁰ The fourth-fifth century epic poem *Dionysiaca* lists four seasons and describes the Horae as the daughters of Helios who help guide his chariot through the sky. I describe the four seasons of the *Dionysiaca* in the following chapter’s discussion of synagogue Helios-zodiac cycles.⁷¹

By the fifth century BCE, two official civic calendars were maintained by separate governing bodies in Athens.⁷² The *archontic* calendar was a 12-month lunar calendar maintained by the eponymous archon to track civil and festival dates.⁷³ In the same century, Meton of

⁶⁸ Hesiod, *Work and Days*, 448.

⁶⁹ Hesiod, *Theogony. Works and Days. Testimonia*, ed. and trans. Glenn W. Most. LCL 57 (Cambridge, MA: Harvard University Press, 2018), 901.

⁷⁰ Diodorus Siculus, *Library of History, Volume I: Books 1-2.34*, trans. C. H. Oldfather. LCL 279 (Cambridge, MA: Harvard University Press, 1933), 5.72.5; Pausanias calls the three seasons *Thalo*, *Karpo*, *Auxo* in *Description of Greece, Volume I: Books 1-2 (Attica and Corinth)*, trans. by W. H. S. Jones, LCL 93 (Cambridge, MA: Harvard University Press, 1918), 9.25.1.

⁷¹ Nonnos, *Dionysiaca, Volume I: Books 1-15*, trans. W. H. D. Rouse, LCL 344 (Cambridge, MA: Harvard University Press, 1940), 38.268.

⁷² These calendars are likely older but the first evidence of their existence appears in the 5th c. BCE.

⁷³ This is likely the calendar that Aristophanes mocked in *The Clouds*.

Athens developed a 19-year cycle of intercalations similar to that of Babylon, which ensured that the months of the lunar calendar did not move too far from the solar seasons.⁷⁴ The second civic lunar calendar of Athens was the *prytanic* calendar, which was maintained by the Boule. The *prytanic* calendar consisted of ten months—one for each prytany—of 36 days for the first four months and 35 days for the remaining six months.⁷⁵

A fourth lunar-based calendar appeared in the third century BCE but fell out of use with the rise of other Hellenistic-era calendars in the second century BCE. The phrases *kata theon* and *kata selene* (“according to the moon”) appear in inscriptions to note fixed dates.⁷⁶ This calendar is thought to have provided the foundation for individual city calendars (e.g. the *archontic* calendar of Athens) as well as for establishing set dates to facilitate trade between cities.⁷⁷

In the fourth century BCE, Alexander the Great came into contact with a number of calendrical systems, including the Babylonian and Egyptian calendars. Alexander’s successors, following the War of the *Diadochi*, largely adopted local calendrical traditions while melding

⁷⁴ Meton is also credited with determining the dates of the solstices and equinoxes with the use of a sundial. See Daryn Lehoux, *Astronomy, Weather and Calendars in the Ancient World: Parapegmata and Related Texts in Classical and Near Eastern Societies* (New York: Cambridge University Press, 2007), 88-93.

⁷⁵ The days of the *prytanic* calendar add up to 354, which suggests it was also a lunar calendar. See Stern, *Calendars in Antiquity*, 47-49, for a summary of the debate about whether the calendar was reckoned by the sun or moon as well as how many days and months constituted a year. For an explanation of the *prytanic calendar* see Benjamin Merrit, “Normal Lengths of Prytany in the Athenian Year,” in *Greek, Roman, and Byzantine Studies* 17.2 (2003): 147-152.

⁷⁶ Stern, *Calendars in Antiquity*, 59-62.

⁷⁷ Stern, *Calendars in Antiquity*, 60-61.

certain Greek and Macedonian traditions to them. The Seleucids adopted the Babylonian calendar with three alterations: first, the Babylonian month names were exchanged for Greek month names; second, the start of the year was shifted from the first day of spring to the first day of fall; and third, the Seleucid calendar began a new era by numbering the year beginning with the reign of Seleucus I Nicator in 312 BCE.⁷⁸

I Maccabees and Josephus both used Seleucid dating to reckon the year.⁷⁹ Hundreds of years later, Rabbinic sources provide evidence of the continued reckoning of the year to the Seleucid Era. In b. Avodah Zarah 10, a group of Rabbis debates which calendrical reckoning system to use. Rabbi Nahman states that all Diaspora Jews use the Seleucid Era to determine the year number. Rabbi Ravina, in agreement, cites the *Mishnah* as support for using the Seleucid Era instead of another means of numbering such as from the date of creation or the flood in Genesis.⁸⁰

The Mishnaic passage cited by Rabbi Ravina claims that four distinct “New Years” exist. The first two New Year dates are: 1 Nissan, which is the date from which a king’s reign is counted and 1 Tishrei, which is the date from which the civil year is counted. (The two additional New Years are for trees and animals, respectively, but there is rabbinic debate on which date these fall.) The Mishnaic passage provides evidence that by 300, the Seleucid Era was still used

⁷⁸ An example of this dating appears in 1 Mac 1:10, which says that Antiochus Epiphanes “Began to reign in the 137th year of the kingdom of the Greeks.” (NRSV) Antiochus began to reign in 175 BCE, which is 137 years after the reign of Seleucid I Nicator in 213 BCE.

⁷⁹ See Josephus, *Ant.* 12.5.4 and 1 Mac 1:10.

⁸⁰ m. Ros Has 2a.

by Jews in Palestine, and the passage from the Babylonian Talmud suggests that the Seleucid Era was still used by Jews in Babylon—and perhaps throughout the Sasanian empire—around 500.

The calendrical systems of the ancient world provided rulers a means of political control over their subjects. Festivals, taxation, and the concept of time itself was mediated by a ruler from the sky to his or her subjects. In Greece, democratic bodies determined dates based on lunar positions until the Hellenistic period, which ushered in the rise of the Seleucid and Julian calendars. In Egypt, a solar calendar and a lunistellar calendar were used in conjunction with other popular calendrical systems of the ancient Near East. In Babylon, the lunisolar calendar was continually used, although it was rebranded by different groups who adopted it, such as the Seleucids and Hasmoneans. In the second half of this section, I consider Jewish evidence of calendrical systems in Israel, looking first at the Hebrew Bible and then the emergence of the solar calendars of *I Enoch* and Qumran.

2.2.3 Israelite/Jewish Calendars

2.2.3a Hebrew Bible

The seven-day creation narrative in Genesis serves as the paradigm for the seven-day week in ancient Judaism. In Genesis, a day is established as a night-to-day cycle.⁸¹ Though day and light were created on the first day of creation, the sun, moon, and stars were not created until day four. These astral bodies serve two purposes in Genesis: first, to separate the day from night; and second, to mark the passing of time as signs, seasons, days, and years.⁸²

⁸¹ Gen 1:4.

⁸² Gen 1:14.

The biblical text is sparse on how ancient Israelites reckoned time. Throughout Numbers and Leviticus, festivals are noted as occurring on different days of the months but the exact number of days in a month or how months are reckoned is never mentioned. Evidence of a lunar calendar emerges, however, with the comparison of an instruction in Psalms and the dates of Passover in Leviticus.

Psalm 81:4 commands a *shofar* to be sounded at two events: at the beginning of the month and at the full moon of Passover. At the institution of the Passover festival in Leviticus 23, God instructs Moses that a Passover offering should be made on the fourteenth of the month while the festival itself begins on the fifteenth of the month. If the Leviticus passage is read in conjunction with Psalm 81, for the Full Moon to fall on the fourteenth or fifteenth of the month would require the New Moon to occur on day 29 or 30 of the month. This suggests that ancient Israel—or at least the priesthood—observed a lunar calendar by the final editing of Numbers, Leviticus, and Psalms in the sixth—fifth century BCE.

This lunar calendar was most likely the same used elsewhere in the ancient Near East, that is, the Babylonian lunar calendar. By the Persian period, the Jewish civic and cultic calendar appears to have been conflated with the Babylonian calendar as evidenced by the use of Babylonian month names in Zechariah and the Elephantine Papyri.⁸³

⁸³ Zechariah uses the Semitic variants of Babylonian month names Shebat, Elul, and Kislev in Zech. 1:7, 6:15, and 7:1 respectively. For a list of Jewish literature that uses Assyro-Babylonian month names see Emil Schürer, *A History of the Jewish People in the Age of Jesus Christ*, vol. 1 (London: T & T Clark, 2015), 587-588.

2.2.3b Egypt, *1 Enoch*, and Jubilees

1 Enoch is composed of five individual sections that were written separately and later combined into a single work. The section concerning calendars is often referred to as “The Astronomical Book of Enoch.” Fragments of “The Astronomical Book of Enoch” found among the DSS date to the second century BCE and exhibit signs of prior editing, suggesting an origin some time in the preceding century. *1 Enoch* was used in Jewish circles at least through the first century as evidenced by its inclusion in the Dead Sea Scrolls as well as a reference to it in the New Testament Book of Jude.⁸⁴

In *1 Enoch*, the angel Uriel guides Enoch through the ten levels of heaven, narrating how the sun moves, resulting in a perfectly fixed solar calendar. In this Enochic calendar, the year is divided into four seasons of 91 days. The year begins its cycle on the spring equinox with the first month consisting of 30 days, the second month 30 days, and the third month 31 days. These three months complete the first season, and the cycle of 30-30-31 days continues for the following three seasons. Unlike other seasonal calendars, the Enochic calendar does not appear concerned with regulating agriculture but with tracing the exact movement of the sun.

After describing the solar year to Enoch, Uriel describes the lunar year and explains that each lunar month begins with the waxing crescent moon.⁸⁵ The author of *1 Enoch* notes that the

⁸⁴ See Jude 1:14-15.

⁸⁵ 1 En 78.

lunar calendar must be supplemented to bring it into harmony with the solar calendar, rendering the lunar calendar imperfect.⁸⁶ Any type of intercalations are viewed negatively in *1 Enoch*.

Sacha Stern proposes an Egyptian origin for the Enochic calendar.⁸⁷ I agree and wish to make a further case for Egyptian influence on *1 Enoch*. The primary similarity between the Egyptian and Enochic calendars is in the number of days in a year. The Egyptian calendar consisted of 365 days in a solar year while the Enochic calendar consisted of 364 days. The subtraction of a day from the Egyptian calendar may be so that the Enochic calendar can be divided into equal seven-day periods to mirror the act of creation in Genesis 1-2.⁸⁸ Having 364 days in a year also allows for the division of time into four equal solar seasons of 91 days.⁸⁹ Of course, the number of days in a year is not enough to prove an Egyptian origin for the Enochic calendar. Other evidence includes the geo-politics of the late fourth century BCE.

In 318 BCE, Ptolemy I Soter gained control of Coele-Syria, and his descendants continued to rule the region until 200 BCE, when Ptolemy V Epiphanes ceded control to the Seleucid Empire following the Battle of Panium. If the dating of “The Astronomical Book of Enoch” to the third century BCE is correct, it would have been written while Judea was under Ptolemaic rule. Whether the book was written by Jews in Egypt or Judea, its author likely was

⁸⁶ 1 En 79.

⁸⁷ Stern, *Calendar and Community*, 5-8, 16.

⁸⁸ 364 days / 7-day weeks = 52 weeks.

⁸⁹ The solar seasons are the apparent movement of the sun from equinox to solstice and vice-versa.

aware of the Egyptian solar calendar, which would have been used in official capacities throughout the Ptolemaic empire.⁹⁰ There is further evidence of potential Jewish use of a solar calendar in Egypt, although this evidence is conjectural.

In the second century BCE, the heir-apparent to the Jerusalem priesthood, Onias IV, fled Jerusalem when his father was murdered in a series of events that eventually led to the Maccabean revolt. Onias IV and the priests who followed him traveled to the city of Leontopolis in the *nome* Heliopolis, where they established a Jewish temple under Ptolemy VI Philometer. Onias IV was not the first Jew in the region. In fact, multiple Egyptian papyri list Jews as prominent in the military, civil service, and tax farming endeavors, which indicate that many Egyptian Jews held an elevated status similar to Greeks in the region.⁹¹

Heliopolis served as the center for cultic sun worship in Egypt as far back as the twentieth century BCE. The great temple of the sun god Re-Atum, built either at the end of the third millennium or beginning of the second millennium BCE, stood in Heliopolis and is mentioned in the Hebrew Bible.⁹² The book of Exodus relates that enslaved Israelites helped build the store houses of Pitham, which was the Hebrew transliteration of the Egyptian *Per Atum*

⁹⁰ This is not to suggest that the Egyptian calendar supplanted the use of the Babylonian calendar in the region of Coele-Syria, but instead, I suggest that both were used in conjunction.

⁹¹ The early Ptolemaic rulers relied on non-native Egyptians for civil and authoritative roles within the kingdom. It should be no surprise to see Jews filling such roles in addition to Greeks and other non-Egyptian peoples. See John Barclay, *Jews in the Mediterranean Diaspora* (London: Bloomsbury, 2016), 20-34.

⁹² Gen 41:45, 45:50, and 46:20.

(“The House of Atum”).⁹³ In the fourteenth century BCE, during the Amarna Period, Pharaoh Akhenaten built a temple to the deified solar disc Aten.⁹⁴ The Mnevis bull, believed to be the physical manifestation of Re-Atum was also worshiped in Heliopolis.⁹⁵ In addition to its cultic significance, Heliopolis served as a classical center for mathematical and astronomical learning. According to the third century historian Diogenes Laërtius, the famed astronomer Eudoxus of Cnidus developed theories of solar, lunar, and planetary motion while studying and observing the sky at Heliopolis.⁹⁶

Two classical narratives retroject Jewish cultic foundations at Heliopolis. The first is *Joseph and Aseneth*, which claims that Joseph married the daughter of an Egyptian high priest in Heliopolis and even became Pharaoh over Egypt for a brief time.⁹⁷ The second is the first-century work *History of Egypt* by Apion, about whom we know from Josephus. In *Against*

⁹³ Ex 1:11.

⁹⁴ Erik Hornung, “The Rediscovery of Akhenaten and His Place in Religion,” *Journal of the American Research Center in Egypt* 29 (1992): 43-49.

⁹⁵ Massimiliano Nuzzolo and Jaromír Krejčí. “Heliopolis and the Solar Cult in the Third Millennium BC,” *Ägypten Und Levante / Egypt and the Levant* 27 (2017): 357-80.

⁹⁶ See Diogenes Laërtius, *Lives of Eminent Philosophers*, trans. Robert Drew Hicks, Loeb Classical Library 185 (Cambridge, MA.: Harvard University Press, 1972), 90.

⁹⁷ Ross Shepard Kraemer has convincingly argued for a dating of *Joseph and Aseneth* no earlier than the third century CE. For her argument on dating the text, see *When Aseneth Met Joseph, A Late Antique Tale of the Biblical Patriarch and His Egyptian Wife, Reconsidered* (Oxford: Oxford University Press, 1998), 237-239. Other scholars have argued for an earlier date, noting that it relies on the LXX and lacks any firm method for dating. Kramer and other scholar who date the work later rely on a fourth-century pilgrim account that references the book. On early dating, see Christopher Burchard, “Joseph and Aseneth: A New Translation and Introduction,” in *The Old Testament Pseudepigrapha: Volume 1*, 187-188.

Apion, Josephus argues against Apion's claim that Moses was a priest in Heliopolis who venerated the sun.⁹⁸

The solar calendar of *1 Enoch* contrasts with all other known coterminous calendars in the ancient world except the civil calendar of Egypt. It is possible that during Ptolomaic rule the priests in the Jerusalem temple used a solar calendar in conjunction with the Babylonian-based lunisolar calendar. Once the Oniads lost control of the priesthood, they appear to have splintered into a number of groups that continued to observe a solar calendar. These sects include the founders of the Oniad temple at Heliopolis and possibly the Essenes at Qumran, to whom we now turn.

2.2.3c Qumran

I will not attempt a full analysis of the Qumran calendrical corpus as entire books have been written on the subject. What I do in this brief section is address the broad types of calendrical documents found among the DSS to illustrate the calendrical concerns of ancient Jews as well as the use of solar calendars by the Qumran community. The community at Qumran, which collected, copied, and wrote some of the DSS appears to have observed a solar year of 364 days. This 364-day calendar consisted of 52, seven-day weeks. This means that festivals such as Passover always began on the same day of the week from year-to-year. In a lunar calendar, the number of days in a month changes as does the number of months in a year.

⁹⁸ According to Josephus, Apion claimed that Moses was a native Egyptian, built prayer houses that faced east toward the rising sun, and created a sun dial with an obelisk to imitate the circle of the heavens. Josephus quotes Apion and argues vociferously against Apion's claims. Josephus, *Against Apion* in *The Life. Against Apion*, trans. H. St. J. Thackeray. LCL 186. Cambridge, MA: Harvard University Press, 1926) 2.10-12.

So, while Passover begins on the fourteenth day of the first month according to Leviticus 23:5-8, in a lunar calendar, the day of the week on which the fourteenth occurs changes each year. In a 364-day solar calendar, the fourteenth day of the first month is always the same day of the week. Therefore, at Qumran the calendar not only recorded past time but consistently controlled the day of the week on which future events occurred.

The first collection of calendrical DSS (4Q320-30) consists of the weekly, monthly, and yearly divisions of the 24 priestly courses outlined in 1 Chronicles 24:6-19, called מִשְׁמָרוֹת in Hebrew. These 11 scrolls list phenomena such as the full moon, new moon, festival dates, and historical events in relation to the 24 priestly courses that have been reckoned to a solar calendar. Here is an example of an attempt to reckon the lunar month with a solar month in relation to the week of Immer, which is number 16 of the 24 priestly courses in 1 Chronicles 24: “On the fifth (day) of (the week) of Immer—the thirtieth day of the lunar month—the twenty third day of the tenth (solar) month.”⁹⁹ The notation of a specific day for the lunar month in relation to the solar month suggests that this calendar translated a lunar date—perhaps the date observed in the Jerusalem temple—into the Qumran community’s solar calendar.

The next calendrical scroll (4Q319) contains an alternating list of the priestly course of Shecaniah (tenth course) and Gamul (twenty second course), listing one as occurring every three years in relation to a “sign.” For example, one section of the text as reconstructed by Géza Vermès reads, “The sign of Gamul in the third [year]. The sign of Shecaniah in the sixth [year].” Vermès suggests that the “sign” of the priestly course refers to the need to add an intercalary

⁹⁹ Vermès, “Mishmarot A 4Q320,” in *The Complete Dead Sea Scrolls*.

lunar month of 30 days once every three years to bring the lunar calendar into harmony with the solar calendar.¹⁰⁰

Two cryptic texts conclude the broader corpus of DSS that deal with a calendar. The first (4Q317) consists of tiny fragments of a cryptic text that divides the moon into 14 phases, which correlates with the 14-part division of the moon in *1 Enoch*.¹⁰¹ The second (4Q318) is a zodiac calendar and brontologion, which is discussed in greater detail in the following section dealing with ancient Jewish astrology. The calendrical portion 4Q318 traces the path of the moon through the signs of the zodiac using Hebrew month names (e.g. Adar). The calendrical significance of 4Q318 is similar to that of 4Q319 in that it appears to correlate the lunar calendar with a solar calendar.

Throughout their history, Jews have used an assortment of calendrical systems to serve different purposes. From the earliest evidence preserved in the Hebrew Bible, it appears that ancient Israelites used a lunar calendar comparable to that of Assyria and Babylon. During the Persian period, Jews maintained the use of a lunar calendar as evidenced by the prophet Zechariah and the reference to conflicting festival dates in the correspondence between

¹⁰⁰ Lunar: 354 days x 3 years = 1062 days

Solar: 364 days x 3 years = 1092 days

A lunar calendar that averages 29.5 days a month will fall behind a 364-day solar calendar by 30 days once every three years. For a discussion of this problem, see Vermès, *Complete Dead Sea Scrolls*, 352.

¹⁰¹ A brontologion is an omen text that notes the day of the month at which thunder sounds.

Jerusalem and the temple at Elephantine. The use of a lunar calendar continued in the Jerusalem Temple although a solar calendar appeared by the third century BCE, which may have been adopted in the Jerusalem temple during Egyptian control of the region.

Although the Jerusalem temple authorities abandoned the solar calendar, the dispossessed Zadokite priests continued to use it as evidenced by the Oniads at Heliopolis and the Qumran community. We now turn to the next section, where we examine an assortment of Jewish texts that assume the stars either exert power over the earth or are influenced by occurrences on the earth.

2.3 Astrological

A range of Jewish texts engage with the stars astrologically.¹⁰² These texts often view the stars as referencing past, present, or future cataclysmic events or as providing guidance on decision making. Though the stars in these texts influence/are influenced by humanity, it is always God who maintains ultimate control over the heavens. In ancient Judaism, looking at the sky for astrological purposes is not an attempt to understand the stars in and of themselves, but instead, it is an attempt to understand the will and workings of God. The texts examined in this section range from the Hellenistic-era pseudepigrapha to the Babylonian Talmud (ca. 500). The survey will exhibit the depth and range of astrological beliefs in ancient Judaism.

¹⁰² My use of the term “astrology” in this section relies on the *doctrine of correspondence*, wherein celestial objects are believed either to affect the earth or reflect earthly occurrences in heaven. The stars are viewed as either prescriptive or descriptive to earthly events.

2.3.1 Sibylline Oracles

The Sibylline Oracles are a collection of Judeo-Christian texts that purport to be the prophetic utterances of a sibyl, that is, a divinely inspired prophetess. Sibylline-style oracles constitute an expansive genre of ancient literature. According to Arrian of Nicomedia, Alexander the Great journeyed far into the Egyptian desert to visit the Libyan sibyl of Ammon at the Siwa Oasis to be confirmed as the offspring of the deity Zeus Ammon in the fourth century BCE.¹⁰³ Pausanias, writing in the second century, mentions a Hebrew sibyl named Sabbe from Palestine. He claims that Sabbe's father was Berosus—a famous Babylonian astrologer and priest in the third century BCE—and his mother was named Erymanthe. Pausanias adds that though he identifies the sibyl as a Hebrew, others say that she was Babylonian or Egyptian.¹⁰⁴

Twelve books comprise the Sibylline Oracles. In this section, I am concerned only with Book 5 (*SibOr5*), which ends with an astrological apocalyptic battle. *SibOr5* was composed between 68 - 132 by Alexandrian Jews.¹⁰⁵ Evidence of this date range stems from a prophecy in the book that Emperor Nero was not truly dead and would soon return from Parthia. The

¹⁰³ Pausanias, *Description of Greece, Volume I: Books 1-2 (Attica and Corinth)*, trans. W. H. S. Jones. LCL 93. (Cambridge, MA: Harvard University Press, 1918), 10.12.1. Pausanias describes the former sibyl of the Siwa Oasis as semi-divine. Also see Arrian, *Anabasis of Alexander, Volume I: Books 1-4*, trans. P. A. Brunt. LCL 236. (Cambridge, MA: Harvard University Press, 1976), 3.3.1-3.4.5.

¹⁰⁴ Pausanias, *Description of Greece*, 10.12.9.

¹⁰⁵ Alexandria is the likely origin due to multiple discussions of Egyptian deities and localities throughout the text, including references to Isis, Serapis, and the prophecy of the construction of a temple in Egypt, which was likely the Jewish temple at Heliopolis. For discussion of provenance of the text, see John Collins, "The Sibylline Oracles: Book 5," in *The Old Testament Pseudepigrapha: Volume 1*, 390-391.

terminus ante quem comes from a favorable description of Emperor Hadrian, which was presumably made prior to the outbreak of the Second Jewish Revolt.¹⁰⁶

SibOr5 ends with the sibyl's prophecy of an apocalyptic fight among anthropomorphic and zoomorphic signs of the zodiac and other constellations.¹⁰⁷ The war begins with God initiating the heavenly fight. The figure Lucifer fights on the back of Leo, which might reference the astronomical appearance of the planet Venus in the sign of Leo. Other signs of the zodiac turn against one another and fight, including Capricorn, Taurus, Libra, Gemini, Aries, Pisces, Cancer, Scorpio, and Aquarius.¹⁰⁸ The only three zodiac figures left unnamed in the text are Virgo, Libra, and Sagittarius. Additional figures outside the zodiac also join in the battle, including Orion, Draco, and the dog-star Sirius (Egyptian "Soth").¹⁰⁹ At the end of the passage, the zodiac figures and other stars fall from the heavens and land in the ocean, setting the earth ablaze. The book ends with the earth in flames and sky empty of stars.

¹⁰⁶ In *SibOr* 5:414-434, a scepter-bearing messianic figure appears as a star from the sky who fights against Jewish oppressors. References to a messianic star-figure might suggest a later date for the oracle if it references Bar Kokhba. It is also possible that this oracle is an expansion of Balaam's prophecy in Numbers 24:17, which helped to set messianic expectations about Bar Kokhba.

¹⁰⁷ *SibOr* 5.512-531.

¹⁰⁸ The pairs of zodiac figures that fight one another are often 120 degrees apart (i.e. four signs from each other). In ancient astrology, signs that occurred in Trine (i.e. an equilateral triangle) were portentous. Ptolemy of Alexandria names the triangles as including Aries-Leo-Sagittarius, the second as Taurus-Virgo-Capricorn, the third as Gemini-Libra-Aquarius, and the fourth as Cancer-Scorpio-Pisces. In the Sibylline passage, the author may only be invoking the first two triangles in pairing Leo and Capricorn in battle.

¹⁰⁹ Sirius was a significant star in Egypt that signaled the season for the flooding of the Nile during the summer.

The Book of Revelation in the Christian New Testament was written around the same time as *SibOr 5*, and also describes a cosmic, apocalyptic battle. In Revelation 12, a woman clothed with the sun, moon, and twelve stars—likely representing the zodiac—gives birth to a son who is enthroned in heaven. The woman hides for 1,460 days, at the end of which the archangel Michael leads a battle against a dragon figure and the dragon’s angelic followers.¹¹⁰ The battle ends with the dragon, who the author now identifies as Lucifer, and the dragon’s angels being cast down to earth, upon which additional battles commence.

The similarities between *SibOr5* and Rev 12 suggest the reliance of one story on the other or each author drawing from a similar cosmic-apocalyptic tradition. Whatever the origin of the apocalypses may have been, it is God in the narrative who is in control of the cosmos in both narratives.

2.3.2 Testament of Solomon

Although the earliest manuscript of the Testament of Solomon (*TSol*) dates to the fifteenth century, the text is referenced in a Christian apologetic titled *The Dialogue of Timothy and Aquila*, which dates to the fourth century.¹¹¹ A reference to “a work of Solomon” also appears in a text from Nag Hammadi, but it is unclear which work ascribed to Solomon is being

¹¹⁰ Note that the 1,460 days likely represent the Sothic cycle of 1,460 years. Because the Egyptian calendar did not account for a leap year, the Egyptian calendar fell behind the seasonal calendar one day every four years. It took 1,460 years for the calendar to re-sync with the date on which it originally began.

¹¹¹ Dennis Duling, “Testament of Solomon,” in *The Old Testament Pseudepigrapha: Volume 1*, 940.

cited.¹¹² *TSol* was likely written in Egypt due to its use of *decans*, that is the Egyptian three-part division of each zodiac and month into smaller, ten-degree sections of sky.¹¹³

The author of *TSol* interweaves a magical narrative of Solomon with astrology, demonology, angelology, and medicine. Throughout the work, Solomon calls forth demons whom he questions and subsequently binds with a magical ring to work on building the First Temple. Throughout his questioning, Solomon learns that a number of demons reside in certain zodiacal signs and affect humanity in specific ways. In one example, the demon Ornias tells Solomon that Ornias resides in Aquarius and strangles humans whose horoscopic sign is Aquarius on account of their desire for women whose sign is Virgo.¹¹⁴ Ornias also informs Solomon that the archangel Uriel can control him.¹¹⁵ Another example occurs later in the testament when Solomon summons Onoskolis, who has the body of a woman and the feet of a donkey. Onoskolis bears a striking resemblance to depictions of Capricorn.¹¹⁶ Onoskolis tells Solomon that she travels with the Full Moon and that a group of people falsely worship her

¹¹² For a discussion of the dating of *TSol*, see Duling, “Testament of Solomon,” 941-944.

¹¹³ Kocku von Stuckrad has supported an Egyptian origin of the text based on the name of the demons in addition to the 36 decans. See Stuckrad, *Das Ringen um Die Astrologie: Jüdische und Christliche Beiträge zum Antiken Zeitverständnis* (New York: Walter de Gruyter, 2000), 399-401.

¹¹⁴ *TSol* 2:1-4.

¹¹⁵ Note that this is the same archangel that grants Enoch visions in the “Astronomical Book of Enoch.”

¹¹⁶ *TSol*. 4:1-2.

star.¹¹⁷ With a possible connection to Gnosticism, Onoskolis informs Solomon that she had previously been a spirit but a voice called her physical nature into being.¹¹⁸ To consolidate space, I have included a table below that names the demon and the constellation or star in which they reside. The residence of some demons is not noted in the text. When this occurs, I have left the data blank:

Demon Name	Constellation / Star	Reference
Ornias	Aquarius	TSol 2:1-4
Onoskolis	Capricorn	TSol 4:1-2
Asmodeus	Great Bear	TSol 5:4
Beelzeboul	Venus	TSol 6:7
Lix Tetrax	“Southern Star” ¹¹⁹	TSol 7:6
"Seven Demons"	Pleiades ¹²⁰	TSol 8:4

¹¹⁷ Because TSol describes Onoskolis as half human and half goat, it is likely that TSol is referring to the worship of Pan and casting Onoskolis as a female Pan. Further evidence that suggests TSol views Onoskolis as Pan occurs during Onoskolis’s description of being worshiped in caves both secretly and openly (TSol 4:3-4, 6-7.).

¹¹⁸ TSol 4:8.

¹¹⁹ Lix Tetrax is a wind demon who arrives from the south in the summertime (c.f. TSol 7:5). Lix Tetrax tells Solomon that he resides in a star that sits at the tip of the crescent moon in the south. This star could be any number of stars depending on the location and time the phases of the moon are observed.

¹²⁰ The demons describe themselves as being near one another, which likely refers to the Pleiades star cluster visible with the naked eye. In ancient Greek mythology, the Pleiades were

Scepter	Canus Major	TSol 10:1-2
Leontophoron	Leo	TSol 11:4
"Three-headed-dragon"	Draco	TSol 12:1-2
Obyzouth	Algol ("Demon Star") ¹²¹	TSol 13:1-2
"Winged-demon"	"Star of Wood" ¹²²	TSol 14:3-4
Enepsigos	Saturn ("Kronos")	TSol 15:2, 5
Kunopegos ¹²³	-	TSol 16:1
Ocheikon ¹²⁴	-	TSol 17:1
36 Demons	The Egyptian <i>Decans</i>	TSol 18

the daughters of Atlas and Pleione and served as nymphs for Artemis. In TSol 8:11, the final and most powerful of the seven tells Solomon that she will bind Solomon with the chains of Artemis.

¹²¹ The demon is described as having disheveled hair, which is likely Medusa. The star Algol, nicknamed “the Demon Star,” was originally named by Ptolemy of Alexandria as the head of Medusa.

¹²² The Greek translates to “star of wood.” No known reference to such a star exists in ancient astronomical texts.

¹²³ Described as having the upper body of a horse and the lower body of a fish. Matches depictions of Capricorn, who is often depicted as a goat-fish. See Chapter 3 and 4 for images that match this description.

¹²⁴ A giant and one of the Niphilim. May be represented by the constellation Orion.

TSol synthesizes multiple esoteric traditions within a Jewish narrative. Much of the astrology presented within *TSol* undoubtedly predates the text, but at the same time, *TSol* contains astrological interpretations and developments unique to Judaism. It is difficult to compare *TSol* to other Jewish literature as it is the only surviving Jewish astrological work of its kind.

2.3.3 Treatise of Shem

The Treatise of Shem (*TShem*) purports to have been written by Shem, the son of Noah, and consists of a *calendologium* in which the author writes what will happen whenever a year begins during a specific zodiac sign. The work consists of twelve sections that begin with Aries and run counterclockwise, originally concluding with Pisces. The sole known manuscript erroneously ends with Aquarius with a scribal note that the scribe accidentally omitted Aquarius while copying the text and that he included Aquarius at the end of the copy. The festival of Passover is mentioned multiple times throughout the text, indicating that the work is most likely Jewish. Further, each of the twelve chapters of the text discusses the annual flooding of the Nile, suggesting an Egyptian provenance.

TShem is preserved in a single fifteenth-century Syriac manuscript, but James Charlesworth, who is one of the only scholars of the past century to work on it, argues that it was originally written in a Semitic language and dates between 100–31 BCE.¹²⁵ Charlesworth argues

¹²⁵ Charlesworth cites numerous examples of semiticisms in the text. Concerning the dating of the text, see James Charlesworth, “The Treatise of Shem: A New Translation and Introduction,” in *The Old Testament Pseudepigrapha*, vol. 1, 473-475.

for this date by suggesting the Battle of Actium as a *terminus ante quem*, pointing to a passage in the first chapter in which the year begins in Aries:

The king of Rome will not remain in one place...and the year will be bad, for a great war with misery (will occur) on all the earth, especially in the land of Egypt. And many ships will be wrecked when the sea billows.¹²⁶

Charlesworth interprets the allusion to the Roman king as referencing either Mark Antony or Octavian and the wrecking of ships at the Battle of Actium in 31 BCE.¹²⁷

Charlesworth's dating is called into question elsewhere in the passage by other allusions to Roman events. For example, when the year begins in Pisces, the author of *TShem* states that a "black man" will seek to become king, possibly alluding to the accession to the throne of Septimius Severus (r. 193 - 211) or Caracalla (r. 211 - 217). Elsewhere in *TShem*, the author talks about Rome defeating the Parthians and a great earthquake occurring in the Galilee.¹²⁸ Because of the problematic references to events in the Roman empire, it is safer to date the text between the first century BCE–third century CE.

In addition to the difficulty of dating the text based on allusions to historical events, the text's premise of beginning successive years under different zodiac signs is problematic. Because the text begins with the symbol of Aries, it is likely that the author reckoned the start of the year with the spring equinox, which occurred when Aries appeared as the ascendant zodiac in the month of March. The spring equinox served as the beginning of the year in the Hebrew Bible as

¹²⁶ TShem 1:5-10.

¹²⁷ Charlesworth, "Treatise of Shem," 474.

¹²⁸ TShem 3:6-8, 7:19.

well as in the Babylonian calendar, though Egypt and Rome reckoned the beginning of their years in different months.¹²⁹

Charlesworth suggests that the zodiac in *TShem* represents ages under which different zodiac signs preside. Because the axis of the earth is not stationary and rotates slowly, the zodiac appears to shift clockwise by one sign approximately every 2,000 years. At some point in the late first century BCE, the spring equinox began to occur when Pisces—not Aries—was the ascendant zodiac.¹³⁰ Under this interpretation of *TShem*, each zodiacal passage describes a period of roughly 2,000 years when the reckoning of the year based on the vernal equinox shifts by one sign. If the author of *TShem* used the precession of the equinox as a hermeneutical key, we would expect the author’s description of the successive zodiac signs to follow with the precession of the zodiac (i.e. from Aries to Pisces to Aquarius and so on). Instead, the author moves through the zodiac beginning with Aries counter-clockwise to mimic the zodiac’s apparent movement through the night sky. The author begins with Aries and moves to Taurus and then to Gemini and onward.

Although Charlesworth never states it in any of his work on the text, he presumes that the author of *TShem* used a perfectly reckoned solar calendar (i.e. 365.25 days in a solar year) or a calendar with intercalary days/months to ensure that the year started in conjunction with the

¹²⁹ Egypt began the year on the same calendrical date, although this calendrical date shifted one day every four years due to the lack of observing a leap year. Beginning with the Julian calendar and until the 6th c. CE, the Roman start of the year was observed on January 1.

¹³⁰ The most recent precession of the zodiac is believed to have occurred in 2012 with Aquarius becoming the ascendant zodiac at the spring equinox.

spring equinox. It is possible that the author of *TShem* used a lunar or solar calendar for reckoning years that did not include intercalary months. A lunar calendar that did not include intercalary months would observe the shift of the zodiac sign under which the vernal equinox occurred every two to three years.¹³¹ It is also possible that the author used a lost method of calculating the start of a new year in which the way he reckoned a new year changed the zodiac sign under which the year began.

TShem contains too little evidence to determine exactly what the author envisioned as accomplishing with the text. What can be said is that the author held a deterministic view of the zodiac, that is, the zodiacal sign under which events occurred affected those events. By using the calendar, one could know what to expect within a given range of time regarding war, sickness, and harvest—the three themes of each chapter in *TShem*.

2.3.4 2 Enoch

There is no agreed upon date or provenance for *2 Enoch* due to the complexity of its recension history. All manuscripts are Slavonic, with the earliest copy dating to the fourteenth century. The 20 extant manuscripts vary widely, with many manuscripts including stories missing from others. Several scholars have attempted to date the work. Robert Charles suggested a first-century date while Milik argued for a ninth-century date.¹³² Because it is impossible to

¹³¹ That is 12 months x 29.5 days = 354 days in a lunar year. So 365.25 days - 354 days = 11.25 day discrepancy between the solar and lunar years.

¹³² Robert Charles, *The Book of Secrets of Enoch* (Oxford, 1986) and Józef Milik, *The Books of Enoch: Aramaic Fragments of Qumran Cave 4* (Oxford, 1976).

settle on a date that falls within the range of our study of Jewish engagement with astrology, I only briefly examine the use of the zodiac in the text.

In *2 Enoch*, the figure of Enoch is taken on a journey from the first through the tenth heavens, which are summarized as follows:

Heaven	Reference	Description (Recension J)
First Heaven	2En 3-6	Clouds and the angels who govern the stars
Second Heaven	2En 7	Darkness and a prison for those awaiting judgment
Third Heaven	2En 8-10	Paradise as well as a place for torture
Fourth Heaven	2En 11-17	Solar and Lunar Tracks
Fifth Heaven	2En 18	Grigori (i.e. the Watchers)
Sixth Heaven	2En 19	7 Angels
Seventh Heaven	2En 20:1-4	Throne of God
Eighth Heaven	2En 20:5	12 zodiacs, seasons, the means of controlling heat and coolness on the earth
Ninth Heaven	2En 20:6	Houses of the 12 zodiacs
Tenth Heaven	2En 21-22	Face of God

When Enoch reaches the seventh heaven, he views the base of the throne of God and then ascends directly to the face of God at the tenth heaven. On his way between the seventh and tenth heavens, Enoch says that he viewed both the zodiac and each individual zodiac's house. After arriving at the face of God, God tells Enoch many stories, including the story of creation. God breaks the story of creation down day-by-day.

On the fourth day of creation, God created the heavenly bodies in the following order:

Day of Creation	Heavenly Body Created
First (highest)	Kronos / Saturn
Second	Aphrodite / Venus
Third	Aries / Mars
Fourth	The Sun
Fifth	Zeus / Jupiter
Sixth	Hermes / Mercury
Seventh (lowest)	The Moon

This ordering of the planets is not found elsewhere in antiquity.

In *2 Enoch*, the stars, planets, and zodiac are predominantly used to mark the passage of time. In the longer “J Recension” of *2 Enoch*, Andersen translates the text following the creation of the planets on Day 4 as:

And the sun goes in accordance with each animal, and the twelve animals are the succession of the months. And I assigned their names and the animals of their seasons, and their connection with the newborn, and their horoscopes, and how they revolve.¹³³

With this passage however, the fourth day of creation ends and the fifth begins. How natal horoscopy might have been determined is not explained.

¹³³ 2 En 30:6. This text does not exist in the shorter recension of 2 Enoch.

Because it is impossible to date *2 Enoch*, we are unable to use it in our analysis of the zodiac in early-to-late antique Judaism. Even if portions of *2 Enoch* are early, there have undoubtedly been additions and edits to the text. A prime example of the convoluted nature of *2 Enoch* can be found in the many different calendars that the text establishes. First, in the fourth heaven, Enoch states that there are 10 months. The first and sixth month have 42 days while the other 8 months have 35 days. The total days in a year, then, are 364 days.¹³⁴ Following the passage establishing that the year has 364 solar days, Enoch says that the year lasts for 365.25 days. A few chapters later, Enoch establishes yet another solar calendar, although most manuscripts contains different number of days for each month or have months missing.¹³⁵

While it is possible that *2 Enoch* has ancient roots, its recension history and lack of ancient manuscripts render it largely unusable for our study of Jewish astrology beyond establishing a concern to understand correct cosmological order.

2.3.5 Dead Sea Scrolls

Three DSS, all found in Cave 4, contain explicit astrological data.¹³⁶ Two of the fragments are astrological physiognomies (4Q186, 4Q534, and 4Q561) and one is a brontologion (4Q318). Physiognomy is the art of judging someone's character based on their outward

¹³⁴ 2 En 13:3-4.

¹³⁵ 2 En 16.

¹³⁶ Jacobus has summarized other texts among the Dead Sea Scrolls, including the Community Rule (1QS), which contain zodiacal and possible astrological language. The purpose of our discussion of the DSS is to examine the varied ways ancient Jews interacted with the sky. Discussing the explicit zodiacal Dead Sea Scrolls conveys the knowledge of astrology at Qumran.

appearance. Physiognomies exist apart from astrology, such as the fourth century BCE pseudepigraphical work ascribed to Aristotle titled *Physiognomonics*. In *Physiognomonics*, the author argues that just as horse-tamers and hunters can read the disposition of horses and dogs, respectively, based on their appearance, a person can be trained to read the physical characteristics of humans.¹³⁷ One example of physiognomic instruction from *Physiognomonics* is that dancers and gamblers have short arms.¹³⁸

Ptolemy of Alexandria dedicates an entire chapter of *Tetrabiblos* to reading physiognomies based on a number of astrological principles. He predicts physical appearances based on whether the five planets are rising or setting, on the current season, on the visible zodiac signs, and on the appearance of constellations outside the zodiac that have a human shape.¹³⁹ An example of a physiognomy from *Tetrabiblos* is that being born in the upper half of Aries, Taurus, or Leo renders a person strong while being born in the lower half of Aries, Taurus, or Leo renders someone weak.¹⁴⁰

¹³⁷ Aristotle, *Physiognomics in Minor Works: On Colours. On Things Heard. Physiognomics. On Plants. On Marvellous Things Heard. Mechanical Problems. On Indivisible Lines. The Situations and Names of Winds. On Melissus, Xenophanes, Gorgias*, trans. by W. S. Hett. LCL 307 (Cambridge, MA: Harvard University Press, 1936), 805a.15-30.

¹³⁸ Aristotle, *Physiognomics*, 808a.30.

¹³⁹ Ptolemy, *Tetrabiblos*, trans. F. E. Robbins, LCL 435 (Cambridge, MA: Harvard University Press, 1940), 3.11.

¹⁴⁰ Ptolemy says that the non-human zodiac forms convey their animal characteristics to people, hence people born under the sign of Aries, Taurus, and Leo have strong bodies but weak legs. Ptolemy, *Tetrabiblos*, 3.145.

The two fragmentary physiognomies from Qumran use the sign—and possibly the specific portion of the sign—under which someone was born to interpret both their physical characteristics as well as the allotment of good and evil in their personal make-up. It is impossible to know if these physiognomies were first written at Qumran or copied from elsewhere. The Qumran physiognomies can be read in two ways: descriptive or prescriptive. If descriptive, the physiognomies are genethlical in nature in that they foretell how a newborn will eventually look and act. If prescriptive, the physiognomies allow judgements to take place based on the appearance of an adult or youth. The Qumran physiognomies were likely used in the latter sense as there is little or no evidence of children living or being born at Qumran.¹⁴¹

The fragments of 4Q186 contain three different physiognomies, the first of which is the most complete. It states that someone born in the foot of the bull is meek, has long and thin toes and limbs, and long and lean thighs.¹⁴² The person is said to have a spirit consisting of nine parts with six parts in the “House of Light” and three parts in the “Pit of Darkness.” The second fragment of 4Q186 contains a description of what the person will look like in addition to having a spirit that consists of eight parts in the “House of Life” and one part in the “Pit of Darkness.” This fragment unfortunately only contains the phrases “...is born...” and “...his animal is...” with the individual’s birth month and zodiac sign not surviving.

¹⁴¹ Jodi Magness, *The Archaeology of Qumran and the Dead Sea Scrolls* (Grand Rapids: Eerdmans), 172-175. The Damascus Document and additional sectarian scrolls indicated members of the wider Essene movement were married and had children.

¹⁴² The first physiognomy of 4Q186 bears a striking similarity to the physiognomy discussed in fn. 140 in Ptolemy’s *Tetrabiblos*.

The sole fragment of 4Q561 contains even less data, with a description of an individual who will have a long and nice nose, even teeth, a somewhat thin beard, and thick and smooth limbs. The allocation of the person's personal make-up in light or darkness did not survive. The birth month and zodiac sign are also missing from this fragment.¹⁴³

The final astrological text from Qumran is 4Q318, otherwise known as 4QBrontologion. A brontologion is a type of meteorological astrology in which the day, the position of the planets, and the position of the zodiac are noted at the moment of thunder. There is little evidence of meteorological astrology in Greece prior to the Byzantine period but ample evidence from ancient Mesopotamia. In fact, Tablets 36-49 of the Babylonian astrological and omen text *Enuma Anu Enlil* deal with weather omens, with tablets 42-46 dealing specifically with thunder in relation to the position of the sky.¹⁴⁴ 4QBrontologion operates with a 360-day solar calendar. Such a calendar is not attested elsewhere in the DSS, but the premise for a 360-day calendar exists in *I Enoch*, where it is noted as an incorrect calendar.¹⁴⁵ A 360-day calendar also existed for astrological purposes in Mesopotamia from the second millennium BCE to the sixth century BCE.¹⁴⁶

¹⁴³ See 4Q561 in Martínez and Tigchelaar, *The Dead Sea Scrolls Study Edition*.

¹⁴⁴ Erlend Gehlken, *Weather Omens of Enuma Anu Enlil: Thunderstorms, Wind and Rain (Tablets 44-49)* (Leiden: Brill, 2012), 5-6.

¹⁴⁵ The author states that those who follow a 360-day calendar fail to add the 4 epagomenal days that bring the year to 364 days. 1 En 75:1-3; 82:5-12.

¹⁴⁶ Some Mesopotamian calendrical documents contain 12 months of 30 days, possibly in case a month was determined to contain 30 days after the fact. For a discussion of Mesopotamian calendars, see the previous discussion under the 'Calendrical' section. Mark Cohen, *The Cultic Calendars of the Ancient Near East* (Bethesda, Md.: CDL Press, 1993). 4-5; Jonas Greenfield,

4QBrontologion consists of two parts: a calendar that records the position of the New Moon in relation to the day and the zodiac sign in which it occurs; and a set of predictions based on which sign of the zodiac the moon resides during the sound of thunder.¹⁴⁷ The predictions contained within 4QBrontologion state that if it thunders in Taurus, the country will face hard labor and war; and if it thunders in Gemini, strangers will bring “terror and affliction.”¹⁴⁸ 4QBrontologion can be interpreted as either prescriptive as it predicts future events or descriptive in describing and interpreting occurrences of the past.

The astrological data contained within the DSS grant insight into the breadth of Jewish engagement with astrology. With so few fragments of what were once longer astrological texts, it is difficult to know if such texts were merely preserved or if they served a purpose within the Qumran community. From what is preserved, it is apparent that the Qumran community maintained a range of astrological practices that can be found elsewhere in the ancient Mediterranean and Near East, including Mesopotamia, Egypt, and Greece.

Michael Sokoloff, David Pingree, and Ada Yardeni, “An Astrological Text from Qumran (‘4Q318’) and Reflections on Some Zodiacal Names,” *Revue de Qumrân* 16.4 (64) (1995): 511–12.

¹⁴⁷ David Pingree, “An Astrological Text from Qumran (‘4Q318’) and Reflections on Some Zodiacal Names,” *Revue de Qumrân* 16.4 (64) (1995): 517.

¹⁴⁸ Jacobus offers summarizes research into the Brontologia, including Milik’s comparison of 4QBrontologion with a 10th c. CE agricultural work titled *Geoponia*, which contains somewhat similar predictions to thunder in Taurus and Gemini. Helen Jacobus, “Calendars and Divination in the Dead Sea Scrolls: The Case of 4Q318: Zodiac Calednar and Brontologion,” in *Cosmologies: Proceedings of the Seventh Sophia Centre Conference* (Lampeter: Sophia Centre Press), 2010 31-33; 4QBrontologion, frag. 8.

2.3.6 Rabbinic Literature

The rabbinic sages viewed astrology with a mixture of suspicion and belief. Rabbinic astrological discussion falls into two primary categories: first, stories that rely on astrology to drive a narrative forward and second, debates about whether astrology exists and if it does, whether it has power over Israel. Of course, it is impossible to discern any holistic set of beliefs from debates found in rabbinic works. What we can deduce, however, is that because astrological beliefs were debated by the rabbis, such beliefs must have been prevalent enough to warrant discussion.

One example of the rabbinic use of astrology as narrative appears in b. Sotah 12b, which retells the story from Exodus where Pharaoh orders newborn Hebrew males thrown into the Nile.¹⁴⁹ In this retelling, the rabbis relate that Pharaoh's astrologers foretell of a Jewish savior who will be born in Egypt but will be destroyed by water. In response to the astrologers, Pharaoh orders all newborn Hebrew males to be thrown into the Nile. The rabbis offer a parenthetical comment at this point and assert that the astrologers misunderstood their reading of the stars and in fact foretold Moses' downfall at Meribah in Numbers 20:2-13 and not at the Nile. In this narrative, astrology exists but the implication is that Pharaoh's astrologers failed to read God's true intention in the stars.

In a passage in *Genesis Rabbah*, Rabbi Huna reports that God's desire to create Israel preceded any act of creation. Rabbi Huna compares God's plan to create Israel to a fatherless king ordering that ink and pen be purchased for his son. When people realize the king has no son,

¹⁴⁹ Ex 1:15-22.

they assume that the king is an astrologer who foresees the birth of a future son.¹⁵⁰ In this story, astrology is judged neither permissible nor forbidden. Instead, the concept of astrology is used as a given to express a truth about God. It is interesting that the fictional astrologer is a king, which suggests the existence of a royal or elite class of astrologers similar to that claimed by Firmicus Maternus in the fourth-century work *Matheseos* and found in the Greek *Alexander Romance*.¹⁵¹

The second category of rabbinic use of astrology is the debate about whether astrology exists, and if it does, to what extent it has power over Israel. In b. Shabbat 156a, Rabbi Ashi argues that the day of the week on which someone is born determines their destiny based upon what God created on that day of the week in Genesis 1. For example, Rabbi Ashi says that he and Dimi ben Kakutza were born on the first day of the week (Sunday). Rabbi Ashi became a leader of a yeshiva while Kakutza became the leader of a group of thieves because the first day of the week was the day God separated light from darkness.

Following Rabbi Ashi's discussion of day-based destiny, Rabbi Hanina argues that it is not the constellation of the day that controls someone's fate, but instead the constellation of the hour under which one is born. At no point in Rabbi Ashi's previous discussion of day-based destiny does he describe constellations as operative in determining one's fate. Rabbi Hanina's statement against day-based astrology, however, re-frames Rabbi Ashi's discussion in astrological terms.

¹⁵⁰ Genesis Rabbah 1.4-8.

¹⁵¹ According to Maternus, astrology was created and practiced by Pharaoh Nechepso and his priest Petosiris. In *The Greek Alexander Romance*, trans. Richard Stoneman (London: Penguin Books, 1991), 1.3, Nectanebo II of Egypt uses an astrology board with Olympias.

Rabbi Hanina, after introducing natal astrology, describes how each of the seven ancient planets affects a person. For example, one born under the sign of Mars will spill blood and work as a doctor, thief, animal slaughterer, or circumciser. One born under Jupiter will be just. One born under Mercury will be enlightened. Rabbi Hanina curiously describes Mercury as being the closest planet to the sun. No surviving ancient text orders Mercury next to the sun, which begs the question of where the rabbis and their editors obtained their astronomical information.

The idea of being born under a planet likely refers to the planet's zodiacal house. That is, each planet rules over specific portions of the zodiac. Ptolemy of Alexandria says that Mars rules over Scorpio and Aries; Jupiter over Sagittarius and Pisces; and Mercury over Gemini and Virgo. Rabbi Hanina, by referring to the planet under which one is born, is likely referring to the constellation under which one is born by means of the constellation's ruling planet.

After describing how each planet affects one's destiny, Rabbi Hanina asserts that Israel has its own constellation that influences the Jewish people. Following Rabbi Hanina's statement is a litany of rabbis who argue that Israel does not have a constellation and that astrology has no power. Rabbi Hanina employs a concept developed by Ptolemy of Alexandria known as geographic astrology. In *Tetrabiblos*, Ptolemy argues that different countries and their people are influenced by certain constellations and the planets that rule over those constellations. Ptolemy argues that Coele-Syria, Judaea, and Idumaea are ruled by Aries and Mars, which renders the people of those lands bold, godless, and scheming.¹⁵²

¹⁵² The Greek used for "godless" is *atheoi*. Jews were often viewed as godless due to their rejection of Greco-Roman cults and practice of monotheism or monolatry. Ptolemy, *Tetrabiblos* 2.75-79.

The rabbis arguing against Rabbi Hanina use several proof texts to establish that Israel does not have an astrological sign. Some of these include Abraham's counting of stars in Genesis 15 as a failed attempt to interpret that he will not have a son; a verse from Jeremiah that instructs Israel not to follow the trends of other countries; the failed prediction of a Chaldean astrologer against the daughter of a rabbi; and the failed predictions of a Chaldean astrologer about a rabbi's son turning into a thief.¹⁵³

The rabbis who argue against the use of astrology far outweigh those who argue in favor of astrology, but the significance lies in the fact that astrology is debated at all. Rabbinic texts offer insight into the types of astrological practices that may have been prevalent among those who authored and edited the Babylonian Talmud. The practices detailed therein include natal astrology, geography-based astrology, and interpretations of the zodiacal houses. All of these practices require an erudite knowledge of the cosmos, and the fact that a number of rabbis in the Babylonian Talmud speak about them favorably suggest there were rabbinic sages who taught astrology.

2.3.7 Sepher Ha-Razim

In 1963, Mordecai Margalioth combined multiple fragments from the Cairo Genizah as well as medieval magical manuscripts to reconstruct the *Sepher Ha-Razim* (SHR), which he

¹⁵³ b. Šabb.156a-157a.

dated to the third-to-seventh century.¹⁵⁴ It is likely that much of it was written in the earlier range of dates, with the text's final compilation taking place toward the latter end of the range.¹⁵⁵

SHR begins with the angel Raziel gifting Noah a magical text. Noah learns many mysteries from the text including the correct movements of the sun and moon, astrological practices, and how to interpret thunder and lightning, all of which is then passed down from generation to generation to Solomon.¹⁵⁶

Following this introduction, SHR describes seven heavens, explaining what occurs in each and the names of the angels who rule them, and magical instructions to invoke those angels to bring about specific results. One example of an angelic spell from the third heaven instructs a reader to invoke the angels of speed if he or she wants to ensure that a certain race horse wins. All he or she must do is copy an incantation on a thin silver plate and conceal that plate in the specified horse's racing lane.¹⁵⁷

SHR presents astrology as a controllable force in the universe. The entities of the heavens can be bent to the will of humanity if the right incantation is recited and the proper ingredients procured. For example, in the fourth heaven, a reader can halt the chariot of Helios and ask the

¹⁵⁴ For a description of Margalioth's work as well as the manuscript tradition for SHT see Michael Morgan, "Introduction," in *Sepher Ha-Razim: The Book of Mysteries*, trans. Michael Morgan (Chico, CA: Scholars Press, 1985), 1-13.

¹⁵⁵ Morgan, "Introduction," in *Sepher Ha-Razim*, 8-11.

¹⁵⁶ Moses' ownership of magical texts is referenced in Jub 10:12-14. The view of Solomon as possessing magical powers can be found in *The Testament of Solomon* and Josephus, *Ant.* 8.42-45, as discussed previously in this chapter.

¹⁵⁷ *Sepher Ha-Razim*, Third Heaven 35-40.

sun questions about life and death if the reader recites a list of angelic names seven times, reads a spell, and burns a concoction of spices.¹⁵⁸

SHR presents a mystical tradition in which a person can connect directly to the divine apart from the instruction of rabbis or priests. SHR does not occur in a vacuum but follows in the tradition of esoteric texts that came before it, such as the Enochic literature and the astronomical texts from Qumran. All of these present a means for a person to commune with the heavens.

The evidence for Jewish engagement with astrology is vast but no more so than elsewhere in the ancient Mediterranean. Astrology was one fatalistic practice that anyone could access with the right teaching. By looking up and observing the movements of the night sky, one could gaze into the heavens themselves. It should be no surprise that astrology was popular among sectarian movements as evidenced in the DSS and in later esoteric literature such as SHR.

A few key features of the astrological texts discussed in this section are worth noting. First, a preponderance of Jewish astrological texts have an Alexandrian or Egyptian provenance, including *SibOr5*, *TSol*, and *SHR* as well as texts discussed in the previous sections, including the Sethian texts from Nag Hammadi and possibly *I Enoch* as evidenced by the influence of the Egyptian calendar.

The city of Alexandria was home to astronomical and astrological traditions in addition to Ptolemy's contributions in the second century. The fourth-century Roman astrologer Firmicus Maternus frequently cites the pseudepigraphal, second-century BCE astrological work of

¹⁵⁸ *Sepher Ha-Razim*, Fourth Heaven 25-43.

Pharaoh Nechepso and his high-priest Petosiris.¹⁵⁹ In the fourth-century *Greek Alexander Romance*, Pharaoh Nectanebo visits the court of Philip II of Macedon disguised as an Egyptian magician. In the text, Nectanebo meets with Olympia and casts the horoscope of the unborn Alexander using an astrology board to divine Alexander's future.¹⁶⁰

While Alexandria served as one incubator for the practice of astrology, evidence from the Babylonian Talmud suggests a continued development of astrological practices in Babylonia. The Jerusalem Talmud does not contain the same discussions about whether astrology is valid, and if it is, whether it has any authority over Israel. The evidence from the Babylonian Talmud suggests that Babylonian Jews were more concerned with astrology than Palestinian Jews. Further, the two rabbinic figures who argue in favor of astrology in the Babylonian Talmud—Rabbi Ashi and Rabbi Hanina—both lived in Babylon.

The final section of this chapter surveys a series of references in the writings of Philo and Josephus that describe the Jerusalem temple in astronomical and astrological terms

2.4 Cultic

In this section, Philo's cosmological interpretation of Jewish history and the menorah as well as his rejection of Alexandrian astrology are briefly examined, followed by Josephus'

¹⁵⁹ Nechepso and Petosiris are said to have lived in the 7th c. BCE. See Firmicus Maternus, *Ancient Astrology: Theory and Practice = Matheseos Libri VIII* (Abingdon, MD: Astrology Classics, 2005), 3.1.1, 4.0.5, and 8.5.1.

¹⁶⁰ *The Greek Alexander Romance*, 1.3.

interpretation of omens that preceded the First Jewish Revolt and his description of the tabernacle in cosmological terms.

2.4.1 Philo: Joseph's Dream, Negation of Alexandrian Astrology, and the Menorah

In his treatise *On Dreams*, Philo re-interprets Joseph's dream of his brothers worshiping him as a reference to the zodiac.¹⁶¹ Philo argues that Joseph viewed himself as the twelfth zodiac sign, hence completing the zodiac and worthy of worship by the other signs of the zodiac (i.e. his brothers). Philo does not name a specific zodiac sign in reference to Joseph or display any belief in the zodiac as dictating fate. The zodiac is merely a means of understanding the story of Joseph and his brothers.

Elsewhere in his writings, Philo derides those who worship the stars as failing to worship the one who created them. In describing the ascetic Therapeutae who lived outside of Alexandria in *On the Contemplative Life*, Philo disparages people who worship the cosmos:

But what shall we say of those men who worship [τιμῶντας] the perfect things made [of the four elements], the sun, the moon, and the other stars, planets, or fixed stars, or the whole heaven or the universal world? And yet even they do not owe their existence to themselves but to some creator whose knowledge has been most perfect, both in mind and degree.¹⁶²

¹⁶¹ Philo, *On Dreams* in *On Flight and Finding. On the Change of Names. On Dreams*, trans. by F. H. Colson and G. H. Whitaker. LCL 275 (Cambridge, MA: Harvard University Press, 1934), 2.112-113.

¹⁶² Philo, *On the Contemplative Life* in *Every Good Man is Free. On the Contemplative Life. On the Eternity of the World. Against Flaccus. Apology for the Jews. On Providence*, trans. by F. H. Colson. LCL 363 (Cambridge, MA: Harvard University Press, 1941), 5.

This “worship” could be in reference to the astral cult of Serapis, which flourished at the time of Philo’s writing, or an otherwise unknown Hellenistic cult based on Babylonian star worship, as argued by Joan Taylor.¹⁶³ Another interpretation could be that the word translated as “worship”—τιμῶντας—is better translated as “honored” and references basic astrological practices, which were widespread in Alexandria as evident in the writings of Ptolemy of Alexandria in the second century, less than a generation following Philo’s death. Though we do not have access to the sources Ptolemy drew from *Tetrabiblos*, he likely inherited an already established tradition.

While Philo shows disdain for astrology, he viewed the astronomical ordering of the cosmos as evidence of a higher power. In *Who Is the Heir of Divine Things*, Philo describes the temple menorah as an earthly representation of a heavenly reality.¹⁶⁴ The central stem represents the sun with three of the stems representing the planets above the sun: Saturn, Jupiter, and Mars; and three of the stems representing the planets below the sun: Mercury, Venus, and the Moon. Philo notes that Mercury is closest to the sun and that the Moon is closest to the air of the earth, which suggests Philo is working with an ordering of the planets that we later see represented in

¹⁶³ Joan Taylor and David Hay, “Astrology in Philo of Alexandria’s *De Vita Contemplativa*,” *ARAM Periodical* 24 (2012): 307.

¹⁶⁴ Philo, *Who Is the Heir of Divine Things* in *On the Confusion of Tongues. On the Migration of Abraham. Who Is the Heir of Divine Things? On Mating with the Preliminary Studies*, trans. by F. H. Colson and G. H. Whitaker. LCL 261 (Cambridge, MA: Harvard University Press, 1932), 224-225.

rabbinic writings.¹⁶⁵ Philo's planetary ordering comes from Plato and does not represent the ordering that Ptolemy likely inherited from Hipparchus.

2.4.2 Josephus: Omens and the Tabernacle (*Jewish War* 6 and *Antiquities*. 3)

In *The Jewish War* (*War*), Josephus lists a series of omens that foretold the coming war with Rome and ultimately would result in the destruction of the temple. At the time these omens appeared, Josephus says that they were interpreted in a positive light, although they were harbingers of destruction. The primary omen that Josephus notes was a star (i.e. a comet) that resembled a sword suspended over Jerusalem. Josephus also remarks that during the night of the Festival of Unleavened Bread, the temple shone brightly for half an hour making it appear as if it was day. Josephus says that the public viewed the light as a good sign but that the scribes interpreted the light as an ill omen. An interesting feature of this text is that Josephus refers to a class of temple scribes who were responsible for interpreting omens. The existence of such a class is known from Babylon, Egypt, and elsewhere in the ancient Near East, so it should be no surprise to find a similar class of omen-reading scribes at the Jerusalem temple.¹⁶⁶

In *Antiquities*, Josephus describes the desert tabernacle of Exodus in cosmological terms.¹⁶⁷ The tabernacle space had three divisions, representing the three divisions of the cosmos: land, sea, and the heavens. While the priests could access the first two divisions, only

¹⁶⁵ See b. Šabb 156a.

¹⁶⁶ Josephus, *The Jewish War, Volume III: Books 5-7*, trans. H. St. J. Thackeray, LCL 210 (Cambridge, MA: Harvard University Press, 1928), 6.288-300.

¹⁶⁷ Josephus, *Ant.* 3.179-187.

God could access the third. Josephus then describes the twelve loaves of showbread as reflecting the twelve months of the year. Josephus appears to describe a solar calendar in his description and not a lunar calendar, which would require the occasional thirteenth intercalary month.

Josephus describes the menorah as containing seventy pieces, equating to ten pieces per branch. Each branch represents a planet, with each branch's division representing the ten-degree divisions of the sky through which the planet moves. Josephus here is referencing the Egyptian *decans*, although in a circuitous way. The *decans* were the three-part division of the 12 zodiac spaces, which resulted in a total of 36 *decans*. Each Egyptian *decan* occupied ten degrees of space for a total of 360 degrees. So, while Josephus is describing the *decans* in terms of planetary divisions and not divisions of the zodiac, he arrives at the same result of ten-degree segments of the sky. Moving beyond the menorah, Josephus says that the veils in the tabernacle are divisible into four pieces, each representing one of the four classical elements: earth, wind, water, and fire.

Josephus concludes his description of the tabernacle as a representation of the cosmos by interpreting every aspect of the high priestly garment as reflecting a different feature of the cosmos. The linen worn by the priest represents the element of earth because of its production from flax. Josephus describes the blue robe worn above the linen as representing the sky due to its color. The bells that hung at the end of the blue robe represent thunder. Because the ephod is made of four colors (Exodus 25:6: gold, blue, purple, and scarlet), it represents the four elements. The high priest's breastplate represents the earth because it is placed in the middle of the ephod and the earth is in the middle of the cosmos. The girdle of the priest represents the ocean because the ocean encircles the world like the girdle encircles the priest. The high priest's ephod has a

golden clasp at each shoulder, which Josephus interprets as the sun and moon. The twelve stones of the high priest's breastplate represent the twelve months of the zodiac, which Josephus equates as the same (another indication of the use of a solar calendar). The mitre on the high priest's head represents the heavens because it is both blue and has the name of God inscribed upon it.

Josephus concludes his description of the tabernacle by emphasizing the wisdom of Moses. Because it was Moses who constructed the tabernacle under God's instruction, Moses possessed the same wisdom of the cosmos as would later be discovered by the Greeks and Romans. Though here Josephus describes a cultic setting, he attempts to demonstrate that the Hebrews were the true progenitors of knowledge when it came to the ancient sciences. In this description, Moses already knew of the four elements, the tripartite division of the universe, and the twelvefold division of the sky into the zodiac.

Both Philo and Josephus offer descriptions of the Jerusalem temple and its implements in relation to the cosmos. Philo wrote in Alexandria during the first century BCE—first century CE, where he would have come into contact with astrology and astral based religions. Josephus, writing from Rome in the first century, claims in an autobiographical account to have been from a priestly family before being captured during the First Jewish Revolt.¹⁶⁸ Josephus' description

¹⁶⁸ Josephus *The Life in The Life. Against Apion* trans. by H. St. J. Thackeray, LCL 186. (Cambridge, MA: Harvard University Press, 1926), 1.

of the tabernacle in cosmological terms provides insight into how priests may have viewed the Jerusalem temple.

Philo might also have come from a priestly family. In *De Viris Illustribus* Jerome (fourth–fifth) describes Philo as “an Alexandrian of the priestly class.” In addition, Philo’s high political and social status in Alexandria suggest he was from an elevated class, such as the priests.¹⁶⁹

If the temple and its implements served as a reflection of the cosmos, it should be no surprise that Philo and Josephus offer similar descriptions of the menorah. Every element within the temple had a heavenly counterpart. Philo and Josephus grant us a view into the priestly conception of Jewish cult and the cosmos.

2.5 Summary and Conclusion

The goal of this chapter has been to display the varied ways in which ancient Jewish literature incorporates cosmological knowledge. In the historical section, various authors claimed that Enoch, Seth, or Abraham were the originators of the world’s cosmological knowledge. Enoch and Seth are part of revelatory traditions in which cosmological knowledge could only be disclosed by God. Abraham, on the other hand, is depicted as a Greco-Roman astronomer who discovered cosmological knowledge by observing the heavens. In the calendrical section, the calendars of Mesopotamia, Greece, and Egypt were surveyed to provide a context for the

¹⁶⁹ Philo was selected to speak on behalf of the Alexandrian Jews to the emperor Gaius Caligula in Rome. See Philo, *On the Embassy to Gaius* in *On the Embassy to Gaius. General Indexes* trans. by F. H. Colson. LCL 379 (Cambridge, MA: Harvard University Press, 1962).

development of the priestly lunisolar calendar in Israel as well as the development of the Enochic solar calendar. In the astrological section, authors interacted with the zodiac and stars in a number of ways to understand past, present, and future events. In the cultic section, Philo and Josephus describe the menorah and other Jewish elements in cosmological terms, suggesting a priestly tradition of understanding the temple as a microcosm of the universe.

The remainder of this study is concerned with the Helios-zodiac cycle in ancient Palestinian synagogues. The literary and historical sources discussed in this chapter provide a context for the cosmological narratives in which these fourth-sixth century mosaic panels appear. Though much of the literature discussed in this chapter predates the emergence of monumental synagogues, it attests to a continuous tradition of Jewish engagement with cosmological knowledge beginning in the Persian period and through the Late Roman-Byzantine period.

Chapter 3: The Helios-Zodiac Cycle in the Synagogues of Ancient Palestine

The ancient synagogues of Na'aran, Beth Alpha, Huseifa, Susiya, Hammath Tiberias, Huqoq, Wadi Hamam, and Yafia, are paved with mosaic floors depicting square Helios-zodiac cycle panels, while mosaic floor of the En Gedi synagogue contains an inscription listing the signs of the zodiac and the seasons. The panels consist of a central medallion showing the Greco-Roman god Helios/Sol encircled by a zodiac wheel with depictions of the twelve signs of the zodiac, and personifications of the four seasons and/or winds in the corners.¹ In this chapter, I survey the synagogue that contain Helios-zodiac cycles and analyze their Helios-zodiac panels. I devote special attention to contemporary Greco-Roman literature concerning the Helios medallion, the zodiac, and the seasons. In Chapter 4, I survey contemporary depictions of Helios-zodiac cycles in Greek and Roman material culture to provide a context for the form and function of the Helios-zodiac cycle in synagogues.

Louis-Hugues Vincent first attempted to interpret the Helios-zodiac cycle in 1921 following the discovery of the Na'aran Helios-zodiac panel. Vincent believed the Na'aran panel displayed a hybridized Jewish and Greco-Roman astral cult.² In 1928, Eleazar Sukenik

¹ I refer to Helios/Sol as “Helios” unless a more specific deity is being discussed, such as Sol Invictus. Likewise, I refer to the seasons/winds as “seasons” unless discussing the specific representation of the four winds as seasons.

² Vincent does not name any specific “cultes astraux,” but he may have had Mithraism in mind. Louis-Hugues Vincent and Pierre Benoit, “Un Sanctuaire dans la Region de Jericho, La

discovered a second Helios-zodiac cycle at Beth Alpha, about which he wrote:

We see here pictorial expression of belief in the influence of the planets on the affairs of this world. Even Judaism could not withstand this universal influence which permeated all religions and peoples in the ancient world...³

Sukenik was not interested in exploring synagogue zodiac imagery any further. In fact, the rest of his one-page interpretation of the Beth Alpha zodiac panel deals with its potential influence on Medieval Jewish astrological thought.⁴

The first scholar to present a holistic theory of the Helios-zodiac cycle was Erwin Goodenough. In a multi-volume work published between 1953–1968, Goodenough argued that a Hellenistic and mystical form of Judaism was the creative force behind pagan symbols in Jewish art. Goodenough further suggested that a Hellenistic and mystical form of Judaism existed in opposition to “literary” Rabbinic Judaism.⁵

Goodenough proposed that the Helios-zodiac cycle represents a type of panopticon depicting God’s view and power over the universe.⁶ Goodenough’s theory, however, has been challenged. Michael Avi-Yonah and Lee Levine each argue that the Helios-zodiac cycle should

Synagogue de Na’arah,” *Revue Biblique* 68, no. 2 (April 1961): 168.

³ Eleazar Lipa Sukenik, *The Ancient Synagogue of Beth Alpha: An Account of the Excavations Conducted On Behalf of the Hebrew University, Jerusalem/פרשת בית הכנסת העתיק בבית אלפא: פרשה* (Piscataway, NJ, Georgias Press: 2007), 56.

⁴ Sukenik, *Beth Alpha*, 55-56.

⁵ Erwin Goodenough, *Jewish Symbols in the Greco Roman Period: Abridged Edition*, ed. by Jacob Neusner (Princeton: Princeton, 1988),59-62.

⁶ Goodenough, *Jewish Symbols*, 168-169.

be interpreted as calendrical, with Avi-Yonah suggesting that the panel represents the priestly calendar of the pre-70 Jerusalem Temple.⁷ Zeev Weiss interprets the zodiac panel at Sepphoris narratively as a story of promise and redemption told through each successive register of the mosaic.⁸ Jodi Magness argues that Goodenough's hypothesis is more accurate, suggesting that the Helios-zodiac cycle evidences a mystical, non-rabbinic form of Judaism.⁹

In this chapter, I show that the Helios-zodiac cycle depicted in ancient synagogues embodies a number of these theories. No panel is *only* a calendar or *only* a depiction of a Jewish narrative. Instead, each panel uniquely participates in a shared cosmological *milieu* that engages with ancient science, cosmology, geography, and literature. The following is a survey of synagogues decorated with Helios-zodiac cycles.

⁷ See Michael Avi-Yonah, *Art in Ancient Palestine* (Jerusalem, Magnes Press, 1981) and Lee Levine, *Visual Judaism in Late Antiquity: Historical Contexts of Jewish Art* (New Haven: Yale University Press, 2012), 254-256.

⁸ Weiss argues for a narrative interpretation of synagogue mosaics that contain panels depicting the *Aqedah*, the zodiac, and the temple, where each respective panel represents a story of promise (*Aqedah*), eternity of the promise (zodiac), and the redemption of Israel (ark and *menorot*). In his volume, he relies upon the Sepphoris and Beth Alpha synagogues as evidence. It is unclear if he interprets other synagogue mosaics in the same way. Zeev Weiss, *The Sepphoris Synagogue: Deciphering an Ancient Message through Its Archaeological and Socio-Historical Contexts* (Jerusalem: Israel Exploration Society, 2005), 239-256.

⁹ See Jodi Magness, "Heaven on Earth: Helios and the Zodiac Cycle in Ancient Palestinian Synagogues." *Dumbarton Oaks Papers* 59 (2005): 1-52.

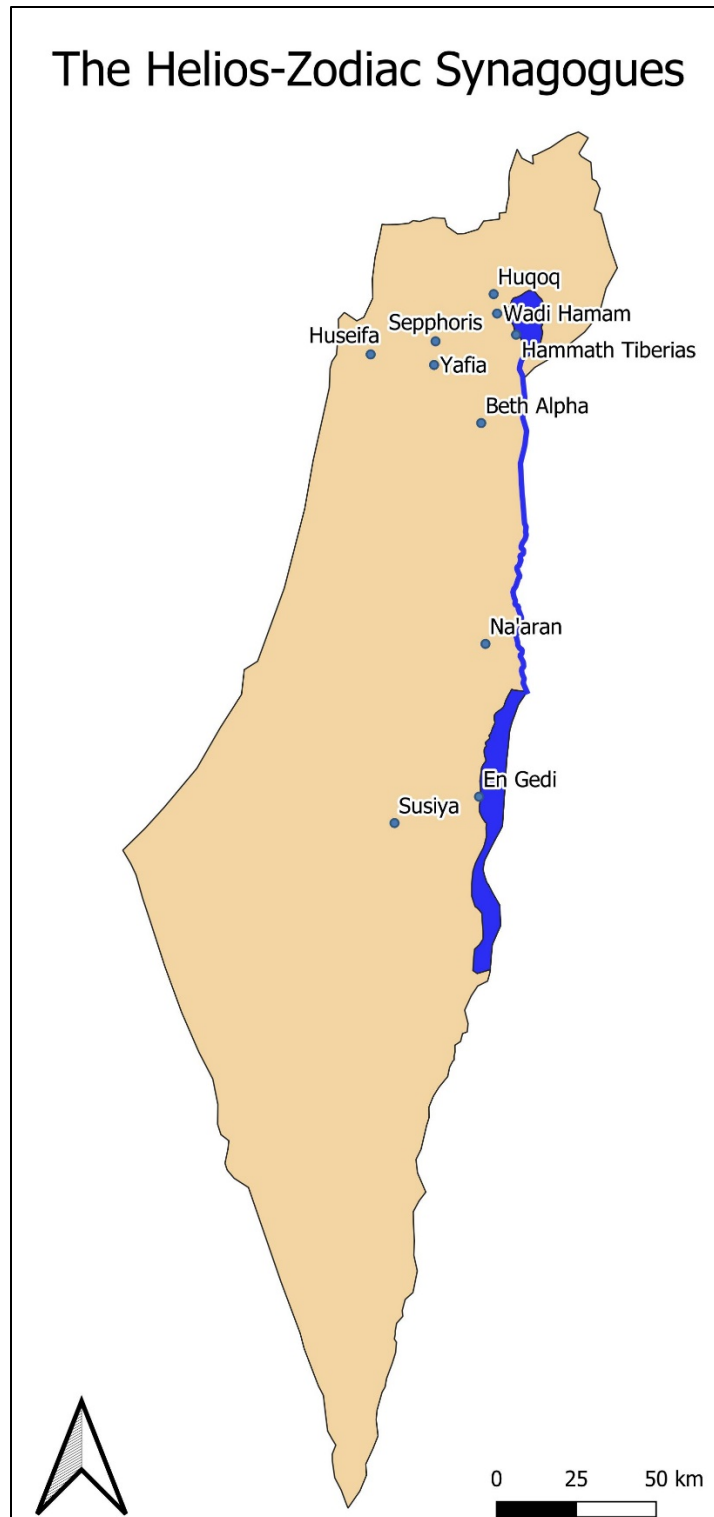


Figure 1. Map of Late Roman-Byzantine synagogues containing Helios-zodiac cycles in ancient Palestine. Each synagogue in the map above is discussed in the current chapter.

3.1 Na'aran Synagogue

3.1.1 Basic Information

The village of Na'aran is located approximately 4 km northwest of Tell es-Sultan (Tel Jericho) and 6.5 km from Eri (modern Jericho).¹⁰ Na'aran is mentioned in Joshua 16:7 and 1 Chronicles 7:28 as belonging to the tribe of Ephraim and located near Jericho. Amos 2:7 may also refer to Na'aran.¹¹ In the early Roman period, Josephus mentions Na'aran as “Neara” when describing Herod Archelaus’ appointment as ethnarch.¹² Eusebius refers to Na'aran as “Naorath” in the *Onomasticon* as a “Villula Judeaorum” north of Jericho.¹³ During his 1873–1874 survey of Palestine, Charles Clermont-Ganneau surveyed the Jericho region, interviewing locals and identifying the modern town of 'Ayn ed Dûk as ancient Na'aran.¹⁴

3.1.2 Excavation and Research

The synagogue of Na'aran was brought to light by the explosion of a Turkish shell in 1918 during the final days of World War I. In a *Times (of London)* article from October 10, 1919,

¹⁰ Vincent and Benoit, “Un Sanctuaire,” 163.

¹¹ The NRSV translates the second half of Amos 2:7, “A father and son go into the same girl so that my holy name is profaned.” The word translated as “girl” is הַנְּעָרָה and could reference Na'aran in line with the spelling of the village that appears in Joshua 16:7: וְנִצְרָתָהּ.

¹² Josephus, *Jewish Antiquities, Volume VII: Books 16-17*, trans. by Ralph Marcus, Allen Wikgren. LCL 410 (Cambridge, MA: Harvard University Press, 1963), 17.340.

¹³ Eusebius, *The Onomasticon: Palestine in the Fourth Century A.D.*, trans. by G. S. P. Freeman, ed Joan E. Taylor (Jerusalem: Carta, 2003), 136.24.

¹⁴ Charles Clermont-Ganneau, *Archaeological Researches in Palestine*, vol. 2 (Jerusalem: Raritas, 1896), 21-22.

Clermont-Ganneau describes a photograph of a dedicatory inscription from the exposed portion of the mosaic that he had received from Major. A. M. Furber, a British military officer. Clermont-Ganneau provided a translation of the inscription and drew comparisons between the Na'aran inscription and inscriptions from Kafr Kanna and Sepphoris.¹⁵ Later in 1919, Vincent and Marie-Joseph Lagrange of the École Biblique began excavating the Na'aran synagogue. Vincent published two preliminary reports on the excavation in the *Revue Biblique* in 1921, and the final report was published posthumously with additional notes added by Pierre Benoit in 1961.¹⁶

Vincent initially suggested a *terminus post quem* of the second century for the synagogue, assuming that mosaic floors were found only in synagogues built after the second century.¹⁷ He later altered his proposed construction date to the first century BCE to the first century CE because of the style and content of the inscriptions.¹⁸ In notes added to Vincent's report in 1961, Benoit suggested a fifth century date, citing architectural and artistic similarities between the synagogues of Na'aran and Beth Alpha.¹⁹

¹⁵ Charles Clermont-Ganneau, "New Hebrew Mosaic Unearthed by Turkish Shell: Palestine Campaign Echo," *The Times (of London)*, October 10, 1919.

¹⁶ Vincent, "Le Sanctuaire Juif D' 'Aïn Douq," *Revue Biblique* 16, no. 3/4 (October and July 1919), 442-443; Vincent, "La Synagogue de Noarah," *Revue Biblique* 30, no. 4 (October 1921), 576-601; and Vincent and Benoit, "Un Sanctuaire," 161-167.

¹⁷ Clermont-Ganneau, "New Hebrew Mosaic," *Times (of London)*. For a summary and analysis of synagogue typology development, see summary in Chapter 1 or Jodi Magness, *The Archaeology of the Holy Land: From the Destruction of Solomon's Temple to the Muslim Conquest* (New York: Cambridge University Press, 2015), 308-309.

¹⁸ Vincent, "Le Sanctuaire Juif," 546-548.

¹⁹ Vincent and Benoit, "Un Sanctuaire," 175.

3.1.3 Description of the Synagogue

Vincent's original plan of the Na'aran synagogue first appears in Benoit's 1961 excavation report.²⁰ A wall enclosed the synagogue complex, which contained a main hall, an ancillary room accessed through the western wall of the hall, an L-shaped narthex to the north of the hall, and an L-shaped courtyard to the north of the ancillary room and to the north and west of the narthex and hall.²¹ The northwest corner of the L-shaped courtyard contained a small *loggia* with two pilasters opening eastward to the courtyard. In the eastern part of the courtyard, a square pool or fountain was located in front of the entrance to the narthex.

²⁰ Vincent and Benoit, "Un Sanctuaire," plates 4 and 5.

²¹ Vincent and Benoit, "Un Sanctuaire," plates 4 and 5; See Figure 1.

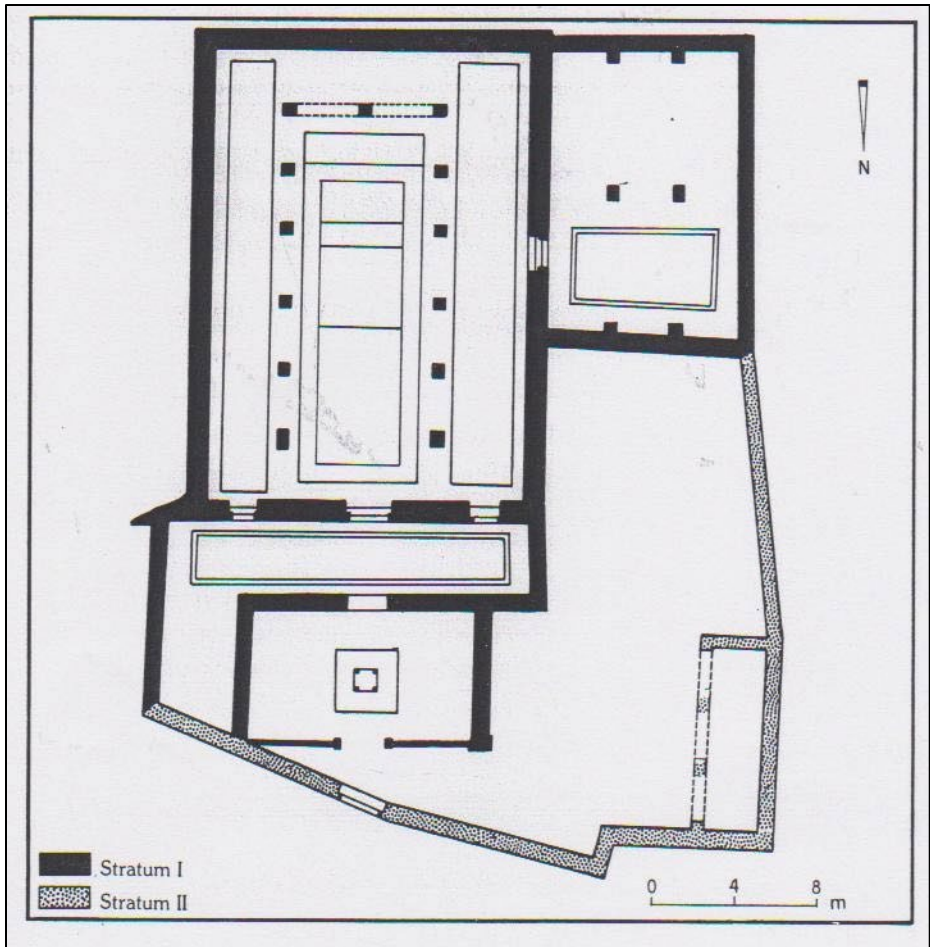


Figure 2. Original plan of Na'aran in Vincent and Benoit, "Un Sanctuaire," plate 5.

Although Vincent proposed a classical *peripteral sine postico* basilica design with straight walls, the southern extent of the basilica and assumed southern row of columns were either destroyed or not exposed during the excavation. In the excavation report on the Beth Alpha synagogue, Sukenik correctly suggested that Na'aran had only two rows of parallel columns and an apse in the basilica's south wall.²²

²² Benoit agrees with Sukenik's architectural assessment of Na'aran. See Sukenik, *Beth Alpha*, 53, and Vincent and Benoit, "Un Sanctuaire," 164, 174.

The basilica measures 21.94 x 14.94 m, and, in line with Sukenik's and Benoit's assessment, contains two rows of six piers that stretched from the basilica entrance in the north wall to the south wall.²³

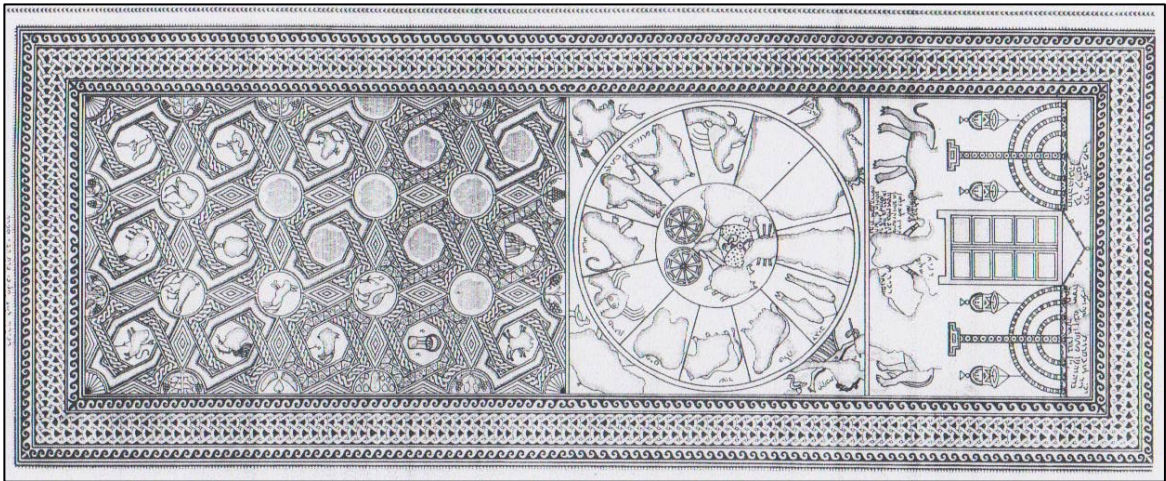


Figure 3. Drawing of the Nave mosaic of Na'aran in Vincent and Benoit, "Un Sanctuaire," plate 14a.

The parallel rows of north-south piers divide the basilica into a central nave and two aisles. The width of the eastern aisle measures 3.2 m, and the width of the western aisle measures 3.8 m. Although destroyed, the synagogue's south wall would have contained an apse that likely housed a *bema* and/or a Torah shrine. The basilica façade has three entrances. A large central door opens to the nave while two smaller, flanking doors open to each aisle. A fourth door in the hall's western wall provided access to an ancillary room of unknown function.²⁴

²³ Vincent describes the architectural design as "une basilique classique ou chrétienne" in Vincent and Benoit, Vincent and Benoit, "Un Sanctuaire," 164. For synagogue orientation, see Vincent and Benoit, "Un Sanctuaire," 165; Frowald Hüttenmeister, *Die Antiken Synagogen in Israel*, vol. 2 (Wiesbaden: Reichert, 1977), 334.

²⁴ Vincent and Benoit, "Un Sanctuaire," plate 4.

A mosaic carpet covers the hall's floor and divides it into five primary zones: two aisle mosaics, two sets of intercolumnar mosaics, and a central nave mosaic. The mosaic floor of each aisle is decorated with different geometric designs: a square pattern in the eastern aisle and a diamond pattern in the western aisle. The surviving intercolumnar mosaics consist of geometric patterns, with two panels containing images of birds.²⁵

The nave mosaic is set apart by a single border composed of two outward facing wave-crest patterns with a double guilloche in the middle. Within the guilloche, the nave mosaic is divided into three panels. The southern panel spans approximately half of the nave and consists of a geometric pattern of circles and octagons framing various animals and vegetation.

A double-line border separates the geometric carpet from the central Helios-zodiac panel, which was badly damaged by iconoclasm, collapse, and the WWI shelling. It originally contained a central Helios medallion encircled by a zodiac cycle and figural representations of the seasons in each of the square's spandrels.

Another double-line border separates the zodiac panel from the northernmost panel of two lions facing a central figure identified by an inscription as Daniel. There are several additional dedicatory inscriptions in this panel as well as two *menorot* flanking a Torah shrine/Ark of the Covenant.

²⁵ There is evidence of iconoclasm in a partially preserved mosaic panel, in which the feet and body of the bird survive and the head of the bird is obliterated. Vincent and Benoit, "Un Sanctuaire," plate 14a. See Figure 3.

3.1.4 Helios-zodiac Cycle

The zodiac panel is oriented southward with the head of Helios in the central medallion pointing where the Torah shrine would have sat opposite the basilica's entrance. The zodiac panel measures approximately 3.5 x 3.5 m and was badly damaged.²⁶

3.1.4a Helios

The head of Helios is destroyed, but six radiating rays from his nimbus are visible. A cape decorated with dots is fastened with a clasp around Helios's partially preserved neck. His left hand emerges from under his cape holding a decorated scepter. He stands in a quadriga pulled by four horses, which were carefully removed by iconoclasts. Based on the destruction pattern as well as contemporary depictions of Helios, it is likely that the medallion contained four horses with the two inner horses looking at one another and the two outer horses looking away from one another.²⁷ Two spoked wheels of the quadriga are depicted in profile at the bottom of the medallion.

3.1.4b Zodiac

Like the Helios medallion, the encircling medallion of the zodiac was damaged by iconoclasm. Each figure, whether anthropomorphic or zoomorphic, was carefully removed. The first sign of the zodiac, Aries, sits at the two o'clock position on the zodiac wheel. The inscription טלה was left intact across the top of the panel, suggesting that images and not the

²⁶ Steven Werlin, *Ancient Synagogues of Southern Palestine, 300-800 C.E.: Living on the Edge*. (Leiden: Brill, 2015), 45.

²⁷ See the discussion of the Sepphoris synagogue in Section 3.6.

zodiac itself were the reason for the iconoclasm. A sheep-shaped lacuna in the mosaic panel suggests that it contained a depiction of Aries in profile facing right with legs pointing toward Helios.

Moving clockwise, the next zodiac panel in the wheel is Taurus, which sits at the three o'clock position. The inscription שור runs across the top of the panel. A bull's tail is visible just outside of an animal-shaped lacuna. Based on the position of the tail, the bull stood with legs pointing toward Helios and facing right.

Continuing clockwise, the next panel sits at the four o'clock position and contains a large lacuna in which the figure of Gemini and its inscription were destroyed. The edge of a piece of clothing and possible leg are all that survive.

Next to Gemini is the figure of a crab in the five o'clock position with the inscription סרטן, indicating Cancer. Though the figure is mostly destroyed, two eyes are visible in the middle of a lacuna. The circular lacuna is flanked by eight bent legs—four on each side. The crab stands in profile with legs pointing toward Helios. Two clawed legs may have been bent against the crab's body.

To the right of Cancer is the figure of Leo at the six o'clock position. Leo is represented in side-profile and mid-pounce. Leo's tail survives but his body was carefully removed. Two bent forelegs emerge from the iconoclastic lacuna. The inscription אריה runs along the upper left of the panel.

The next zodiac figure is Virgo in the seven o'clock position. The lacuna is shaped like a standing human in frontal profile with legs pointing toward Helios. A bent arm emerges to the

right of the lacuna. To the left of the lacuna, the edge of a grain sheaf is visible. The inscription בתולה runs along the top of the panel.

To the right of Virgo is another human shaped lacuna in the eight o'clock position with the inscription מזוגיים, indicating the figure of Libra. The representation of the anthropomorphic figure, like the last two panels, is nearly destroyed and in frontal profile. The bend of a left arm extends from the lacuna to the right and a single scale is visible to the left of the lacuna. The ends of two sandaled feet emerge from the bottom of the lacuna, each slightly pointing outward in a duck-footed stance.

Continuing clockwise, the figure of a scorpion in the nine o'clock position is easily detected though the inscription did not survive. Like Cancer, Scorpio is depicted from above with the lacuna of his curved tail pointing toward Helios. Four legs emerge from each side of the lacuna and a thin strip of his surviving body can be seen in the left of the panel. Two claws extend from near Scorpio's head, from which one surviving eye looks at the viewer.

The next two panels moving clockwise would have been Sagittarius and Capricorn but neither figure nor accompanying inscription survive.

The next surviving panel is Aquarius in the twelve o'clock position, which also was carefully obliterated by iconoclasts. The lacuna in this panel is shaped like an amphora with two handles flanking the removed tesserae. If the panel did contain an amphora, it is interesting that the iconoclasts destroyed the representation as it depicted neither an animal nor a human.

The final panel contains Pisces in the one o'clock position and is labeled with the inscription דגים. Two fish-shape lacunae hang from a preserved split line. The fish-shaped lacunae face away from Helios with tails pointing inward.

3.1.4c Seasons

A personification of each season occupies the four corner spandrels of the square zodiac panel. The personification of Autumn is in the top-right corner of the panel and contains an inscription that flanked the head of a destroyed anthropomorphic Autumn and reads תְּקוּפַת [תש]רִי. An adornment sits on top of a tuft of partially preserved hair, suggesting the seasonal representation is female. To the left of the lacuna, a hand grasps a staff or wand; to the right in an open, outstretched hand. A ram's horn is depicted behind the shepherd's staff and a bird stands upside down on the upper-right border of the panel.

The personification of Winter is in the top-left spandrel of the panel. Iconoclasts completely removed the figure, although the inscription that flanked its head survives and reads תְּקוּפַת טִיבִית. The edge of a garment and a staff/wand are visible on the left of the lacuna. On the right, a partially surviving bird stands upside down on the upper-right border of the panel.

The bottom-left spandrel of the panel contains a mostly destroyed personification of Spring, as indicated by the flanking inscription תְּקוּפַת [ג]יִסָּן. The destroyed figure grasps a staff or wand in her left hand. Underneath the staff/wand are three stalks of grain. On the left side of the destroyed figure, a bird stands upside down on the upper-right border of the panel.

The final season is Summer. The accompanying inscription is completely destroyed. The only portion of the personification that survives is the lower demarcation of the figure's clothing.

3.1.5 Archaeoastronomical Analysis

The synagogue of Na'aran is located at $31^{\circ} 53' 1.78''$ N, $35^{\circ} 26' 41.33''$ E and its façade faces 360 degrees N.²⁸ The synagogue has a north-south orientation with its apsidal wall facing Jerusalem. The surrounding environs of the ancient village were not excavated, so it is impossible to know whether the synagogue was built to align with surrounding buildings or if it was aligned north-south to face Jerusalem. When the 3D synagogue model and mosaic floor plan are added to Stellarium, no arrangement of dates and times align the synagogue with astronomical phenomenon. Congregant's entering the synagogue would have seen the sunrise to the left of the entrance and sunset to the right. The sun, moon, planets, and zodiac would appear to rotate clockwise in relation to the congregant's entering through the north wall and facing south during a service.

It is likely that Na'aran was oriented toward Jerusalem and alignment with the sun did not play a factor in the synagogue's construction beyond the possible use of known astronomical points to orient the synagogue to face Jerusalem.

²⁸ All geo-coordinates in this chapter are given in degrees, minutes, and seconds (DMS). All directional orientations are given based on a 360-degree compass where North = 360 degrees, East = 90 degrees, South = 180 degrees, and West = 270 degrees.

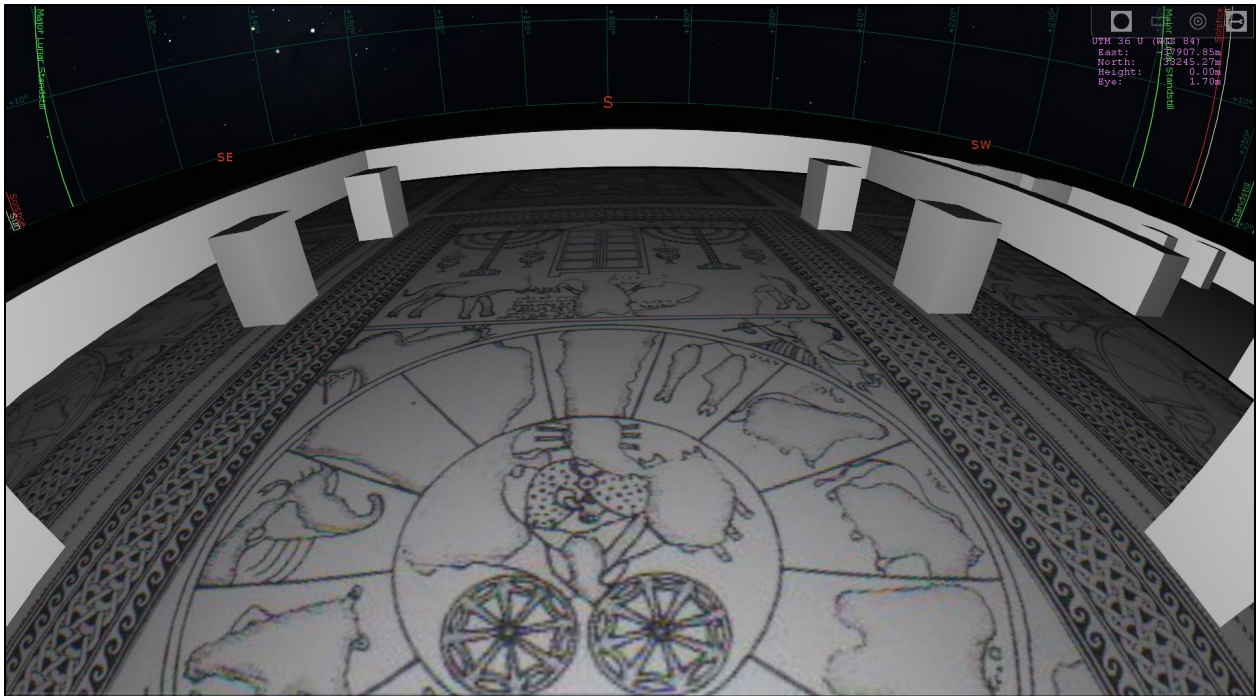


Figure 4. Na'aran foundation model with mosaic floor plan. The top panel of the Temple faces south toward Jerusalem. Image generated using Stellarium. For details on how the models were generated, how they were added to Stellarium, and instructions on accessing the models and program, see the Appendix.

3.1.5 Summary and Analysis

The zodiac runs clockwise, translating to a west-to-east progression through the sky. The clockwise direction is opposite the natural progression of the zodiac, which follows the same east-to-west path of the sun. One theory for this apparent reversal is the relative position of the observer.

In the creation narrative of Genesis and Enuma Elish, the world consists of the earth, heavenly dome, waters above the heavens of creation, and the heavenly hosts above the water. Above the dome but below the primordial waters, the sun, moon, and stars rotate around the world in an east-to-west (counterclockwise) progression. Looking up from earth, the stars

progress east-to-west, but looking down at the cosmos from the heavens, the stars progress west-to-east (clockwise).

The seasons in the Na'aran Helios-zodiac cycle progress counterclockwise in opposition to the zodiac's progression. The mosaicists/congregants may have wanted the seasons to reflect the natural progression of time while the zodiac reflects either the view from heaven or the view of congregants as they walked into the building. The appearance of seasons with wings are figural representations of the Horai—the four-winged goddesses of the seasons—or the Anemoi—the four-winged gods of the divine winds who often represent the seasons. Based on hair style, it is likely that the seasons at Na'aran were female, though it is impossible to tell with certainty. I discuss the representation of the seasons as the Horai in the following section on Beth Alpha, and I discuss the representation of the seasons as the Anemoi in the section on Huqoq.

The zodiac panels at the three o'clock, six o'clock, nine o'clock, and twelve o'clock positions hover in-between two seasons. I have named this alignment the “thirty-minute position” because each zodiac sign falls within a given hour and thirty-minute position on the face of a clock.

The zodiac panels are not correctly aligned with the seasons. For example, the four zodiac signs closest to the personification of Autumn are Aquarius, Pisces, Aries, and Taurus, although they are associated with winter and spring. The reason for this misalignment is unclear.

3.2 Beth Alpha Synagogue

3.2.1 Basic Information

The remains of the ancient Beth Alpha synagogue are located on the grounds of a kibbutz immediately west of Beth She'an, at the foot of Mount Gilboa in the Jezreel Valley. Before the

kibbutz was founded in 1922, Ernest Schultz noted archaeological remains in the area in 1847. He described the area as desolate but containing building materials and “old-fashioned” sarcophagi.²⁹ Schultz understood the name Beth Alpha as a corruption of the fortress of Bethulia mentioned in Judith 4:6.³⁰ Conversely, Sukenik believed that the name Beth Alpha stemmed from a corruption of the name of an Amora named Ilfa (Hebrew: אילפא) in Talmudic literature. In 1921, the land was sold to the Jewish National Fund, which settled farmers there.³¹

3.2.2 Excavation and Research

The ancient synagogue was discovered by chance in December 1928 when members of the Beth Alpha kibbutz began digging an irrigation channel. A group of workers exposed a narrow strip of mosaic containing portions of a zodiac cycle and Hebrew characters. One of the workers traveled to Jerusalem, where he reported discovery to a group composed of the Zionist Executive, the Department of Antiquities, and the Hebrew University. The Department of Antiquities then issued an excavation permit to the Hebrew University, which began work at the site on January 9, 1928 under Sukenik’s direction.³² Sukenik concluded excavations by the end

²⁹ Sukenik, *Beth Alpha*, 9.

³⁰ Ernest Schultz and Herrn Gross, “Mittheilungen über eine Reise durch Samarien und Galilaea.” *Zeitdeutmorggese Zeitschrift der Deutschen Morgenländischen Gesellschaft* 3.1 (1849): 46–62.

³¹ Sukenik, *Beth Alpha*, 10.

³² Sukenik, *Beth Alpha*, 5.

of the winter of 1929. In spring 1929, the Department of Antiquities approved the construction of a protective structure for the synagogue remains.³³

3.2.3 Description of the Synagogue

The remains at Beth Alpha consist of a basilica with portico, courtyard, and antechamber. The basilica is 27.70 m long from north to south and 14.20 m wide from east to west.³⁴ It is oriented southward, pointing 207 degrees SW.³⁵ The roughly cut limestone walls are preserved to a height of one to four courses. The inner walls were thickly plastered, with several areas of surviving plaster preserving red floral designs.³⁶

³³ Sukenik, *Beth Alpha*, 7.

³⁴ See Figure 5.

³⁵ Sukenik, *Beth Alpha*, 11.

³⁶ Although Sukenik notes the presence of painted plaster, he does not include an image of the designs. *Beth Alpha*, 12.

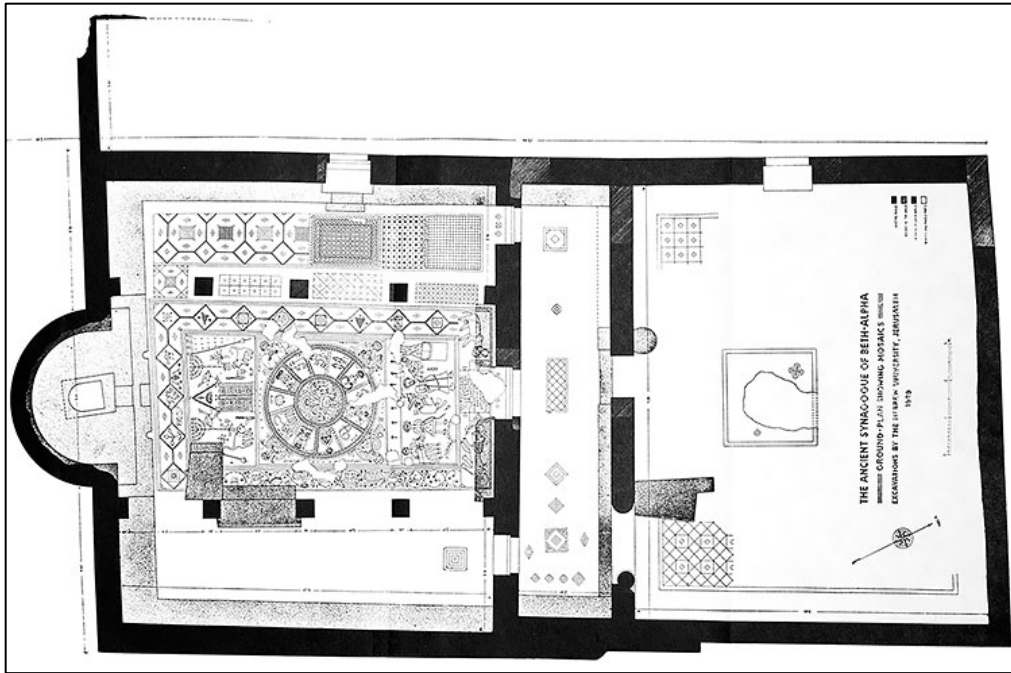


Figure 5. Sukenik's plan of Beth Alpha

Two rows of pillars divide the synagogue into a nave with flanking aisles. The nave measures 5.40 m wide; the western aisle is 2.75 m wide; and the eastern aisle is 2.75 m wide. The piers are set into the mosaic floor. They were constructed of alternating courses of basalt blocks laid in headers and stretchers. The absence of stylobates suggests that Beth Alpha had a single story, as the weight of a second story gallery would be difficult to support with the ground as a foundation. Sukenik, however, suggested that Beth Alpha was two stories due to the discovery of multiple small columns, half-columns, a column base, and a capital at the northern end of the synagogue. He suggested that the western antechamber had contained steps leading to a second story, although no stairs were found.³⁷

³⁷ Sukenik, *Beth Alpha*, 16-17.

Sukenik notes that roof tiles were only found above a layer of plaster that sat directly on the mosaic floor of the nave, with a single roof tile discovered on top of the mosaic itself.³⁸ Although he argued that the distribution of roof tiles was proof of a gallery at Beth Alpha, it is reasonable to assume that the structure had a tiled, clerestory roof.

The floor of Beth Alpha is paved with mosaics. Each aisle and intercolumnar space contain panels with various geometric designs. The nave is divided into three panels bordered by a series of black and red lines, with each panel bounded by a box consisting of different colored lines of varying thicknesses. To the immediate north of the first panel in the nave is a double *tabula ansata* inscription. The first inscription is in Aramaic and provides a now-destroyed date mentioning the emperor Justin, referring either to Justin I (r. 518-527) or Justin II (r. 565-574).

³⁸ Sukenik, *Beth Alpha*, 14.



Figure 6. Beth Alpha mosaic floor. Image rendered by author. See the Appendix for details on model and image creation.

The Greek inscription is directly above (south of) the Aramaic inscription and commemorates Marianos and his son Hanina as the craftsmen who laid the mosaics. A bull with a hump on its back flanks the inscriptions to the west and an open-mouthed lion with mane flanks the inscription to the east.

The northern most panel of the nave (i.e., nearest the entrance of the hall) depicts the 'Aqedah.³⁹ Two servants stand to the left holding a saddled donkey. The servant on the right wears a sleeveless tunic that ends above his knees. Two *orbicula* decorate the bottom of his tunic and two ends of a chain with ornaments hang around his neck. He and the other servant stand in profile, looking at the viewer. Both servants have identical curly hair. The hair of the servant on the right is brown while the hair of the servant on the left is blond. The mosaicists had difficulty drawing perspective and only the right-hand servant has legs. The feet of the servant on the right are clad with either boots or sandals and point to the right, encouraging the viewer to read the scene from left to right.



Figure 7. The 'Aqedah Panel of Beth Alpha. Image Rendered by Author.

³⁹ Gen 22.

Towards the right-hand side of the panel, the inscription אברהם identifies a man with a nimbus around his head as Abraham. Abraham holds a long knife in his left arm and is in the process of tossing Isaac, who is identified with his own inscription יצחק, onto a burning altar. Abraham wears a sleeved white tunic with black stripes that cross his torso and Roman *cuculus* shoes that point to the right. He has a pronounced hump on his back that stretches from his waist to his neck, and a white beard and curled hair. To the immediate right of Abraham is an altar consisting of a modular base, a half-gold half-white brazier, and flames fueled by wood.

Isaac is small, possibly represented as a child. He wears a long sleeve white tunic and pants that end in white footies. His hands are bound behind his back as Abraham tosses him into the fire.

At the top of the panel, the hand of God flanked by seven rays of light emerges from a black circle to stop Abraham's offering of Isaac. Below the hand of God is a palm branch to which a vertical ram is tied, accompanied by the inscription והנה אייל ("and behold a ram"). The ram appears identical in form to the depiction of Aries in the panel immediately to the south.

Below and around the scene of the *'Aqedah*, palm branches are placed to fill the empty spaces. To the south of the panel, nine crudely designed date palms separate the *'Aqedah* panel from the southern two panels of the nave.

To the north of the *'Aqedah* is the Helios-zodiac cycle, which consists of a Helios medallion encircled by a radial zodiac wheel, and personifications of the four seasons in the interstitial space of the spandrel corners. This panel is discussed in greater detail below.

The southernmost panel is a depiction of a Torah shrine/Ark of the Covenant. It shows a central shrine flanked by two *menorot*. The shrine consists of a foundation with three column

bases. Two checkered rectangles on the foundation might represent stairs up to the shrine. The front of the shrine consists of two closed doors of four panels each. A gable rests directly on the top of the capital-less columns. Three decorative vases serve as antefixes above each column in front of the gable. A semi-circular shell decorates the gable's tympanum. Two rows of triangles run along the upper sides of the gable as figurative cornices. Two leaf-like projections from the corners of the gable serve as additional antefixes. Each side of the gable is decorated with a stork standing on top of the edge facing inward and walking up the side.



Figure 8. Temple/Torah Shrine at Bath Alpha. Image rendered by author. Contrast raised for image clarity.

Each *menorah* flanking the shrine is composed of bulbs, likely representing pomegranates. The left *menorah* consists of 30 bulbs that range in color from bronze to gold. It has a tripod stand and seven lit oil lamps. The right *menorah* consists of 27 bulbs and also sits on

a tripod, although the tripod itself has three vertical stands, each of which has two additional bulbs. The right *menorah* is topped with seven unlit candles.

Outside of each *menorah* is a partially drawn curtain cinched with a clasp at the bottom. The drawn curtains on either side of the panel create the impression that the curtains have been drawn to reveal what is within. Each curtain hangs from a series of rings at the top of the panel and is decorated with tulip bulbs.

Two lions occupy the space between the drawn curtains and the shrine. Each lion faces inward and resembles the depiction of Leo in the zodiac panel instead of the maned lion flanking the inscriptions. The mouth of each lion is open and their tongues stick out, giving the impression that they are in mid-roar. In addition to the lions, incense shovels, *shofarim*, and *etrogim* flank the shrine. An unknown species of flower blossoms on its stalk to the left of the shrine while a fruit-bearing pomegranate tree grows to the right.

3.2.3 Helios-Zodiac Cycle

3.2.3a Helios

Helios's quadriga fills most of the medallion with his four horses facing and charging the viewer.⁴⁰

⁴⁰ See Figure 9.



Figure 9. Beth Alpha Helios-zodiac cycle. Image rendered by the author.

Behind the horses, Helios holds golden reins. Only the front two legs of each horse are visible. Although the colors of the horses' legs vary, they are composed of white, light-yellow, or light-orange tesserae edged with copper-colored tesserae. The front of the quadriga is decorated with a series of curves that could represent the various realms of heaven. The quadriga obscures Helios's body, but his elongated neck and head extend above it. White, diamond-shaped stars are scattered beneath the quadriga and throughout the scene providing a cosmic backdrop.

Helios wears a solar crown from which seven rays of red light radiate. These rays may mirror the seven rays of red light that radiate from the hand of God in the 'Aqedah panel. To the

right of Helios's head is a waning crescent moon and a random assortment of white, diamond shaped stars. To the left of Helios's head is a single white, diamond-shaped star, perhaps indicating a specific heavenly body such as the morning star Phosphorous or the evening star Hesperos.⁴¹

3.2.3b Zodiac

The zodiac begins with Aries as the right-most symbol in the three o'clock position, as indicated by the misspelled inscription טלא written across the top of the panel.⁴² Aries's feet point toward Helios while his head points to the left toward the next zodiac sign. Aries possesses a paddle-shaped tail like that of a beaver. The tail extends below the level at which Aries's cloven hooves stand. The head is wedge shaped with paddle-like ears that flop down to half the length of his head. One eye looks toward the viewer while a closed mouth conceals his tongue and teeth. The representation of Aries in this panel resembles the Ram in the *'Aqedah* panel to the north.

Moving counter-clockwise, the next figure is Taurus as indicated by the inscription שור across the top of the panel. Taurus is at the two o'clock position on the zodiac wheel. Similar to Aries, Taurus is depicted in profile with feet pointing towards Helios and head facing left. Taurus has cloven hooves, no tail, and a pronounced hump on his back near his shoulders. Two outwardly curved horns extend from his head. Unlike Aries, Taurus's mouth is open with red

⁴¹ These named stars are aspects of the planet Venus, since Venus is the final "star" visible at dawn and the first visible "star" at dusk.

⁴² Sukenik suggests that the mosaicists cut the plural form טלאים. Sukenik, *Beth Alpha*, 36.

tongue extended and his single visible eye closed. Taurus's depiction in the zodiac wheel resembles the bull flanking the inscription to the north of the *'Aqedah* panel.

To the left of Taurus stands an anthropomorphized representation of Gemini as a set of twins at the one o'clock position. Two sets of legs face each other with the left pair of legs partially separated from the body to which they belong. The bodies and heads of the twins are in profile and they face the viewer. Both twins have open, wide eyes and curly blonde hair. They wear white, sleeveless tunics that terminate near the knee. The tunics are decorated with crude *orbicula* at the bottom. The stances of the twins are mirror images: one hand covers the waist and the other bends to cover the chest. A misspelled inscription reading תאומומים and runs along the upper left of the panel.

Continuing to move counter-clockwise, the next symbol is Cancer, as indicated by the inscription סרטן inscribed across the top. Cancer is at the twelve o'clock position. The crab has four hind legs on each side of a black and white circular body, with two more legs with claws tucked in at the front of the body. Two red, circular eyes stare at the viewer. Unlike the other figures discussed so far, Cancer faces Helios despite looking at the viewer. The position of Cancer suggests that the crab might be lying on its back.

To the left of Cancer is Leo, as indicated by the inscription ארייה in the upper left of the panel.⁴³ Leo stands in profile facing left at the eleven o'clock position. Four long curved legs terminate with four claws. A long, slender tail curls up and above the back of lion. Two knob-like ears extend upwards at an angle from the head. Leo's visible eye is open as well as his mouth

⁴³ The extra *yod* in ארייה reflects a local spelling variant or a mistake by the mosaicists.

from which his tongue extends. This representation of Leo is identical to the depictions of the lions that flank the Torah shrine/Ark of the Covenant in the panel at the southern end of the nave.

To the left of Leo is Virgo in profile at the ten o'clock position, accompanied by the inscription בתולה. She sits on a throne with a rounded back and two circular arm rests. Virgo's hands rest in her lap. She has curly blonde hair, and two earrings dangle from her ears. Virgo wears a long, decorated, sleeveless yellow tunic cinched at her waist. The tunic ends just above her red shoes, which match a pair of red gloves covering her hands. Virgo's feet point to the left, indicating relative motion to the east in line with the other zodiac symbols.

The poorly laid inscription מאזנים indicates that the next symbol is Libra at the eight hour and thirty-minute position. The mosaicists allocated too much space for Virgo, which they fixed by narrowing Libra's panel. Libra stands in profile with his legs pointing towards the Helios medallion. He wears a sleeveless tunic that ends at his waist. The mosaicists could only fit one of Libra's legs in the panel—the left leg—to make room for Libra's scales, which he holds in his right hand. Behind Libra's left leg, the end of a cape-like garment can be seen. Libra wears a long dark boot on his left foot, which points to the left.

The next panel is Scorpio at the eight o'clock position. The scorpion is depicted in profile from above. His head faces left and his tail curls behind him to the right and above his body. The tail is tipped with a dagger-like barb. Scorpio has two claws that extend from the front of his body. Two black eyes set in white circles are visible. The mosaicists erred with Scorpio's legs, giving him ten instead of eight legs. Scorpio's inscription is one of the clearest in the mosaic and reads עקרב.

Sagittarius is identified with the inscription קשת at the seven o'clock position. He stands with legs pointing towards Helios, but unlike the other signs, he faces to the right. Sagittarius wears a sleeved tunic that ends near his knees. He wears ankle high boots on his feet. In his left hand, he grasps a crude bow with a notched and drawn arrow.

A large portion of the next sign at the six o'clock position was destroyed in antiquity and was repaired by filling in the lacunae with mortar.⁴⁴ Based on the surrounding signs, it depicted the sea-goat Capricorn. The split toe of the goat hooves as well as back-curling horns is visible from what survives in the left-hand side of the panel. On the right-hand side, traces of the outline of a curled dolphin-like tail extend upward.

Next to Capricorn is Aquarius at the five o'clock position. Aquarius extends his arms over a well, drawing water from a bucket or vase tied to a string. He wears a white, sleeveless tunic. Aquarius's feet are not visible, giving the impression that he faces the viewer completely. The inscription above his head reads ודלי

To the left of Capricorn, two fish swim in opposite directions, representing the sign of Pisces at the four o'clock position. The fish at the top of the panel swims to the right while the fish on the bottom swims to the left. The fish have an odd design. In addition to their heads, bodies, and caudal fin, they appear to have legs extending from their body similar to the legs of Scorpio. The top fish has four pairs of three leg-like appendages while the bottom fish has two pairs of three leg-like appendages and two pairs of four leg-like appendages. The inscription reads גים.

⁴⁴ Sukenik, *Beth Alpha*, 38.

3.2.3c Seasons

The Winter season is represented in the upper-right corner of the zodiac panel and is personified by the bust of a winged female in profile. She has curly blond hair and an earring dangling from each ear. Her cheeks are red, possibly indicating the winter cold. Two wings extend from either side of the figure. She is clothed with a tunic and green necklace. Under each wing a star like shape appears to shine. These symbols could be *orbicula* on a tunic or clasps covering the cinch of cloth over Winter's shoulders. On top of her left wing is a circular object that might represent an empty basket. Other items in the scene are too abstract to determine what the mosaicist intended. The inscription תקופת שבט appears in the upper left of the panel.

To the left of Winter, in the upper left corner of the panel, Spring is depicted in half-profile. Like Winter, she wears a tunic, earrings, and a green necklace. Two *orbicula*, stars, or clasps connect her wings to her tunic. Spring holds a shepherd's crook to her right. On her left, a star shines with twelve rays. In front of her tunic, a bird stands to the right and a stalk with three tulips is to her left. The inscription תקופת ניסן runs across the upper left side of the panel.

Continuing to move counterclockwise, the personification of Summer appears in the bottom-left of the panel. She is depicted in half-profile with wings partially extended. Whereas Winter and Spring are accompanied by two stars, clasps, or *orbicula* attached to their wings, Summer has two partially exposed radiant suns. An earring hangs from each of her ears and a green gem is set in her curly hair. Summer wears a tunic with a large cross or the Greek letter *X* (*chi*) on the front. A belt-like cloth extends across her waist, connecting her wings. Clusters of three grapes flank each side of her head. Additional agricultural objects are to her left. These likely include a piece of fruit, a budding flower, and flower petals, although the identifications

are suspect as it is hard to determine what the mosaicists intended. The inscription תקפות תמוז is to the right of Summer's head.

The final season is Autumn on the bottom right of the zodiac panel. She is also personified as a winged female in half-profile. Her hair is styled or possibly bound by a net. A jewel or star is depicted above her head and an earring dangles from each ear. A bird perches on her right wing, looking toward her. To Autumn's left, two large, two-handled jars are filled with liquid—possibly date wine as suggested by a fruit-bearing date palm to the left. In the front of Autumn, between her wings, a spread of fruit including a three-grape cluster, pomegranate, and two indistinguishable fruits is displayed. To the left of Autumn, an inscription reads תקפת תישרי.

Diamond shapes separate each season, likely representing an attempt by the mosaicists to fill negative space due to miscalculating how much space the zodiac wheel and Helios medallion would fill.

3.2.4 Archaeoastronomical Analysis

The synagogue of Beth Alpha is located at 32° 31' 6.86" N, 35° 25' 38.62 E. Its apsidal wall faces 207 degrees SW and the façade faces 27 degrees NE. Like Na'aran, the environs of Beth Alpha were not excavated. It is unclear how surrounding buildings may have affected the construction and orientation of the synagogue. The apsidal wall, however, points in the general direction of Jerusalem.

When the Beth Alpha synagogue plan and a photogrammetric rendering of its mosaic floor are added to Stellarium, sunlight passes through the apsidal wall and strikes the Helios-zodiac cycle during the winter solstice, summer solstice, and equinoxes depending on the height of a proposed window in the center of the back of the apse.

To show this alignment with the sun, I set the date of Stellarium to the solstices and equinoxes during the year 525 and traced the sunlight as it passed through the apsidal window.



Figure 10. Beth Alpha model with render of mosaic floor. The synagogue was oriented to catch the light of the sun through a proposed apsidal window.

The resulting simulation shows that sunlight would have fallen through the window on the Helios medallion. Such a feature could have been intentional for sun light to play a role in liturgy or it could be coincidental with the synagogue's orientation. Other buildings in antiquity such as Nero's *Domus Aurea* and the Pantheon in Rome made use of light in a similar fashion, as did several Late Roman churches.⁴⁵

⁴⁵ Robert Hannah, "The Orchestration of Time in Ancient and Medieval Buildings," in *Archaeoastronomy in the Roman World*, eds. Giulio Magli, et al. (Switzerland: Springer, 2019): 37-56.

3.2.5 Summary and Analysis

The zodiac and seasons run counter-clockwise, reflecting the east-to-west motion of the heavenly bodies in the sky. All movement indicated within the zodiac wheel, except for Sagittarius, is leftward. The zodiac begins with Aries in the right hand/eastern location, reflecting its position in the vernal new year. The Helios medallion depicts a waning crescent moon, however, which may be a mistake of the mosaicists. The waning crescent leads to the new moon just before month's end. In all other synagogue zodiac panels containing a crescent moon, the moon is depicted as a waxing crescent, which represents the first day of the month—*Rosh Chodesh*. With the number of mistakes the mosaicists made in spelling and depicting figures, it would be no surprise if the lunar phase was flipped in error.

The inscriptions for Aquarius and Pisces each begin with a *vav*.⁴⁶ Since Capricorn, Aquarius, and Pisces constitute the winter months, it is likely that the now-destroyed inscription of Capricorn began with a *vav* as well. The inclusion of the *vav* may represent the mosaicists/congregants desire to highlight the beginning of the Jewish year in the spring, which differed from the Roman new year in the winter and the rabbinic new year in the fall.⁴⁷ By including a *vav*, the mosaicists indicate that the winter months are a set of times that follow from what precedes, giving the Beth Alpha zodiac wheel a calendrical dimension that emphasizes the Jewish year.

⁴⁶ Sukenik, *Beth Alpha*, 37-38.

⁴⁷ See Chapter 2 for a discussion of calendars in antiquity.

The Beth Alpha zodiac wheel is aligned hourly in clock positions except for the panel of Libra, which lost space due to the expansion of Virgo's panel. The hourly alignment means that three zodiac panels fall directly beneath a season. The seasons, however, do not align with their correct zodiac signs. Instead, the zodiac wheel is a full 45-degree counter-clockwise rotation from aligning with the correct seasons. (Or the seasons are a 45-degree clockwise rotation from aligning with the correct zodiac signs.) For the seasons to align correctly, Spring would need to occupy the upper right corner of the panel instead of Winter, or Aries would need to be positioned in the upper left part of the mosaic under Spring.

The depiction of the seasons as winged females corresponds to descriptions of the four Horai—Helios's daughters and goddesses of the seasons—as found in the fourth century Greek epic *Posthomerica* and the fifth century Greek epic *Dionysiaca*.⁴⁸ In *Posthomerica*, Quintus Smyrnaeus describes the Horai as rosy-cheeked and uniquely dressed handmaidens, each of whom presides over one-quarter of seasonal time. They are the daughters of Helios and the lunar goddess Selene. The lines describing Spring, Summer, and Autumn are lost. The surviving description of Winter associates her with the sign of Capricorn.⁴⁹

In the *Dionysiaca*, Nonnus describes the Horai in detail. Winter wears a veil over braided hair. Spring wears a dewy coronet on her head. Summer carries a sickle and stalk of grain.

⁴⁸ Nonnos, *Dionysiaca, Volume I: Books 1-15*, trans. W. H. D. Rouse. LCL 344 (Cambridge, MA: Harvard University Press, 1940), 11.484-521.

⁴⁹ Quintus Smyrnaeus, *Posthomerica*, ed. and trans. Neil Hopkinson. LCL 19 (Cambridge, MA: Harvard University Press, 2018), 10.334-350.

Autumn wears olive shoots in her hair. The depictions of the seasons at Beth Alpha closely resemble the descriptions of the Horai in the *Dionysiaca*.

With the similarities between the Horai in the *Dionysiaca* and the personifications of the seasons at Beth Alpha, it is likely that the *Dionysiaca* was part of the *milieu* that influenced their representations. It is no surprise that the mosaicists—Marianos and his son Hanina—would draw from Greek tradition to depict the seasons. The names of the mosaicists suggest that they are a Romanized Jewish family. Marianos is a Greek transliteration of the Roman name Marianus while Hanina is a Greek transliteration of the Hebrew name הַנִּינָה. Because the Beth Alpha mosaicists displayed a greater aptitude for laying Greek text in the mosaic than Hebrew/Aramaic text (as evidenced in the two dedicatory inscriptions), they appear to have been more familiar with the Greek language.

3.3 Huseifa Synagogue

3.3.1 Excavation and Research

Modern 'Isfiya is located approximately 13 km southeast of Haifa at the southern end of Mount Carmel. Michael Avi-Yonah discovered the remnants of a synagogue mosaic in the modern village square on August 12, 1930, during an inspection for the Department of Antiquities.⁵⁰ Before excavating, Avi-Yonah purchased the right to relocate two chicken coops and a kitchen above the ancient synagogue. Avi-Yonah was unable to excavate the southern two-

⁵⁰ Michael Avi-Yonah, "A Sixth-Century Synagogue at Isfia," *Quarterly of the Department of Antiquities in Palestine* 3 (1934): 118.

fifths of the building due to a row of houses above it. During excavations, a fragmentary zodiac panel was discovered.

3.3.2 Description of the Synagogue

The Huseifa synagogue is a basilica with main hall and two flanking aisles. Traces of the mosaic floor bedding leading to a narthex were uncovered but not excavated.⁵¹ The entire north wall was excavated, measuring 10.1 m and preserved in spots to a height of 40 cm.⁵² Because the east wall extended under a modern house, the excavators were only able to uncover 6.2 m of its length. This wall was preserved in spots to a height of 36 cm.⁵³ The west and south walls could not be excavated as they were covered by modern buildings.⁵⁴ The main entrance was oriented roughly east-to-west, with the basilica pointing approximately 50 degrees NE.⁵⁵

⁵¹ Avi-Yonah, "Isfia," 120.

⁵² Avi-Yonah, "Isfia," 118.

⁵³ Avi-Yonah, "Isfia," 118.

⁵⁴ Avi-Yonah, "Isfia," 118-119.

⁵⁵ Avi-Yonah, "Isfia," 119.

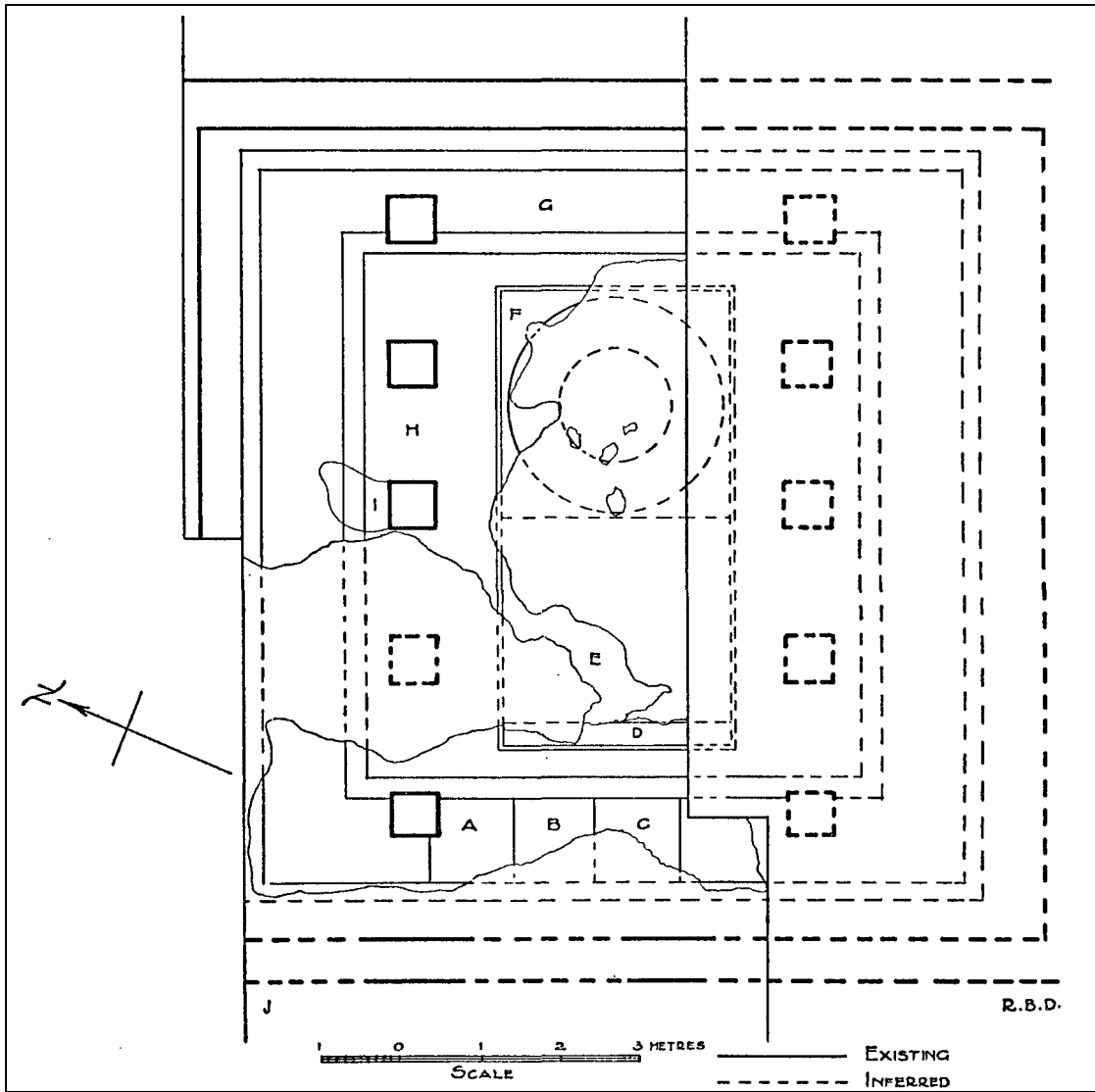


Figure 11. Plan of Huseifa synagogue from Avi-Yonah, "A Sixth-Century Synagogue at Isfia," Fig. 1.

Each aisle is approximately 2.6 m wide and separated from the central aisle by five columns with square bases measuring 60 x 60 cm. The intercolumniations measure 0.80–1.35 m from column to column. Although the columns themselves were not found, the excavators ascertained their positions and sizes of the bases from gaps in the mosaic pavement. No stylobates are noted in the excavation report.

Aside from the foundations and walls, the only architectural fragments discovered during the excavation were three straight, stone rafters described as displaying a “turned-up edge.”⁵⁶ The only artifacts published are sherds of “ribbed Byzantine and painted Arab pottery.”⁵⁷

The mosaic floor is intermittently preserved with small patches of the zodiac panel found *in situ*. At the southern entrance to the synagogue, a rectangular strip of mosaic divided into four square panels spans the length of the main hall. The northernmost square panel contains a *menorah*, *lulav*, *etrog*, *shofar*, and incense shovel. The *menorah* has a central shaft that alternates between circular and square links and branches consisting of alternating circle and heart-shaped links, which represent an *etrog*, pomegranate, or almond blossom.⁵⁸ A single green glass tessera is placed in the center of each link. The stem of each branch is topped by a ceramic oil lamp with handle facing outward and lit flame facing towards the central shaft, which is topped by a ceramic oil lamp with two wicks. The tesserae of the *menorah* have red, yellow, and orange hues, likely representing the varied shades of gold as described in Exodus 25.

The second square panel, that is the panel to the south of the *menorah*, contains an inscription surrounded by a wreath of woven bands laced with red, blue, and white flowers. The excavators compared this style of wreath to wreaths depicted in mosaics in North African

⁵⁶ Avi-Yonah, “Isfia,” 120.

⁵⁷ Avi-Yonah, “Isfia,” 120.

⁵⁸ See Avi-Yonah, “Isfia,” plate 42 for depiction of the *etrog*; see Ex 25:31-40 for description of the *menorah*.

churches of the late Roman period.⁵⁹ Approximately half of the wreath and inscription are preserved. The first two lines of the inscription survive and read “Shalom Israel.”

The third square panel, that is, the panel to the south of the wreathed inscription consists of a second *menorah* identical to the *menorah* in the first panel, although the only cultic implements preserved are an incense shovel and part of a *shofar*. The orientation of the ceramic oil lamps atop the branches and central shaft of *menorah* differs from the first square panel. Whereas the flames of the oil lamps in the first panel face the central shaft with the lamp of the central shaft containing two flames, the oil lamps of the third panel face the viewer. That is, the lamps appear facing the viewer as if they are tipped forward, making the flame lower than the handle of the lamp. It is unclear from the photograph in the excavation report whether the central lamp in the third panel had two flames.⁶⁰

The fourth and final square panel is not discussed in the excavation report though its western and northern borders are drawn as having been excavated.

Moving eastward into the synagogue, a rectangular border composed of two rows of tesserae encloses a series of three central panels. The first, easternmost panel towards which the *menorot* point consists of a narrow rectangular border with an inscription that the excavators describe as being contained within a *tabula ansata*, although the ears of the *tabula ansata* are not preserved. Avi-Yonah translated the inscription as:

...and blessed be...of the scholar.../...(Honored by the memory of every one

⁵⁹ Avi-Yonah, “Isfia,” 123.

⁶⁰ Avi-Yonah, “Isfia,” plate 42, figure 2.

who) promised and gave his donation, be (he blessed) [or: be (his lot with the just)].../...Honored be the memory (twice) of Jodia who gave...⁶¹

To the east of the inscription is a much larger panel only a thin strip of which is preserved. The strip contains sprawling grape vines with two bunches of growing grapes along with four birds. A partridge leans forward, eating from a grape bunch. A second bird is partially preserved in the east. The heads of two peacocks face each other at the end of the strip above the inscription.⁶² The eye of the partridge and the necks of the peacocks are made of green glass tesserae.

The final panel of the main hall is poorly preserved and consists of a zodiac panel. Four small patches of preserved tesserae demarcate two concentric circles that contained Helios in the central medallion and the twelve signs of the zodiac in the radiating encircling wheel. The largest preserved portion of the zodiac consists of a strip of tesserae running along the northern edge and a small portion of the eastern edge of the panel.

3.3.3 Helios-zodiac Cycle

Five zodiac figures and one season are partially preserved at Huseifa, allowing for a general reconstruction of the zodiac panel. The five partially preserved zodiac figures are Sagittarius, Capricorn, Aquarius, Pisces, and Aries. The single preserved season is likely Autumn due to the presence of pomegranates, ears of corn, and a sickle.⁶³ Only a small patch of tesserae

⁶¹ Avi-Yonah, "Isfia," 128-129.

⁶² Avi-Yonah, "Isfia," 124.

⁶³ Avi-Yonah, "Isfia," 126.

belonging to the Helios medallion survive. No picture of the patch is included in the excavation report, although Avi-Yonah says that only the outer edge of the medallion is preserved.

3.3.3a Zodiac

Sagittarius is the westernmost zodiac sign in the synagogue, appearing as the southernmost sign in relation to the zodiac at the six hour and thirty-minute clock position. Half of the archer's body is preserved. Sagittarius's left arm is extended with right arm drawing an arrow notched in a bow that is not preserved. A yellow garment is draped over Sagittarius's left shoulder, which Avi-Yonah notes is reminiscent of Heracles.⁶⁴ The head of Sagittarius looks right (i.e. eastward/counterclockwise in relation to the zodiac), and points towards the center of the zodiac.

Moving clockwise from Sagittarius, the next zodiac figure is Capricorn at the seven hour and thirty-minute clock position. A tiny patch of tesserae depicts two straight horns of Capricorn pointing toward the center of the zodiac.

The next sign moving clockwise is Aquarius at the eight hour and thirty-minute clock position, represented by an amphora with water flowing from the rim. Green glass tesserae depict the water. Based on the publication photograph, the amphora appears to contain a shell motif, which is similar to other late Roman depictions of amphorae in Palestine, including a recently discovered mosaic floor at Beit Kama.⁶⁵

⁶⁴ Avi-Yonah, "Isfia," 125.

⁶⁵ See "Byzantine Era Mosaic Floor Found on Negev Kibbutz," *Jerusalem Post* (May 12, 2013).

Continuing clockwise, a small patch of tesserae containing a fin and possibly a tail represents the figure of Pisces at the nine hour and thirty-minute clock position. Due to the size of the fin and tail, it is likely that this segment of the zodiac panel contained two fish swimming opposite each other, as in other synagogue zodiac mosaics such as Beth Alpha.⁶⁶

The final preserved sign is another small patch of tesserae that preserves the hooves and end of the tail of Aries at the ten hour and thirty-minute clock position.

3.3.3b Seasons

The upper left corner of the panel is partially preserved and contains the head of a woman with hair flowing past her ears looking right, flanked by autumnal agricultural products. A narrowing arch extends from the season's left shoulder, representing a wing similar to the personification of the seasons at Beth Alpha. The woman is likely a personification of Autumn, but this interpretation is based solely on the agricultural products that surround her, which are difficult to identify.

No other corner of the zodiac panel is preserved.

3.3.4 Archaeoastronomical Analysis

The synagogue of Huseifa is located at 32° 43' 10" N, 35° 3' 48" E. Its façade faces approximately 230 degrees SW and the wall opposite the façade faces approximately 50 degrees NE.⁶⁷ Like Na'aran and Beth Alpha, the environs of Huseifa were not excavated, and it is

⁶⁶ Avi-Yonah, "Isfia," 125; Sukenik, *Beth Alpha*, 38.

⁶⁷ Avi-Yonah says that "the building had an inclination of 22 degrees to the west from true magnetic north," but the north arrow in the plan (Fig. Figure 10) places the "east wall" at

impossible to know whether the synagogue was built to align with surrounding buildings. What can be said, however, is that the synagogue is aligned with the rising and setting of the sun on the summer solstice. The wall opposite the façade and nearest the Helios-zodiac cycle is aligned with the rising sun the morning of the summer solstice. When the model and floor plan were loaded into Stellarium, sunlight never struck the Helios medallion through a window like at Beth Alpha.

If the Na'aran synagogue was intentionally aligned with the rising sun on the summer solstice, it may reflect the continuation of a practice described by Josephus of the temple facing the rising sun. I discuss this feature of the pre-70 Jerusalem temple in Chapter 5.

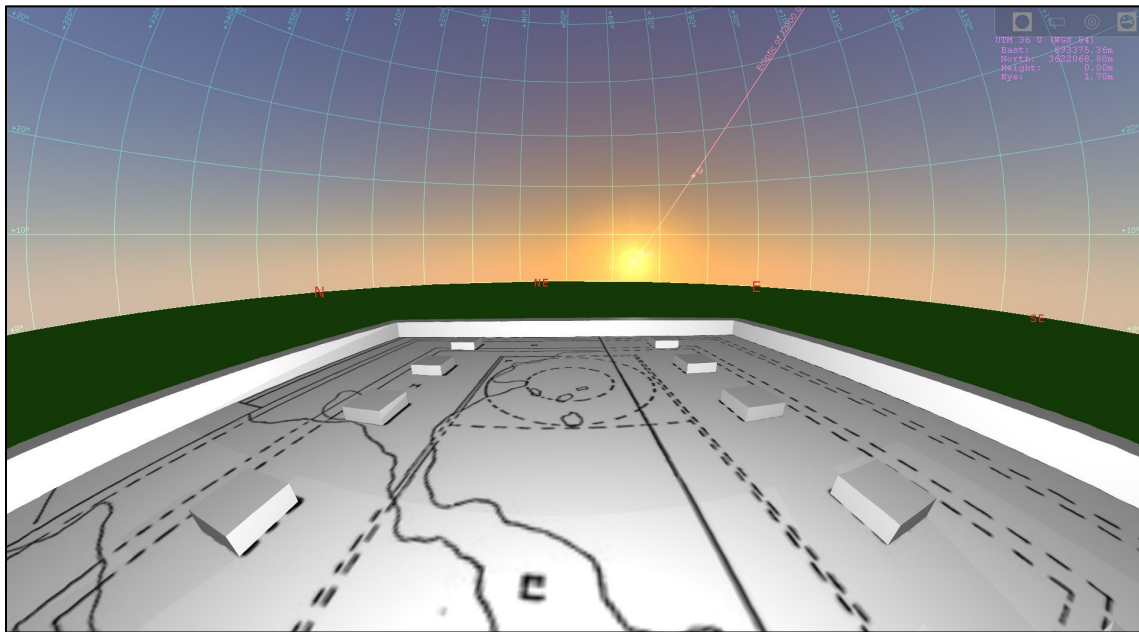


Figure 12. Image of the proposed foundations of the Huseifa synagogue with rising sun on the summer solstice, looking southwest. Rendered image from Stellarium.

approximately 50 degrees NE. In the case of this discrepancy, I have used the approximate orientation based on the plan.

3.3.5 Summary and Analysis

Like at Na'aran, the zodiac at Huseifa progresses clockwise. Three individual zodiac panels are depicted under each of the four seasons in hourly alignment. The seasons, however, do not align with their corresponding zodiac signs. Libra, Scorpio, and Sagittarius are the autumnal zodiac signs, but the signs of Pisces, Aries, and Taurus are aligned with the personification of Autumn. At Beth Alpha, although the individual zodiac panels do not correspond to their correct season, they are grouped in quadrants according to season (i.e., the spring zodiac signs of Aries, Taurus, and Gemini are grouped in the upper-right quadrant). The individual zodiac panels at Huseifa are not grouped in quadrants according to seasons. To align with the correct seasons, the zodiac wheel would need to rotate 210 degrees clockwise or 150 degrees counterclockwise.⁶⁸

It is impossible to know how the seasons progressed with only one personification preserved. As at Beth Alpha, the seasons appear to have been personified as winged women, suggesting a depiction again as the Horai. Too little is preserved of the Huseifa zodiac to say more about the Helios-zodiac cycle.

3.4 Susiya Synagogue

3.4.1 Basic Information

Susiya is located approximately 10 mi south of Hebron and 16.5 mi west of the Dead Sea. The name appears to be modern as no site in antiquity bears a name resembling Susiya. Avraham Negev suggests that it should be identified as Khirbet Kurmul in southern Judea?⁶⁹ Eusebius

⁶⁸ This would align Libra, Scorpio, and Sagittarius with Fall in the upper left of the panel.

⁶⁹ Avraham Negev, "Excavations at Carmel (Kh. Susiya) in 1984: Preliminary Report," *Israel*

refers to the region in which Susiya lies as *Daroma* (the “South”)⁷⁰ Victor Guérin first noted the remains of Susiya in his nineteenth century survey of ancient Palestine.⁷¹ In the early twentieth century, Adolf Reifenberg and Leo Mayer noted the remains of a synagogue at the site.⁷²

3.4.2 Excavation and Research

Shemarya Gutman surveyed the synagogue and excavated its narthex in 1969, which led to a full-scale excavation of the building from 1971 to 1972 by Gutman, Ehud Netzer, and Zeev Yeivin.⁷³ In 1978, Yizar Hirschfeld excavated a house on the western hill of the ancient village. In 1984, large-scale excavations at the site were conducted under the direction of Negev and Yeivin.

Exploration Journal 35, no. 4 (1985): 231-252; Zeev Yeivin, “Susiya, Khirbet,” *The Archaeological Encyclopedia of the Holy Land*, vol. 4 (New York: Prentice Hall, 1993), 1415-1417; Victor Guérin, *Description géographique, historique et archéologique de la Palestine 1: Judée*, pt. 3 (Paris: L’Imprimerie impériale, 1863), 172-173.

⁷⁰ Eusebius, *Onomasticon* 27.

⁷¹ Guérin, *Description Géographique*, 172-173.

⁷² Claude Conder and Horatio Kitchener, *The Survey of Western Palestine: Memoirs of the Topography, Orography, Hydrography, and Archaeology: Judaea* (London: Palestine Exploration Fund, 1883), 414-415; Leo Mayer and Adolf Reifenberg, “Es-Samu’,” *Quarterly of the Department of Antiquities in Palestine* 6 (1937), 222.

⁷³ Shmarya Gutman, Ehud Netzer, and Zeev Yeivin., “Excavations in the Synagogue at Horvat Susiya,” in *Ancient Synagogues Revealed*, ed. Lee Levine (Jerusalem: Israel Exploration Society), 123-128.

3.4.3 Description of the Synagogue

The synagogue consists of a large peristyle courtyard, a broad house hall, and ancillary rooms.⁷⁴ The courtyard is paved with flagstones and surrounded by columns on its northern, eastern, and southern sides. Two small storerooms are located in the northeastern and southeastern corners of the courtyard. At the western end of the courtyard five steps lead to a narthex and the entrance to the hall. Three thresholds are located in the east wall of the broad house, serving as the primary entrances to the hall.

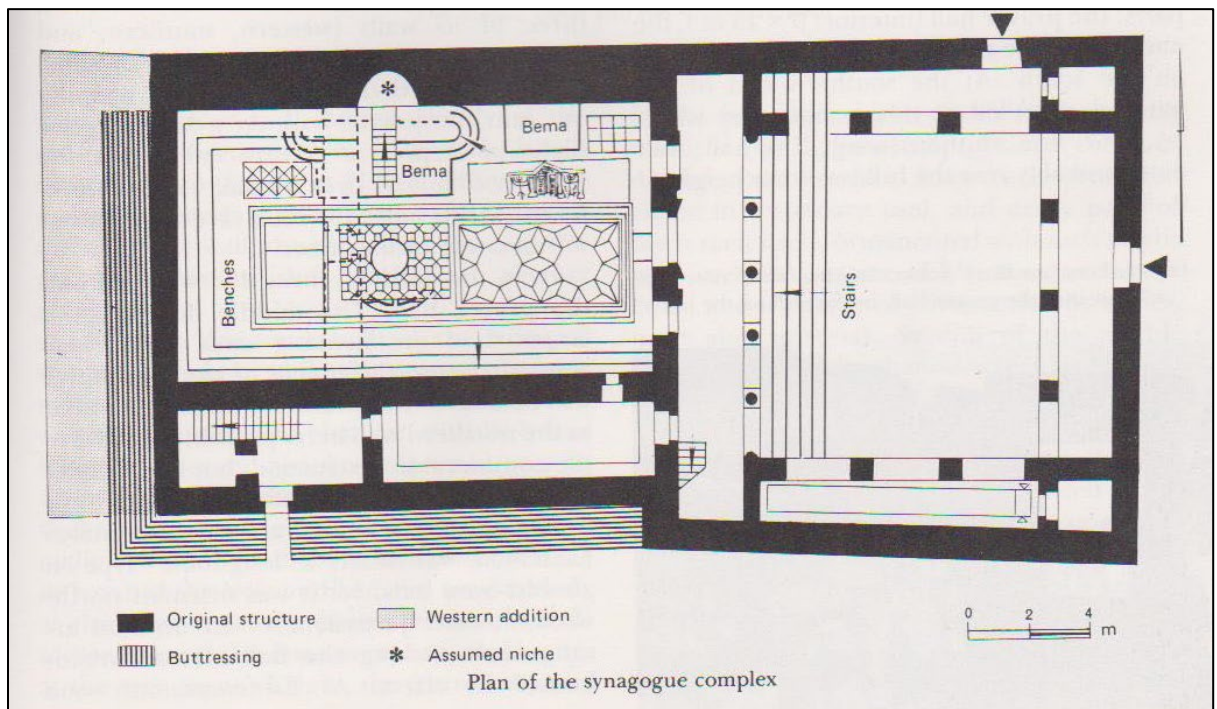


Figure 13. Plan of the Susiya synagogue from Gutman et al., "Horvat Susiya."

⁷⁴ See Figure 13 for synagogue plan.

The hall is 9 m wide from north to south and 15 m long from east to west. It is paved with a mosaic floor. Benches line the southern and western walls. Approximately 4 m of a bench extends eastward along the north wall but ends to make room for a niche and *bema*.

Two narrow rooms at the south of the hall are accessible by a single door at the western end of the south wall. The first room is paved with flagstones and has a bench that wraps around the eastern, southern, and western walls. A door in the west wall leads to a smaller room that the excavators suggested contained a staircase at one time. A roughly-built wall separates a small closet-like area within the stair room. A door in the south wall provides a second means of access into the complex and direct access to the proposed stairs.

The mosaic floor of the hall underwent extensive repairs in antiquity. It is difficult to determine when these took place due to the brevity of the archaeological report as well as the lack of datable material. An early mosaic consisting of three panels covered the hall from east to west. The excavators describe the westernmost panel as containing three scenes: “a hunt, Daniel in the Lion’s den(?); and a damaged section, the nature of which is unclear.”⁷⁵ No image of this panel is published in the report. The middle panel in the hall originally contained a zodiac design, although the repairs to the floor replaced nearly all of it with square and quadrilateral designs with a white medallion in the center. The edge of a circular guilloche border with a single wing extending from the corner of the panel is visible. The easternmost panel consists of two circular medallions with radiating square and diamond designs.

⁷⁵ Gutman, et al., “Horvat Susiya,” 126.

Several inscriptions survive throughout the complex, one of which is by the middle entrance to the prayer hall and is of interest. It reads:

Remembered be for good and for
bles[sing]
who endeavored and made []
the se[co]nd week
[year]
four thousa[nd]
when the world was creat[ed]
[] .. in it.
Let there be pea[ce]⁷⁶

This inscription likely refers to the date of the creation of the world as established in the second century Rabbinic work *Seder Olam Rabbah*, in which the date of creation was determined to be 3,461 BCE.

3.4.4 Helios-zodiac Cycle

Very little of the Helios-zodiac cycle survives at Susiya. A feathered wing of a season stretches rightward in the bottom left corner of the panel. Directly above the wing, a guilloche border defines the edges of two panels of the zodiac wheel. A few tesserae of each zodiac design are visible, but too little is preserved to determine to which signs these tesserae belong.

3.4.5 Archaeoastronomical Analysis

The synagogue of Susiya is located at 31° 23' 30.67" N, 35° 6' 44.45" E. Its façade faces nearly due east at 89 degrees E and the wall opposite the façade faces 270 degrees SW. The

⁷⁶ For an image of the inscription and a transcription of the Hebrew, see Gutman et al., “Horvat Susiya,” 127. English translation by the authors.

synagogues façade faces the rising sun throughout the year, with the equinox sunrises aligned with the synagogue. Further, on the summer solstice, the sun passes at a height where sunlight could pass through a second story window to cast light on the Helios medallion as at Beth Alpha. The east-facing façade could again reflect the description Josephus provides of the entrance of the Jerusalem temple facing sun rise.

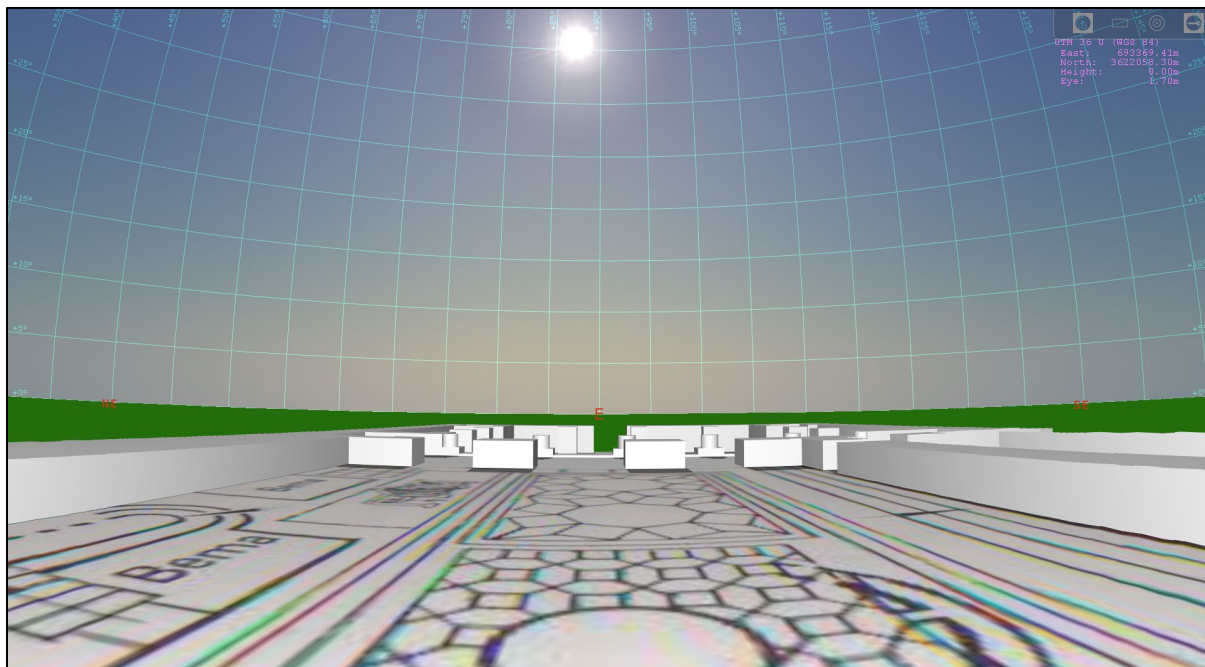


Figure 14. Standing on the Susiya Helios-zodiac cycle, looking east on the summer solstice.

3.4.6 Summary and Analysis

The significance of the Helios-zodiac cycle at Susiya, though poorly preserved, is magnified with the inscription that references a dating schema based on the creation of the world. The idea of *thema mundi*—the positions of the planets within the zodiac at the moment of the world’s creation—was prevalent in Greco-Roman astrological practices. The *thema mundi* may have been the hermeneutical key to understand the Mithraic *tauroctony*, which is discussed in

Chapter 4.⁷⁷ In the fifth century, Macrobius used the *thema mundi* to interpret Cicero's *Dreams of Scipio*. In the *Greek Alexander Romance*, the *thema mundi* is taken for granted in a scene where Nactanebo reads the natal astrology of Queen Olympias.⁷⁸

Two months are associated with the date of the creation of the world in *Seder Olam Rabbah*, based on the tradition that the Flood began “on the seventeenth of the second month” in Genesis 7:11. Rabbi Jehoshua says that Nissan is the month of creation and dates the beginning of the flood to 17 Iyar with the disappearance of the Pleiades star cluster in Taurus. Josephus also associated the setting of the Pleiades with flooding. Rabbi Eliezer says that Tishrei is the month of creation and dates the beginning of the flood to 17 Marheshvan, which is the date on which the Pleiades first appear in the night sky.⁷⁹ Rain was often associated with the heliacal rising or setting of the Pleiades. In *Antiquities*, Josephus discusses a torrential downpour at the setting of the Pleiades that saved John Hyrcanus and the inhabitants of Jerusalem during the siege of Antiochus VII Sidetes.⁸⁰ Conversely, Hesiod marks the appearance of the Pleiades as a time for autumnal harvest due to imminent rain.⁸¹

⁷⁷ Tamsyn Barton, *Ancient Astrology* (New York: Routledge, 2016), 200.

⁷⁸ *The Greek Alexander Romance*, trans. Richard Stoneman (London: Penguin Books, 1991), 4.

⁷⁹ *Seder Olam: The Rabbinic View of Biblical Chronology*, trans. Heinrich Guggenheimer (New York: Roman and Littlefield Publishers), 4.

⁸⁰ Josephus, *Jewish Antiquities, Volume V: Books 12-13*, trans. by Ralph Marcus. LCL 365 (Cambridge, MA: Harvard University Press, 1943), 13.236.

⁸¹ Hesiod, *Works and Days in Theogony. Works and Days. Testimonia*, ed. and trans. by Glenn W. Most. LCL 57 (Cambridge, MA: Harvard University Press, 2018), 383.

The debate in *Seder Olam Rabbah* centers on whether the world was created on 1 Nissan (vernal equinox), in line with Rabbi Jehoshua, or on 1 Tishrei (autumnal equinox), in line with Rabbi Eliezer. Regardless of which month the world was created, it was of enough interest to the rabbis to include a relative date and discussion of that date in *Seder Olam Rabbah*.

If the “four thousand” years of the Susiya inscription is meant to be taken literally, it would result in an implied date of 539.⁸² This date could commemorate the construction of or repairs to the synagogue or the dedication of the inscription. The Helios-zodiac cycle could reflect the date of the creation of the world based on the position of the zodiac panels in relation to the seasons, though it is impossible to tell due to the poor state of preservation. The alignment of the synagogue façade with the rising sun on the vernal and autumnal equinoxes lends further credence to the importance of an equinox as a *thema mundi* for the congregation of Susiya.

3.5 Hammath Tiberias

3.5.1 Basic Information

Hammath Tiberias is located approximately 20 m west of the shore of the Kinneret, on the southern outskirts of modern Tiberias. Ancient Hammath Tiberias existed as two towns that grew together in the early Roman period following the founding of Tiberias by Herod Antipas in 20. The earliest reference to Hammath Tiberias appears in Joshua 19:35, where תַּמַּת is listed

⁸² The result of the date of the creation of the world (3461 BCE) subtracted from the date listed in the inscription 4000 years results in a Common Era date of 539.

among the fortified cities of the tribe Naphtali. Josephus refers to the springs of Hammath as the center of a small village named Emmaus, a Greek Semitism derived from *חממת*.⁸³

In 1871, Charles Warren and Charles Wilson surveyed the city of Tiberias, noting the continued use of the hot springs.⁸⁴ They documented the remains of an 11 ft 6 in thick wall that stretched from the shore of the Kinneret to the mountain range west of the city.⁸⁵ From 1920 to 1921, Nahum Slouschz and Vincent excavated a site 500 m northwest of the hot springs. Slouschz's excavation uncovered a basilical synagogue. Whereas Slouschz dated the structure to the early Roman period based on literary evidence, Vincent proposed a fourth-fifth century date based on the stratigraphy of the site.⁸⁶

Archaeologists briefly visited the hot springs in the winter of 1935/36 to conduct a rescue excavation in preparation for the construction of a modern bath house. In 1947, the head of the Department of Antiquities, Na'im Makhouly, excavated a portion of the synagogue prior to bath house construction. Makhouly's excavations ended prematurely due to the outbreak of the 1948 Arab-Israeli war. In 1961, continued modern bath house construction around the hot springs prompted an excavation of the hot springs and their environs.

⁸³ Josephus, *Jewish Antiquities, Volume VIII: Books 18-19*, trans. Louis H. Feldman. LCL 433 (Cambridge, MA: Harvard University Press, 1965), 18.60. Josephus translates Emmaus as meaning "warm bath" in *The Jewish War, Volume II: Books 3-4*, trans. by H. St. J. Thackeray, LCL 487 (Cambridge, MA: Harvard University Press, 1927), 4.11-13.

⁸⁴ Charles Warren and Charles Wilson, *The Recovery of Jerusalem. A Narrative of Exploration and Discovery in the City and the Holy Land* (New York, D. Appleton & Company, 1871), 362.

⁸⁵ Warren and Wilson, *The Recovery of Jerusalem*, 362.

⁸⁶ Louis-Hugues Vincent, "Hammath Tiberias," *Revue Biblique* 30 (1921): 438-441.

3.5.2 Excavation and Research

Moshe Dothan conducted two excavation seasons at Hammath Tiberias under the auspices of the Israel Department of Antiquities and Museums and the Department of Education and Culture from December 5, 1961–March 5, 1962 and November 5, 1962–January 8, 1963, with subsequent test trenches dug in 1964 and 1965 in preparation for the final publication of the site.⁸⁷ Dothan's excavations unearthed four periods of occupation, which he labeled Strata IV to I, with Stratum IV being the earliest. Strata II and I each contained two phases of synagogue construction, which Dothan designated IIb, IIa, Ib, and Ia. The only intact mosaic floor exposed was in Stratum IIb, which includes a Helios-zodiac panel.

Dothan only excavated to the depth of Stratum IV in a few trenches to preserve the more recent remains.⁸⁸ The function of the structures uncovered in Stratum IV cannot be determined with certainty as so little material was uncovered. Among the finds were early Hellenistic pottery and coins of Antiochus IV, giving a *terminus post quem* of the second century BCE.

Like Stratum IV, Dothan only partially excavated Stratum III to preserve the synagogues of Stratum II and I. Stratum III yielded the remains of a monumental building likely associated with the hot springs. Dothan suggested that the building of Stratum III may have been a *palestra* connected to *thermae*.⁸⁹ Whatever the monumental building is, it is difficult to date with

⁸⁷ Moshe Dothan, *Hammath Tiberias: Early Synagogues and the Hellenistic and Roman Remains*, vol. 1 (Jerusalem: Israel Exploration Society, 1983), 4-5.

⁸⁸ Dothan, *Hammath Tiberias*, vol. 1, 10.

⁸⁹ Dothan, *Hammath Tiberias*, vol. 1, 16.

certainty. All that can be determined is that it was built and used between Stratum IV and Stratum IIb. No coins were found in Stratum III and the ceramic evidence only provides a late Hellenistic/early Roman *terminus post quem*.⁹⁰

Stratum II preserved two phases of synagogue construction: “the early synagogue” of IIb and “the Severos synagogue” of IIa. The “Severos synagogue” is so-named due to a Greek mosaic floor inscription that reads “Sever[os] disciple of the Most Illustrious.”⁹¹ Dothan dates the synagogue of IIb to the third century based on architectural features as well as coins of Elagabalus (218-222) and Alexander Severos (222-235). He presents a fourth-fifth century range for the synagogue of IIa based on coins of Constantius II (346-361), Valens (364-375), and Arcadius (393-395). Five coins of Honorius and Theodosius II were also found, the latest of which dates to 408-423. Dothan says that these later coins were found in unsealed contexts and should be used with caution, though he never states where these coins were found.⁹²

⁹⁰ Dothan provides a firmer date of 20 CE to 130-135 CE. *Hammath Tiberias*, vol. 1, 18-19.

⁹¹ Dothan, *Hammath Tiberias*, vol. 1, 55, 57–59.

⁹² Dothan, *Hammath Tiberias*, vol. 1, 66–67.



Figure 15. Mosaic floor of Hammath Tiberias Synagogue, Stratum IIa. Image rendered by the author.

Stratum I preserved two phases of synagogue construction: the synagogue of 1b and the synagogue of 1a. The synagogue of 1b was a basilica paved with a mosaic floor, of which only a 1 x 1 m section was preserved. The small mosaic patch contained an outer guilloche pattern, an inner wave pattern, and a scene that included a deer. Dothan dates the construction of the late Roman synagogue of 1b to 420-423 based on an assumed destruction of the previous synagogue of Stratum IIa by an earthquake in 419.⁹³ A *terminus ante quem* of 423 is based on a law in the

⁹³ Note that Dothan does not describe earthquake damage. See Dothan, *Hammath Tiberias*, vol. 1, 67.

Theodosian Code making it illegal to construct any new synagogues in the Roman Empire beginning on February 15, 423.⁹⁴ Of course, because such a law existed in the Theodosian Code does not mean that it was followed or enforced, as evidenced by the construction of other Late Roman-Byzantine synagogues with inscriptions dated to the sixth century, such as Beth Alpha. In addition, Dothan does not describe evidence of destruction that one would expect to see associated with an earthquake, such as collapse in a single direction and cracks in walls. Synagogue Ib should therefore be dated later, although not enough evidence is provided in the archaeological report for a secure dating.

David Stacey has re-dated Stratum Ib and Ia based on ceramic evidence, suggesting Synagogue Ib went out of use around 749.⁹⁵ Stacey cites lack of evidence to corroborate an earthquake. Stacey proposes a date for Stratum Ia to after 749, noting that kilns built against the synagogue walls could have been constructed anywhere from the mid-eight to late eleventh century.⁹⁶

Jodi Magness has re-dated Synagogues IIa and IIb based on the ceramic, stratigraphic, and numismatic evidence. Magness argues that Dothan dated the synagogues too early whereas the evidence suggests a later date. Magness argues that Stratum IIb dates to the fourth century; Stratum IIa (“Severos Synagogue”) was built in the fourth-fifth century and occupied until at

⁹⁴ Dothan, *Hammath Tiberias: Late Synagogues*, vol 2, completed and ed. by Barbara L. Johnson (Jerusalem: Israel Exploration Society), 12.

⁹⁵ David Stacey, “The Later Synagogues at Hammath Tiberias and Problems of Dating the Islamic Phases and Pottery,” *The Roman and Byzantine Near East* 3 (September 2002): 235-260.

⁹⁶ Stacey, “Later Synagogues at Hammath Tiberias,” 258-259.

least 475 based on the presence of Late Roman C Form 3 bowls and worn coins dating to the fifth century; Stratum Ib was built in the sixth or seventh century and occupied until at least 750; and 1a was used into the ninth or tenth century.⁹⁷

3.6.3 Description of the Synagogues

3.6.3a *Stratum IIb: Early Synagogue*

The early synagogue of Stratum IIb is a basilica consisting of a main hall, a southern ancillary room, and northern ancillary room. The main hall stretched northwest to southeast and measures 12.55-13.10 m wide and 9 m long. A 1.20 m long niche on the southeastern side of the hall extended the main hall to a length of 10.20 m. Three rows of three columns ran along the length of the hall. The first two rows sat on stylobates, serving as the boundary for the nave. The third row of columns was built on the foundation of the floor.

The southeastern ancillary room is 11.30 m long and 3.00 m wide. The southeastern room stretches along the southeast wall of the synagogue, with its southwest wall extending from the southwest wall of the basilica. The northwest room measures 5.00 x 2.70 m, with its southwest wall aligned with the middle row of columns in the hall. Although no threshold or doorway is marked on the architectural plans, a door is proposed as having existed in the northeastern side of this room. An ovoid, stone-lined pit was found at the southern end of the room. Dothan suggested that this room served as a stairwell to reach a second story or the roof. No remains

⁹⁷ Magness, "Helios," 9-13.

indicating a stairwell, however, were found. The existence of the stone-lined pit casts doubt on the use of this room as a stairwell.⁹⁸

Both the main hall and the southeastern room were paved with mosaics as evidenced by loose tesserae found in the mortar bedding for the mosaic of the Stratum IIa synagogue. Only a small sliver of the mosaic of IIb survives, which consisted of a 125 x 40 cm patch of a guilloche and single line border nearly abutting the south wall of the hall. During this early synagogue phase, the building was entered through the southern room. In subsequent phases of use, the synagogue entrance shifted to the north side of the building.

3.6.3b Stratum IIa: Late Roman Synagogue (the “Severos Synagogue”)

The Severos synagogue shared the same basilical layout as the early synagogue with three major changes. First, the southern room, which had been an open corridor-like room, now was partitioned by three walls into three small rooms. Second, the entrance to the basilica through the southern room was blocked and three new entrances were inserted into the north wall. Third, the northern ancillary room was sealed and no longer used.

⁹⁸ Dothan, *Hammath Tiberias*, vol. 2, 21-25. Dothan also proposes the existence of a second story for use as a women’s section, although it is doubtful that there was a second story based on the architectural remains, and on a lack of evidence that women were separated from men.



Figure 16. Detail of Hammath Tiberias Synagogue nave, Stratum IIb. Image rendered by the author.

A mosaic floor covered the nave and four aisles. The nave mosaic was divided into three registers.⁹⁹ The central and northern registers were bounded by a black border that set these two registers apart from the southern register. The northernmost register, inside the black border line, was bounded by an outer guilloche pattern and inner red border. Inside the red border, two lions flank a square panel of nine Greek inscriptions organized into three rows of three inscriptions each. Seven of the nine inscriptions are proclamations of vow fulfillments. The north-central inscription (i.e. closest to the entrance) reads, “Sever[os] disciple of the most Illustrious Patriarch.” The east-central inscription reads, “Iouillos the supervisor completed the entire work,” possibly commemorating the mosaicist or donor who paid for the mosaics.¹⁰⁰

The central register of the nave, which is bounded by a red border, consists of a Helios medallion encircled by a zodiac wheel with Hebrew inscriptions identifying each sign. The four anthropomorphized seasons occupy in the four corners of the square panel, each with its name inscribed in Hebrew.

The southern register of the nave mosaic is bounded by a series of unique borders that set it apart from the other two panels. Beginning with the outermost and moving in, a black line encloses a double-guilloche pattern, which surrounds an additional red border. A Torah shrine/Ark of the Covenant flanked by two *menorot* is depicted inside the series of borders.¹⁰¹ Each *menorah* is lit and sits on a three-dimensional stand. The western menorah stand is a cube

⁹⁹ See Figures 16-18 for the mosaic floor of the “Severos synagogue.”

¹⁰⁰ Dothan, *Hammath Tiberias*, vol. 1, 55.

¹⁰¹ See Figure 17 for the Ark/Torah Shrine scene.

while the eastern menorah is a pentagonal prism. Each *menorah* consists of a series of bulbs shaped like pomegranates. The western *menorah* is made up of 46 pomegranate bulbs, and the eastern *menorah* is made up of 39 pomegranate bulbs.



Figure 17. Detail of ark/Torah shrine panel of Hammath Tiberias synagogue, Stratum IIa. Image rendered by the author.

The *menorot* flank a three-dimensional representation of a Torah shrine/Ark of the Covenant. The shrine has two columns with Corinthian capitals on cube bases. Between the columns, two stairs lead to a closed double door that is partially covered by a single cinched curtain. Each door has three panels. In the middle, a square panel is flanked vertically by rectangular panels.

Above the door and capitals is a triangular gable with a concave shell in the tympanum. Each of the angled sides of the gable is topped with four S-shaped patterns lying parallel to the

angle of the gable, representing cornices. Surrounding the scene are two *etrogim*, two incense shovels, two *lulavim*, a *shofar*, and a matrix of tulip bulbs that serves as a background for the scene. Dothan notes that the *lulavim* and *shofar* are represented as bound and gilded in accordance with Rabbinic law.¹⁰²

The mosaic floor of the nave's western and eastern aisles is decorated with geometric patterns and a *tabula ansata* with a Greek and Aramaic inscription pronouncing a blessing on Severos and Iouillos for their contribution to the synagogue's construction.¹⁰³ The mosaic in the eastern aisle shows a complex pattern of overlapping and rotated squares, some of which contain three-dimensional projections. In the center of the aisle, a cut was made to insert a five-line inscription that blesses Profoturos for constructing the aisle in which the inscription appears.

3.6.3c Stratum Ib: Byzantine Synagogue

The Byzantine synagogue of Ib is a basilica with a nave, two aisles, an apse, two small southern rooms flanking the apse, and an eastern room with a small apse. The builders leveled the synagogue of IIa with fill and dug into the slope of the surrounding hill to create a flat surface. The nave of synagogue Ib measures 18.30 x 7.60 m. Each aisle measures 18.30 x 3.60 m, for a total of 18.30 x 14.80 m for the hall. The dimensions of the apse are not provided in the archaeological report, although based on the published diagrams, it appears that the apse runs the width of the nave (7.60 m) and extends approximately 3 m north from the north wall.¹⁰⁴

¹⁰² Dothan, *Hammath Tiberias*, vol. 1, 39.

¹⁰³ Dothan, *Hammath Tiberias*, vol. 1, 60.

¹⁰⁴ Dothan, *Hammath Tiberias*, vol. 2, 17-19.

A 55 cm wide stylobate surrounds the northern, eastern, and western sides of the nave. Only a small portion of the stylobate was found *in situ*, but its foundations were preserved in the nave.¹⁰⁵ The small room to the west of the apse measures 5 x 4 m and could be entered from the hall through a double-winged door. A rectangular cistern measuring 1.5 x 1 m was found in the eastern corner of the room. Large quantities of pottery and the base of a lion statuette were recovered from the cistern. To the west of the apse is a small room measuring 3.8 x 1.80 m, which served as a possible repository for ritual artifacts used in the synagogue. An L-shaped corridor surrounds this room and possibly housed a stairway that led to a second story gallery.

The western ancillary room measures 19.80–20.50 m long from north to south and 6.80 m wide from east to west. This room was accessible from the prayer hall through three evenly spaced entrances along the east wall, and from outside the building through a single entrance in the north wall, which is an extension of the north wall of the prayer hall.

The entire hall was paved with a mosaic floor, although the only portion left intact was a 65 cm wide guilloche border along the western edge of the nave. Dothan mentions a large number of tesserae as well as a mosaic bedding in the rest of the hall.¹⁰⁶

3.6.3d Synagogue Ia: Abbasid Synagogue

The latest synagogue re-used the walls of synagogue Ib but altered the interior of the building and laid new mosaics at the same level as the previous floor. A network of rooms was constructed against the façade of the western room, which wrapped around the new synagogue's

¹⁰⁵ Dothan, *Hammath Tiberias*, vol. 2, 19.

¹⁰⁶ Dothan, *Hammath Tiberias*, vol. 2, 34-35.

courtyard. While the three entrances in the hall's north wall were maintained, the entrance in north wall of the western room was closed. The apse of the western room was removed and replaced by a straight wall. The room to the west of the hall's apse was expanded and subdivided into five small rooms.

Only small portions of the mosaic floor of this synagogue survive, on the basis of which Dothan reconstructed a design of geometric patterns covering the main hall. As in the synagogue of Ib, the courtyard and western room were paved with limestone blocks.

3.5.4 Helios-zodiac Cycle of Stratum IIa ("Severos Synagogue")

3.5.4a Helios

A wall of Stratum Ib cut through the lower half of Helios riding a *quadriga* in the zodiac panel of synagogue IIa.¹⁰⁷ Two pairs of horses' hooves with one additional hoof are visible, as are two wheels of the chariot, which face the viewer in profile. Under the chariot are two waves of blue water.¹⁰⁸ Helios stands with his right hand bent at a 45-degree angle and the palm open and facing the viewer. He holds a globe and whip in his left hand. A radiant, six-ray nimbus surrounds Helios's head. He is portrayed with the golden *segmentum* and bracer typical of military garb, and wears a blue, long-sleeved tunic with purple cloak.

¹⁰⁷ See Figure 18 for Hammath Tiberias Helios-zodiac cycle.

¹⁰⁸ Dothan states that clouds are visible between the horses' hooves and the water, but on closer examination of the mosaic, the horses are drawing the chariot across water—not clouds. Dothan, *Hammath Tiberias*, vol. 1, 40-41.

There is a waxing crescent moon to the left of Helios and an eight-pointed star to his right. The beginning of a horse's mane is visible below the star. The rest of the scene was destroyed by the wall of Stratum Ib.



Figure 18. Detail of Helios-zodiac panel. Image rendered by the author.

3.5.4b Zodiac

Aries is depicted to the left of Helios's head in profile at the eleven hour and thirty-minute clock position to begin the zodiac cycle. The sign is depicted as a ram in mid-pounce, with rear legs are planted and front legs raised. Aries's head points towards Helios and his legs face outward. If Aries's feet are used to establish a "down" orientation, then he faces to the left. The figure has two curved horns, split hooves, and a paddle-like tail akin to the portrayal of Aries at Beth Alpha. An inscription to the right of Aries's head reads טלה.

Continuing to use Aries's feet as a "down" orientation, moving to the right of the panel at the ten hour and thirty-minute clock position is Taurus, indicating that the cycle should be read counter-clockwise in imitation of the zodiac and the sun's east-to-west progression through the sky. Taurus is depicted as a male bull facing left and caught in mid-leap with front legs raised and back legs planted. The bull has two short pointed horns, four split hooves, male genitalia, and a curved tail ending in a tuft of hair. Above his head is the inscription שור.

To the right of Taurus at the nine hour and thirty-minute clock position is an anthropomorphic depiction of Gemini. Only the left half of the panel survives. The surviving half of Gemini is a nude male, facing inward, with feet that point to the left, indicating movement in the same direction as Aries and Taurus. Only the final two letters, which are *mems*, survive in an inscription running above Gemini's head. The inscription likely read [תארו]מם.

To the right of Gemini is a small surviving patch of tesserae in the shape of a crab's claw, indicating a zoomorphic depiction of Cancer at the eight hour and thirty-minute clock position. To the right of Cancer, Leo is depicted as a lion pouncing to the right with back legs planted and front legs raised in an identical stance to Aries, although Leo moves in the opposite direction.

Leo is depicted with whiskers, a mane, and a tail curving upwards. Above Leo is the inscription אריה.

Next to Leo is the anthropomorphic and clothed female Virgo at the six hour and thirty-minute clock position, holding a lit torch in her left hand. Virgo faces right, indicating movement in the same direction as Leo. She wears a head covering and a blue *himation* over a red tunic. Virgo's left hand is covered and right hand exposed. Virgo's inscription runs to the left of her head with a spelling error: the mosaicists used a *chet* instead of a *heh* for the final letter. The inscription reads בתולה.

To the right of Virgo stands a nude, anthropomorphic male Libra at the five hour and thirty-minute clock position. The figure holds a pair of scales in his right hand and a scepter in his left hand. A cloth, possibly a *chlamys* or *pallium*, is draped over Libra's left shoulder. His right foot points to the left and his left foot points toward the viewer. Libra faces leftward, indicating motion left in opposition to Virgo's momentum. To the left of his head is the inscription מוזנים.

To the right of Libra, a zoomorphic Scorpio is partially preserved in the four hour and thirty-minute clock position. Scorpio stands in profile from above with stinger, lower four legs, two of four upper legs, and a portion of his body. The rest of Scorpio, along with the accompanying inscribed name, was destroyed by later construction. Scorpio faces to the right.

The sign to the right of Scorpio would have been Sagittarius, but it and its inscription are not preserved. To the right of the destroyed Sagittarius panel stands a zoomorphic depiction of Capricorn at the two hour and thirty-minute clock position as a half-donkey, half-fish chimera. Capricorn's lower half is depicted as a coiled fish tail with split tail fin. Three spike-like

features—possibly fins—extend from the bottom of his tail. The upper half of Capricorn is represented by two hooves, a goat’s head, and two long vertical horns. Capricorn faces left and his hooves match the front stance of Taurus. Above his head is the inscription גַּד.

To the right of Capricorn, a nude male Aquarius in the one hour and thirty-minute clock position pours water over his left shoulder from a long-necked amphora. The water pools at Aquarius’s feet in a wave-like pattern similar to that of the water at the bottom of the Helios medallion. His torso is twisted in an athletic pose. Aquarius’s feet point to the left, indicating leftward movement, although he pours the water into the right of the scene. The inscription לָד appears to the left of Aquarius’s arm. The inscription translates as “young boy,” and is an erroneous reversal of the Hebrew letters, which should read דָּל.¹⁰⁹

To the right of Aquarius, the final zodiac sign is Pisces at the twelve hour and thirty-minute clock position, symbolized as two fish one above the other. The lower fish faces to the left with an eye cast upward towards the upper fish, which faces and looks with its eye to the right towards Aries. Each fish possesses a dorsal fin and adipose fin on its back, a pectoral fin on its side, and a pelvic fin and anal fin on its belly. These fins likely depict a herring or similar freshwater fish found in the Kinneret. The inscription דָּגִים runs above the topmost fish.

3.5.4c Seasons

The seasons are personified as female busts, one in each spandrel of the square panel housing the Helios-zodiac cycle. In the upper left corner, the inscription תְּקוּפַת נִיסָן indicates the

¹⁰⁹ Dothan refers to the reversal of the characters as “mirror-writing” and suggests the mosaicists did not know Hebrew. Dothan, *Hammath Tiberias*, vol. 1, 46-48.

personification of spring. Spring faces and looks to the left. Her head is wreathed with green flowers. A metal bracelet dangles from her right wrist and a beaded necklace hangs from her neck. Spring wears a blue *peplos*-like garment cinched with a circular, metallic clasp over her left shoulder. It is possible that there was another clasp on her right shoulder, but if so it is obscured by her right hand, which holds a bowl of fruit or flowers. In her left hand, just out of the frame, Spring holds a flowering plant whose stalk, buds, and flower extend into the scene. The spring signs of Aries, Taurus, and Gemini are contained within Spring's quadrant of the panel.

Directly below Spring in the bottom left of the panel, the inscription תקופת תמוז identifies Summer, who is personified as a woman facing left and looking towards Spring. Summer wears a wreath with seven elongated leaves extending outward and five berries in the center. Her cheeks are red and she wears a patterned *peplos*-like garment cinched with a circular clasp on her right shoulder. Summer's right hand grasps a miniature scythe and her left hand, just out of the frame, holds a bundle of wheat that extends into the frame. The summer zodiac signs of Cancer, Leo, and Virgo are in Summer's quadrant of the panel.

On the bottom right of the panel, the inscription תקופת תשרי identifies the personification of Autumn. A wreath containing pomegranates adorns Autumn's head. She wears a *chiton* cinched at each shoulder with a circular metallic clasp. Autumn's right hand grasps a grape bunch attached to a vine as well as a sprig of olives. She faces left with eyes cast to the left and upward toward Helios and/or Spring. The autumnal zodiac signs of Libra, Scorpio, and Sagittarius are in Autumn's quadrant of the panel.

The final seasonal personification is Winter in the upper-right of the panel. Winter's inscription is partially destroyed and only the word תקופת survives. She wears either a *pallium* or *himation*, which covers nearly all of her dark hair. Golden hoop earrings in each ear support a white stone or pearl. Winter's cheeks are red. In her left arm she holds a single-handled water jug in mid-pour. The rest of the scene is destroyed. The winter zodiac signs of Capricorn, Aquarius, and Pisces are in Winter's quadrant of the panel.

3.5.5 Archaeoastronomical Analysis

Synagogue IIb of Hammath Tiberias is located at 32° 46' 6.51" N, 35° 32' 54.43" E. Its façade faces 315 degrees NW, and its apsidal wall faces 135 degrees SE. The façade of Hammath Tiberias aligns nearly perfectly with sunset on the summer solstice. The alignment is likely an unintended coincidence of facing the apsidal wall of the synagogue toward Jerusalem, especially considering the alignment of the synagogues of Hammath Tiberias with the city's grid pattern.¹¹⁰

3.5.6 Summary and Analysis

The most striking elements of the Hammath Tiberias Helios-zodiac cycle are the globe and whip that Helios holds in his left hand, identifying him as Sol Invictus. A number of coins from the late Roman period depict the Roman god Sol Invictus with a globe and/or whip in his left hand and right hand raised.¹¹¹ Sometimes a single star is depicted beside Sol Invictus.

¹¹⁰ Dothan, *Hammath Tiberias*, vol. 1, 28-29.

¹¹¹ See Figures 14-18 for depictions of Sol Invictus on the coins of Caracalla, Elagabalus, Aurelian, and Constantine I, respectively.



Figure 19. Caracalla. AD 198-217. AR Denarius (19mm, 3.31 g, 1h). Rome mint. Struck AD 200-201. Permission courtesy Classical Numismatic Group.



Figure 20. ELAGABALUS. 218-222 AD. AR Denarius (18mm, 3.67 gm). Rome mint. Struck 219 AD. IMP ANTONINVS PIVS AVG, laureate and draped bust right / P M TR P II COS II P P, Sol standing left, raising hand, holding whip. Permission courtesy Classical Numismatic Group.



Figure 21. Aurelian. 270-275 AD. Antoninianus (21mm, 3.85 gm). Tripolis mint, second officina. Struck circa 273-274 AD. IMP C AVRELIANVS AVG, radiate and cuirassed bust left / SOL-I INVICTO•, Sol standing left, raising hand and holding globe, captive seated left below; star in left field. Permission courtesy Classical Numismatic Group.



Figure 22. CONSTANTINE I. 307-337 AD. *Æ* Follis (4.59 gm). Struck 310-313 AD. Treveri mint. *IMP CONSTANTINVS AVG*, laureate, draped, and cuirassed bust right / *SOLI INVICTO COMITI*, Sol standing left, holding globe. Permission courtesy Classical Numismatic Group.

The globe that the Hammath Tiberias Sol Invictus holds is an unknown *mapa mundi*, that is, a Late Roman map of the world. The globe is divided into four quadrants by two intersecting lines. Each quadrant contains a medallion oriented in the globe's cardinal directions. Dothan suggested that these lines represented the equator and meridian.¹¹² While Dothan's theory is possible, I propose that the map reflects a state-sponsored mapping project undertaken by Theodosius II. A Latin inscription commemorates the completion of the Theodosian map in 435 by two artisans—one a painter and one a writer—who claim to have used previous world maps as a basis for their the Theodosian-sponsored map.¹¹³

¹¹² Dothan, *Hammath Tiberias*, vol. 1, 40.

¹¹³ Oswald Dilke, *Greek and Roman Maps* (Ithaca, NY: Cornell University Press, 1985), 169.

The earlier maps to which the artisans refer were likely produced by Julius Caesar and Marcus Agrippa.¹¹⁴ Caesar's map divided the world into four quadrants according to the cardinal directions.¹¹⁵ Agrippa's map is known primarily from Cassius Dio, who writes that Agrippa's map was carved into marble and placed in the Porticus Vipsania near the Via Flaminia.¹¹⁶

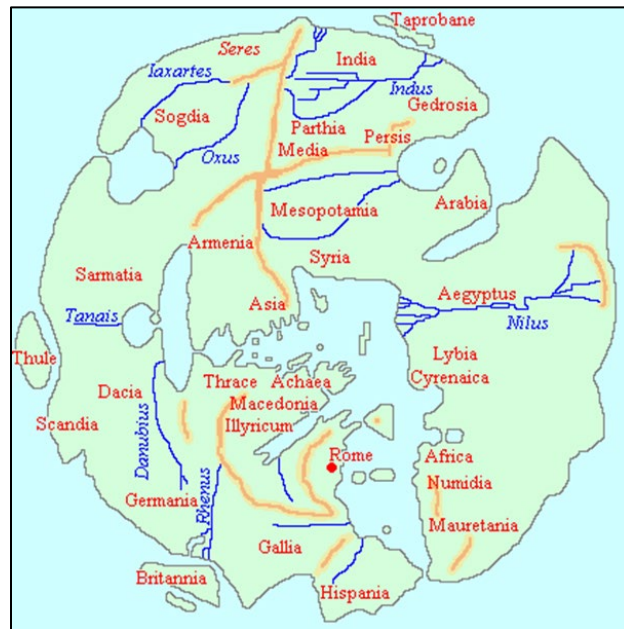


Figure 23. Proposed reconstruction of Agrippa's map based on description in Dio Cassius and Pliny the Elder. Courtesy of Livius.org. Protected by Creative Commons License.

¹¹⁴ See Figure 23.

¹¹⁵ Alexander Riese, *Geographi Latini Minores* (Appui Henningeros Fratres, 1878), 21–23; Silke, *Maps*, 183-184.

¹¹⁶ Cassius Dio, *Roman History*, Loeb Classical Library 83, 55.8.4. Pliny the Elder also discusses the map briefly in *Natural Histories* 2.55.143.

Moving outside the Helios medallion, the next surprising find at Hammath Tiberias is that the seasons align with their respective zodiac signs. The upper-left quadrant of the zodiac cycle contains Aries, Taurus, and Gemini (running from right to left). The personified season positioned in this quadrant is Spring. The mosaicists/patrons at Hammath Tiberias depicted Helios/Sol Invictus as a creator deity who ruled over the earth, the heavenly constellations, and the seasons. They may have viewed Sol Invictus as representing an aspect of the God of Israel, as argued by Martin Goodman.¹¹⁷

3.6 Sepphoris Synagogue

3.6.1 Basic Information

Sepphoris, located 6.5 km northwest of Nazareth, is the site of a fifth century-synagogue. In the early Roman period, Sepphoris was one of two urban centers in Galilee, the other being Tiberias. The inhabitants of Sepphoris did not participate in the First or Second Jewish Revolts. Around the year 200, Rabbi Judah HaNassi relocated the Sanhedrin from Beit She'arim to Sepphoris due to his ailing health. While based at Sepphoris, the Sanhedrin completed the compilation of the Mishnah.¹¹⁸

¹¹⁷ Martin Goodman, "The Jewish Image of God in Late Antiquity," in *Judaism in the Roman World: Collected Essays* (Boston: Brill, 2006), 205-217.

¹¹⁸ b. Roš Haš. 31a–b

From 351-352, the city incited a regional revolt against Constantius Gallus, which resulted in it being razed.¹¹⁹ Sepphoris was rebuilt and appears to have flourished as evidenced by buildings such as the synagogue.

3.6.2 Excavation and Research

Sepphoris has been excavated every year since 1985 by various expeditions including the Hebrew University of Jerusalem, Duke University, and the University of South Florida. To keep this section brief, I focus only on the excavation of the synagogue. The Sepphoris synagogue was discovered in 1993 under the auspices of the Institute of Archaeology of the Hebrew University of Jerusalem. Excavations continued from 1993-1994 and 1996-1998. The 1993-1994 seasons were co-directed by Ehud Netzer and Zeev Weiss, and the remaining seasons were directed solely by Weiss.¹²⁰ The mosaic floor of the Sepphoris synagogue was removed for restoration and a traveling exhibit in 1994. In 2000 the mosaic was returned to the synagogue building, where it is on permanent display in a climate-controlled building.

3.6.3 Description of the Synagogue

The synagogue is located in the northeastern part of the excavated city. The synagogue and surrounding domestic buildings are oriented 25-degrees east of north.¹²¹ An alley ran

¹¹⁹ For a description of the revolt and consequences faced by Sepphoris, see Michael Avi-Yonah, *The Jews under Roman and Byzantine Rule* (Jerusalem: The Magnes Press, 1962), 176-181.

¹²⁰ Ze'ev Weiss, *The Sepphoris Synagogue: Deciphering an Ancient Message Through Its Archaeological and Socio-Historical Contexts* (Jerusalem: Israel Exploration Society, 2005), XIII.

¹²¹ Weiss, *Sepphoris Synagogue* 9–11; and measurements taken by the author.

parallel to the synagogue's south wall and a street ran perpendicular to the main entrance, through the south wall of the narthex.

The synagogue hall is rectangular and consists of a narthex, nave, single aisle, and *bema*. The narthex, nave, and aisle are paved with mosaics.¹²² The narthex measures 6.10 x 2.70–3.00 m. Due to the narrowness of the room, it is likely that there was only a single entrance to the main hall. Weiss proposes that this entrance was aligned with the center of the nave, but it is also possible that such an entrance provided access to the aisle.¹²³ A large cistern of nearly the same dimensions as the narthex lies below the mosaic floor of the narthex. This mosaic consists of three, single-color lines surrounding a guilloche pattern. The inner rectangle of the floor contained a medallion, possibly with an inscription, although only two small fragments of the medallion's border survive.¹²⁴

The synagogue's hall measures 16.1 x 6.5 m. The nave is 4.40 m wide and the aisle is 2.10 m wide. The nave and aisle were separated by five evenly spaced columns along the length of the hall. The westernmost column nearly abuts the *bema*.

¹²² See Figure 24.

¹²³ Weiss, *Sepphoris Synagogue*, 11,14-15.

¹²⁴ Weiss, *Sepphoris Synagogue*, 14-15.



Figure 24. Mosaic floor of Sepphoris synagogue. Photo rendered by author.

The mosaic floor of the aisle is decorated with geometric patterns and medallions, five of which contain square inscriptions each measuring 38 x 38 cm. The inscriptions pronounce Aramaic blessings on a number of individuals, including a man named “Yudan,” the son of

“Isaac the Priest.” These five inscriptions are justified to the right of their respective squares and are read by facing towards the *bema* in the west.

The mosaic floor in the intercolumniation has geometric patterns different from those in the aisle and nave. Between each intercolumniation is a unique design consisting of squares, medallions, and/or diamonds. Four additional inscriptions run east to west along the northern side of the intercolumniated mosaics. The text is read by standing to the south and facing north.

The mosaic in the nave is divided into seven narrative panels set apart by a guilloche border that also separates the individual panels. The easternmost panel, which Weiss labels as Band 7, is mostly destroyed except for a dedicatory inscription in its upper left corner, a portion of a woman’s head covered by a *himation* or veil framed by a doorway, a reclining man wearing a toga adorned with an *orbiculum*, and the curved arm of a man standing between the reclining man and the doorway. Weiss interprets this as the visit by three angels to Abraham and Sarah at Mamre.¹²⁵

Moving eastward toward the platform, Band 6 contains two square panels depicting the *'Aqedah*. The left most panel shows two young men looking toward one another. The man on the left holds the reins of a donkey and sits under a palm. The man on the right stands in front of the donkey and holds a spear in his left hand. The scene to the right is poorly preserved, but the head of a ram partially tangled in a vine facing left can be seen. The rest of the damaged panel likely portrayed Abraham’s offering of Isaac.

¹²⁵ Weiss, *Sepphoris Synagogue*, 156.

Band 5 contains a Helios-zodiac cycle. The panel is similar to depictions elsewhere in that it is a square panel with representations of the four seasons, the twelve signs of the zodiac, and Helios. This panel is discussed in greater detail following the description of the rest of the nave mosaics.

Band 4 contains three rectangular panels. In the upper left corner of the left hand panel, an Aramaic dedicatory inscription blesses the son of Aninah and his sons for making the mosaic.¹²⁶ In the rest of the left hand panel, a black amphora containing oil is labeled, “שמן,” a wicker basket holding flour is labeled “סלט,” and two dark-colored horns gilded with two metallic bands are labeled “הצוּצֶרֶת.” Another inscription above a ram reads, “And the other ram...,” which is a continuation of an Aaronic scene from Band 3 that will be discussed shortly.

In the middle panel of Band 4, an original Greek dedicatory inscription was partially replaced by a later Aramaic inscription that spans the top of the panel. A three-legged showbread table that would have contained a total of twelve loaves of bread dominates the scene. The right-hand panel of Band 4 also contains a dedicatory inscription in honor of the fulfillment of a vow, although the name and/or patronym did not survive.¹²⁷ Beneath the inscriptions is a wicker basket that is tilted slightly toward the viewer to show what it contains. The basket narrows from the top to bottom in the style of a *calathus*.¹²⁸ An assortment of fruits is visible inside the basket including a grape cluster, a pomegranate, and a fig. Two doves are attached to the upper

¹²⁶ Weiss, *Sepphoris Synagogue*, 208.

¹²⁷ Weiss, *Sepphoris Synagogue*, 211.

¹²⁸ Weiss, *Sepphoris Synagogue*, 102.

edges of the basket by their feet. The doves point downward at a 45-degree angle. Two cymbals attached by a chain stretch below the basket. This panel depicts an offering of first fruits. Mishna Bikkurim 3:3,5, and 8 describe the contents of the first fruit offering with two doves as a burnt offering. Music was played according to the text, which explains the presence of the cymbals.

Band 3 contains a Greek dedicatory inscription across the entire panel. Underneath the inscription, on the left side of the panel, a male bull and ram face the mostly destroyed figure of Aaron, who is identified by the inscription “אהרן.” Above the ram another inscription reads, “And the one lamb,” which is from sacrificial instructions that God orders in Exodus 29. Half of a preserved building is depicted in the middle of the scene. The building appears to be a stylized horned altar similar in appearance to the depiction of the Torah shrine in a panel directly above in Band 2. The left half of the altar was destroyed but the surviving right side depicts two steps, a column, a wall consisting of eight courses of stone, and a trapezoidal roof to show the top of the altar with two horns. To the immediate right of the altar is a water basin out of which water flows through the heads of a snake-like ornament into a bowl. Weiss interprets the scene as a whole, consisting of Band 3 and the left-hand panel of Band 4, as a progression through Exodus 29, in which Aaron is first purified with water and then instructed to sacrifice a bull and two rams at the altar in front of the Tabernacle.¹²⁹

Band 2 consists of three panels: the central panel depicts the Torah shrine/Ark of the Covenant and the two outer (flanking) panels show temple implements surrounding *menorot*. In each *menorah* panel, a *lulav* is bound and partially submerged in a bowl filled with water. The

¹²⁹ Weiss, *Sepphoris Synagogue*, 82-83.

bowl has a design similar to a shell. Next to the bowl is a citron. Each panel also has a *shofar* gilded with three metallic bands. The shrine of the central panel of Band 2 sits on a stereobate, upon which six columns topped by Corinthian capitals rest. Between the columns is a six-paneled double door above a destroyed section of the mosaic that likely depicted stairs. The facade has a Syrian gable with a shell tympanum above the door. A curved vine and leaf served as *acroteria* on each side of the gable. Below the facade, an incense shovel points to the left. Seven red coals are visible in the shovel.

Band 1 is divided into three panels: the central panel contains a Greek inscription surrounded by a wreath and the two outer panels contain flanking male lions, facing inward, each holding the head of a bull in an outstretched paw.

3.6.4 Helios-zodiac Cycle

3.6.4a Helios

The central medallion of the Sepphoris zodiac panel shows a *quadriga*, a waxing crescent moon, a red eight-pointed star, an ocean floor on which the horses of the *quadriga* run, and Helios depicted as a radiant sun.¹³⁰ The sun acts as the driver of the quadriga, replacing the anthropomorphized representations of Helios found in synagogues such as Hammath Tiberias and Beth Alpha.

Helios's horses are white and bridled with thin, red harnesses. A pair of horses rears their front legs on either side of the viewer, almost as if the viewer stands in the way of Helios's

¹³⁰ See Figure 25 for the Helios-zodiac cycle.

progression through the sky. The outermost horse on each side of the chariot looks outward while the two inner horses' heads turn towards one another. Six waves of blue and white water, edged with black tesserae, serve as the ground upon which the horses run.

To the immediate right of Helios is the waxing crescent moon. The entire circle of the moon is outlined, though most of it is dark. A red eight-pointed star shines below and to the right of the moon. The single star appearing alongside the moon and Helios, as in other zodiac panels, likely represents the morning star Phosphorous/Venus.



Figure 25. Detail of Sepphoris Helios-zodiac cycle. Photo rendered by the author.

3.6.4b Zodiac

Each of the zodiac signs is anthropomorphized and inscribed with its name as well as the month it represents. When a sign is depicted as an animal, such as the scorpion of Scorpio, a human counterpart accompanies it. Each zodiac frame contains a single shining star. The inclusion of a star and inscribed month highlight the cosmological and calendrical aspects of the

panel. Each figure points inward with their head towards Helios. In the descriptions of the signs that follow, the directions “right” and “left” are given in relation to the figures’ upright orientation.

The zodiac begins with Aries in the eight hour and thirty-minute position. Most of Aries’s panel is destroyed, but the inscription טלה confirms its identification. The final two letters of the month [ני]סך are visible running vertically along the left side of the frame. Two human legs extend below a large central lacuna. Behind the human, the hind legs of a ram are planted on the ground with forelegs raised as if leaping rightward. Though most of the ram’s body is destroyed, the front cloven hoofs and a paddle-like tale are visible.

Moving counterclockwise, the next sign of the zodiac is Taurus in the seven hour and thirty-minute position. Two human legs extend below a large central lacuna. Above the lacuna, a human head with curly black hair looks outward towards the viewer. The human holds a staff or club. Directly behind the human is a leaping bull with a stance similar to that of Aries. The bull’s hind legs are planted with its front cloven hooves raised in mid-leap to the right. The inscriptions שור and איר identifies the panel as Taurus and the month of Iyar.

Continuing counterclockwise, the two male figures of Gemini face one another in the six hour and thirty-minute position. Each twin wraps an arm around the other’s shoulder. A central lacuna exists where the twins’ torsos would be. To the right of Gemini is a three-string lyre and to the left a war club. The left leg of the right-hand twin is bent and points to the right. In the upper right of the panel, the first two letters [תא]ומים (“Gemini”) are visible. The name of the month, which would have been Sivan, does not survive.

This representation of Gemini depicts the twins as Apollo and Hercules based on descriptions found in Diodorus Siculus and Ptolemy. Diodorus attributes the invention of the lyre to Apollo and refers to Heracles's war club as a *ρόπαλον*, which is a specific type of cudgel that thickens towards the butt-end.¹³¹ Ptolemy describes the two "head stars" of Gemini as "the star of Apollo" and "the star of Heracles," as reflected in the depiction of Gemini as Apollo and Hercules at Sepphoris.¹³²

The next sign, Cancer, is at the five hour and thirty-minute clock position. In the panel, a young man in profile wears a sleeved tunic that ends just below the knees. His upper body and most of his head do not survive. The figure wears black shoes that end above his ankles. He has brown, curly hair and holds a poorly preserved, circular object in his left hand. His one preserved eye looks to the right, and like the other signs, his left bent knee indicates motion to the right. To the right of the male, a six-legged crab is represented in profile from above or below. The crab's carapace may be a depiction of its back or belly. The arms of the crab are segmented and end in claws. Like the male in the panel, the crab faces to the right. In the upper right corner of the

¹³¹ For discussion of Apollo and his harp, see Diodorus Siculus, *Library of History, Volume II: Books 2.35-4.58*, trans. C. H. Oldfather. LCL 303 (Cambridge, MA: Harvard University Press, 1935), 3.59.1-8; for the story of Heracles receiving his war-club, see *Library of History* 4.14.3; for a description of the Greek word *ρόπαλον*, see Liddell, Henry George, Robert Scott, and Henry Stuart Jones. *A Greek-English Lexicon: With a Revised Supplement* (Oxford: Clarendon Press, 1996), 1575.

¹³² Ptolemy describes the star of Apollo as leading the two twins westward through the night sky with the star of Heracles following Apollo's lead. The depiction of Gemini at Sepphoris reflects this ordering and movement westward; see Ptolemy, *Tetrabiblos*, trans. F. E. Robbins. LCL 435 (Cambridge, MA: Harvard University Press, 1940), 1.9.23.

panel, the last two letters of the inscription טן[סר] (“Cancer”) survive. The name of the month does not survive.

The next panel, which is mostly destroyed, depicts Leo in the four hour and thirty-minute clock position. A small, triangular patch at the bottom of the panel preserves two legs of a male who is moving toward the right. Behind the human legs are the two hind legs of a lion. Although no more of the lion survives, he likely was positioned in mid-pounce like Aries and Taurus. A triangular patch of tesserae to the right of the leg preserves the tip of a sword that appears to extend from the figure’s waist. In the bottom right corner of the panel enough of the inscription is preserved to read, moving from right to left, אב (“Av”) and ארי (“Leo”).

Next to Leo would have been Virgo in the three hour and thirty-minute clock position, but nearly all of the panel is destroyed except for a slim patch of tesserae in the upper right corner. The upper part of sheaf of wheat is visible as well as three points of the four-pointed, shining star that appears elsewhere throughout the zodiac panel. The sheaf of wheat Virgo holds suggests she was represented as Demeter.¹³³

To the right of Virgo, Libra stands at the two hour and thirty-minute clock position, depicted as a young male holding a pair of scales in his left arm that cross the front of his body. His right arm is covered in a cloak that wraps around his upper body and falls down his back. The figure stands in profile, looking out at the viewer. His head and feet point to the right. A yellow, four-pointed star with four small beams of light is in the upper right of the panel. In the

¹³³ See the story of Demeter gifting wheat in Diodorus Siculus, *Library of History* 3.4.3-5. For Ptolemy on the aspect of Demeter in relation to Persephone, see *Tetrabiblos* 3.7.122

bottom right of the panel, the month name תשרי (“Tishri”) is inscribed horizontally. In the upper-right corner of the panel, just below the star, the name of the figure מזניים (“Libra”) runs vertically.

Next to Virgo is Scorpio, in the one hour and thirty-minute clock position. The panel shows a young male standing in profile with a cloak draped around his front. The cloak is bound with a string or strand of cloth over the right shoulder and covers the upper half of his body as well as his left arm and hand. The young man looks down to his left at a scorpion in profile from above. The scorpion is depicted as having six legs instead of eight. It has a curved belly with elongated stinger and two mouthparts extending from its mouth. The top of the scorpion has eight band-marks from the head to the beginning of the belly. Both the young man and scorpion face and indicate movement to the right. To the right of the young man’s head and above the scorpion is a four-pointed red star with four slim radiating beams of light. Beneath the star, the inscription עקרב identifies the panel as Scorpio. To the right of the young man’s feet and underneath the scorpion is an inscription identifying the month as מרחשון (Marheshvan).

Continuing counter clockwise, Sagittarius is depicted as a centaur in right profile in the twelve hour and thirty-minute clock position. He holds a drawn bow and is in mid-leap to the right. The centaur’s leap is identical to that of Aries and Taurus with back legs planted and front legs raised. The figure has the lower body, legs, hooves, and tail of a horse, and the torso, arms, and head of a young man. A yellow, four-pointed star with four slim beams of light is depicted to the left of the centaur’s head. The centaur looks toward the viewer though his motion indicates movement to the right. Underneath the centaur’s raised front legs, an inscription identifies the

month as כסלו (Kislev). To the left of the torso of the centaur and beneath the centaur's right elbow, the inscription קשת identifies the figure as Sagittarius.

Capricorn is next to Sagittarius in the eleven hour and thirty-minute clock position. All that remains of Capricorn is a human figure kneeling on his right knee with left leg bent at a 45-degree angle. Part of the figure's right arm is extended, though towards what is unknown. This figure only occupies a quarter of the scene. Most of the panel is lost.

To the right of Capricorn is Aquarius in the ten hour and thirty-minute clock position. Only a small patch of tesserae in the bottom right of the panel survives. Flowing water pools in the surviving patch suggest that the panel depicted an anthropomorphized Aquarius pouring water from an amphora.

Next to Aquarius is a well-preserved image of Pisces in the nine hour and thirty-minute clock position. The standing figure holds two fish suspended from a line in his left hand. The fish closest to the viewer is red and partially obscures a dark-colored fish hanging from the same line behind the first. Directly next to the fish, an inscription reads אדר ("Adar") and below the month, the word דגים misspells "fish" with doubled *gimel*. Pisces's left arm is wrapped in a gray-green cloak that is cinched around his neck and covers his torso. Although the lower half of Pisces' body is exposed, no genitals are shown. A four-pointed, yellow star with four slender beams of light is depicted above the man's left shoulder. Pisces faces to the right, looking and indicating movement in this direction with a bent left knee.

3.6.4c Seasons

Spring is personified as a female bust in half profile in the bottom left of the zodiac panel. Her hair is bound in a bun and she wears a *peplos*-like yellow garment cinched at each shoulder.

To her left is a bowl holding three flowers. Farther to the left are the same flowers in a bowl but on a stem. To Spring's right is a short sickle with handle and blade. Next to the sickle is a long, vertical basket filled with flowers and/or fruit. Next to the basket is a two-stemmed, flowering lily. Two inscriptions flank Spring. To her left, the Greek inscription reads MEPINH TPOIIH and to Spring's right, the Hebrew inscription reads תקופת ניסן each translating to "Season of Spring." Spring faces left and looks partially upward at the preceding seasonal personification, which was Winter.

Moving counterclockwise, in the bottom right of the zodiac panel the season of summer is personified as a female bust in profile. Summer faces and looks left towards the previous season, Spring. She wears a tunic that covers only her left shoulder, leaving her right breast exposed. A cap sits on top of Summer's bunched hair, with some spilling down her neck. To the left of Summer, a large, serrated sickle with blade fastened to a bone or wooden handle flanks a Greek inscription from above with a wooden farming implement below. The Greek inscription reads ΘEPINH TPOIIH, identifying the season and personification as Summer. To the left of the inscription and farming implements, the end of a curled vine can be seen. To the right of Summer, a bundle of wheat stands vertically. Next to the wheat, two poorly preserved gourds extend into a destroyed portion of the mosaic. Between the wheat and the gourds, a partially preserved, upside-down Hebrew inscription reads תקופת תמוז.

Above Spring, in the top right of the zodiac panel, is the personification of autumn as a female bust in profile with surrounding agricultural elements. Autumn wears a yellow, sleeveless tunic cinched at each shoulder. Her hair is in a bun with some falling down her neck. She looks downward towards Winter. To the left is a branch with flowering fruit. To the right, two

pomegranates flank a citron and fig. A Hebrew inscription to the left of the Autumn's head reads [ר]תקופת תש. To the right, a Greek inscription reads ΜΕΘΑΠΙΟΡΙΝΗ ΤΡΟΙΗ. Autumn faces left and looks down towards Summer.

The final seasonal personification is Winter as a female bust in profile. She wears a blue-gray veil or *palla*. To the left of Winter are a *dolabra*, a hybrid axe, and a digging mattock with curved end. To the right of Winter is a sickle with a wooden handle and curved blade. A stalk of a plant with a portion peeling away is depicted between the sickle and Winter. The right hand portion of the scene also contains a cylindrical object with a flat left end and tapered right end extending horizontally, which could be a jar or loaf of bread. Two inscriptions flank Winter: to the left a Greek inscription reading ΧΙΜΕΡΙΝΗ ΤΟΙΗ; and to the right, a Hebrew inscription reading תקופת טבת.

3.6.5 Archaeoastronomical Analysis

The Sepphoris synagogue is located at 32° 45' 8" N, 35° 16' 52" E. Its façade faces 135 degrees SE, and the opposite wall faces 315 degrees NW. Like Hammath Tiberias, the Sepphoris synagogue matched the orientation of the surrounding buildings, which were laid out in a grid pattern. There were no alignments found in Stellarium with the Sepphoris structure or its mosaic beyond the façade of the synagogue facing the sunrise. While the sunrise facing façade could be intentional, it is more likely a coincidental result of the synagogue being built within the pre-existing city grid.

3.6.6 Summary and Analysis

Helios's depiction as a radiant sun is unique to the Sepphoris synagogue. This image of the sun, however, is no less a representation of Helios than anthropomorphized depictions. The

Helios at Sepphoris is a hybrid of the divine reality of the sun being drawn across the sky by Helios's horses and the radiant light that one sees when looking at Helios in the sky. The mosaicists and patrons were not worried about depicting divine beings, as evidenced in the representations of Gemini as Apollo and Hercules as well as the Horai in the corners of the panel.

Like Hammath Tiberias, the seasons and their respective zodiac signs align with each another. The zodiac progression begins in the lower-left quadrant with the season of spring and Aries. Both the zodiac and the seasons progress counterclockwise in imitation of the east to west progression of the sun through the zodiac.

Unique to Sepphoris are the Greek names of the seasons: ΜΕΡΙΝΗ, ΘΕΡΙΝΗ, ΜΕΘΑΠΙΟΡΙΝΗ, and ΧΙΜΕΡΙΝΗ. Three of these names are genitive renditions of the names of the Horai in the *Dionysiaca*: Εἰαρ (“Spring”), Θερος (“Summer”), and Χειμῶν (“Winter”). The Greek name for fall—ΜΕΘΑΠΙΟΡΙΝΗ—at Sepphoris is not otherwise attested in antiquity.

3.7 Huqoq Synagogue

3.7.1 Basic Information

The ancient Jewish village of Huqoq is located in Lower Eastern Galilee, near Capernaum and Migdal and 3 km inland from the northwest shore of the Sea of Galilee. Huqoq is mentioned in Joshua 19:34 as a boundary marker for the tribe of Naphtali, and in 1 Chronicles 6:74-75, Huqoq and its pastures are mentioned as having belonged to the tribe of Asher and given to the Gershonites. In the Palestinian Talmud, Huqoq is mentioned in a debate on whether it is permissible to buy uncultivated mustard seeds from someone who may have violated laws concerning the Sabbatical year. R. Judah Ha-Nasi rules that it is permissible to buy uncultivated

mustard seed from anyone, and R. Simeon b. Laqish agrees with the ruling of R. Judah after observing wild mustard seed gathering at Huqoq.¹³⁴

3.7.2 Excavation and Research

Excavations at Huqoq began in 2011 under the direction of Jodi Magness of the University of North Carolina at Chapel Hill. The goal of the project was to partially uncover a synagogue so that dating methodology could be tested. In addition to excavating the synagogue, part of the ancient village of Huqoq was excavated to provide context for the synagogue. During the first season of excavation in 2011, the east wall of a monumental synagogue came to light. The following year, a mosaic floor was uncovered with a depiction of Samson and a dedicatory inscription. Every year since 2011, new mosaics have been discovered. In 2017, a poorly preserved zodiac panel was exposed in the nave.

3.7.3 Description of the Synagogue

Four main occupational strata have been identified at Huqoq dating from the Hellenistic period to 1948, when the modern village of Yakuk was abandoned.¹³⁵ This section focuses on the remains uncovered in Stratum 2, the late Roman phase when the synagogue was built. The synagogue is a basilica measuring 20 m long x 14.19 m wide. Two entrances have been found: one in the south wall and another in the east wall. Although the stylobate was robbed out, its foundations are preserved. The stylobate forms a *pi*-shape running parallel to the east, west, and

¹³⁴ y. Shebi'it 9.1.5a.

¹³⁵ Magness et al., "The Huqoq Excavation Project: 2014–2017 Interim Report," *Bulletin of the American Schools of Oriental Research* 380 (November 2018), 65.

south walls and abutting the north wall. The nave is approximately 5 m wide and each aisle measures 3.60 m wide. The floor of the nave is 0.20 m lower than the surrounding aisles. The interior is paved with mosaics.

The eastern aisle of the synagogue is paved with mosaics divided into panels surrounded by a guilloche border. The southernmost panel in the aisle displays a scene of Samson carrying the gates of Gaza on his back (Judges 16:1-3). Samson's head is at the south end of the panel, as he looks towards the north into the synagogue. In the northwest corner of the panel, a man on horseback—perhaps a Philistine—looks at Samson. To the immediate north of the Gaza panel, a partially preserved panel portrays Samson tying torches to the tails of foxes to burn the fields of the Philistines (Judges 15:4-5). Samson stands with head at the east end of the panel, the opposite of the previous panel. In both scenes, Samson is depicted as a giant figure wearing a waist-cinched tunic decorated with *orbicula* and a *paludamentum*.

To the north of the second Samson panel is a square panel with a commemorative inscription in the center. In the corners of the panel are roundels inscribed with faces or masks, each held aloft by two *putti*, represented as chubby, nude, winged boys. On top of each roundel stands a bare-chested, winged male—an *atlantid*—whose outstretched arms support a central inscription surrounded by a wreath. Three faces—two women on the sides and a male at the top—are preserved inside the wreath, on the north, south, and west sides. A fourth head would have been set in the wreath on the east side, but the lower third of the panel is destroyed. Each

face looks inward toward the inscription, which is a partially preserved blessing commemorating donors or those who adhere to the Jewish commandments.¹³⁶

To the immediate north of the commemorative panel is a three-tiered panel bound by a ribbon border. The bottom (i.e. easternmost) register depicts the aftermath of a battle, including a dead bull pierced by spears; a dead elephant and his rider, who clutches a shield and is pierced by a spear; and a pile of trophies. The middle register displays an arcade with an enthroned, elderly, bearded man holding a scroll inside the central arch. Eight young men dressed in highly ceremonial tunics and mantles are depicted in the flanking arches, each with hands resting on sword sheaths. Above each arch is a lighted oil lamp. The top register depicts the meeting of two groups led by two large male figures. The left (i.e. southern) group consists of the young men depicted in the middle register, who are led by the elderly man. They all wear white, long-sleeved tunics and *himatia*. The elderly man points his right hand toward the sky with index finger extended. He extends his left hand towards the leader of the opposing group, who is a red-haired man wearing a corded diadem around his head and a purple *paludamentum* cinched at his right shoulder. He grasps the horns of a large bull and is accompanied by a phalanx of soldiers with overlapping shields and two battle elephants.

¹³⁶ Magness, et al., “The Huqoq Excavation Project,” 96.



Figure 26. Southern panels of the Huqoq synagogue nave, including the Helios-zodiac cycle. Image rendered by author.

The nave mosaic contains five panels. From south to north, they depict the construction of the tower of Babel, Jonah being swallowed by three fish surrounded by marine life and figures that recall the Odyssey or Aeneid, a Helios-zodiac cycle, Pharaoh's soldiers being swallowed by giant fish in the Red Sea, and pairs of animals walking into Noah's ark.¹³⁷



Figure 27. Detail of aquatic scene in the Huqoq synagogue with sirens/harpies, Jonah, and possibly Odysseus. See discussion of Münster Helios-zodiac cycle in Chapter 4 for comparable aquatic iconography next to a Helios-zodiac cycle.

A single exposed panel at the northern end of the western aisle depicts a series of date palms, wells, a city gate, and an inscription identifying the scene as Israel's arrival at Elim.¹³⁸

¹³⁷ See depictions of these Huqoq mosaic panels in Figures 26–28. The Münster mosaic discussed in Chapter 5 contains a similar scene of Sirens/Harpies singing next to a boat that is interpreted as being piloted by Odysseus. The Huqoq mosaic may also depict Odysseus as an elderly, gray-haired man.

¹³⁸ Ex 15:23, 16:1; Num 33:9-11.

The published scenes in the north aisle of the synagogue include depictions of the Israelites' entrance into the land of Israel, a showbread table, and the four beasts of Daniel 7.

3.7.4 Helios-zodiac Cycle

3.7.4a Helios

Helios's *quadriga* and parts of the four horses are all that survive of the Helios medallion.¹³⁹ The horses are white with the heads of the two middle horses turning towards one another. The head of the left-hand horse turns outward, and the right-hand horse would have mirrored its turn. The horses rear with front legs raised and angled to the left. Five waves of water sit beneath the horses' hooves and the *quadriga*. Above the horses, three surviving radiating rays of light extend from Helios to the left side of the panel. Between each ray is a star, depicted as a circle with five black lines. In front of the light rays is a waxing crescent moon, adding depth to the scene. The scene captures the moment Helios emerges from Oceanus and begins his process overtaking the moon in the morning.

3.7.4b Zodiac

Twelve zodiac panels surrounded the central medallion of Helios, only five of which are partially preserved. Each zodiac sign is in a circular roundel, encased by a guilloche and a ribbon weave. Each roundel contained two images: a larger anthropomorphic representation of the month and a smaller anthropomorphic or zoomorphic representation of the zodiac sign.

¹³⁹ See Figure 28 for the Huqoq Helios-zodiac cycle.

The first preserved zodiac sign is Libra in the six hour and thirty-minute clock position. The inscription [י]תשר identifies the profile bust of a young woman in the panel as the month of *Tishrei*. She wears a blue *himation* cinched with by a metallic clasp over her right shoulder. She faces and looks to the right as a small, anthropomorphic, and male Libra looks back at her. Libra wears a red, full-length *himation* wrapped around his body. His left arm crosses his body and he holds a pair of scales. Libra looks to the left, meeting the gaze of *Tishrei*.



Figure 28. Detail of Huqoq Helios-zodiac cycle. Image rendered by author.

Moving clockwise, the next zodiac figure is Scorpio in the five hour and thirty-minute clock position. A young man representing the month of *Marheshvan* is clothed in a red cloak. He faces right though his eyes look to the left. The inscription מרהשון is to the left of his head. In front of the young man a scorpion representing the sign Scorpio stretches across the roundel with its tail to the right and head to the left. Although part of the scorpion's body is destroyed, it had eight legs and a curled belly with stinger.

The next roundel in the eight hour and thirty-minute clock position is Sagittarius, which is nearly destroyed. The edge of a figure's right arm and an inscription that reads [כ]טלו survive.

The next zodiac sign is Capricorn in the nine hour and thirty-minute clock position. The upper half of a young man wearing a sleeveless tunic and *chiton* draped over his left shoulder personifies the month of *Tevet*. The Hebrew inscription טבת runs just above his head. Behind the young man, a sea-goat stretches from one side of the roundel to the other. The body of the goat faces to the right with the tail coiling and extending to the left. Moving two roundels clockwise, the partially preserved inscription [אד]ר is all that survives to identify the roundel as *Adar/Pisces*.

3.7.4c Seasons

Personifications of the seasons were depicted in each corner of the Helios-zodiac panel. Only two of the four seasonal personifications survive partially but without accompanying inscriptions. The best-preserved season—Autumn—is in the bottom left of the panel, depicted as a winged man in front profile with head turned to the left. He wears a red *exomis* cinched at the waist with a belt, and his right arm and chest are bare. Autumn grasps the antler of a gazelle with his right hand and holds a grape bunch and staff in his left hand. There are two figs on the ground below him. He stands on a ground line with his head pointing towards Helios. The figure looks

to the left towards the season above him, although the bend and position of his left leg indicate motion toward the right. The only inscription that survives in this panel is in the right upper section and reads “תקופת”. Based on the imagery in this panel—especially the grapes and shepherd’s staff—the figure can be identified as *Tishrei*. The individual zodiac panels in the lower left quadrant of the larger panel also consist of the three months/zodiac signs that constitute the seasons of *Tishrei*, supporting this identification.

3.7.5 Archaeoastronomical Analysis

The Huqoq synagogue is located at 32° 53' 5" N, 35° 28' 44" E. Its façade faces approximately 180 degrees S, and the opposite wall faces 360 degrees N. The Huqoq synagogue does not appear to have been aligned with any astral phenomenon. Neither the southern façade nor the northern wall aligns with the sunrise at any point during the year. The north-south orientation may be to fit within a grid pattern of the town or for the façade to face Jerusalem.

3.7.6 Summary and Analysis

Like the zodiac panels at Na’aran and Huseifa, the months and figures progress clockwise/west to east in opposition to the sun’s movement through the sky. Huqoq is another example of the portrayal of the celestial realm viewed externally as described by Eudoxos and his interpreters. Just as Karl Lehman and Jodi Magness have suggested that the zodiac panel is a two-dimensional rendering of a three-dimensional dome, the zodiac panel might be a two-dimensional representation of a three-dimensional sphere.

Unique to Huqoq is the personification of the seasons as males, most likely representing the four sacred winds, which are described as winged males who usher in each season. The four

winds in Greek were called the Anemoi and in Latin the Venti. The wind/season preserved at Huqoq is Euros, the east wind, conflated with Autumn, which brings warmth and rain.

3.8 Additional Evidence:

3.8.1 En Gedi

The oasis and ancient village of En Gedi is located on the western shore of the Dead Sea, approximately 23.50 mi southeast of Jerusalem. The remains of an ancient synagogue were discovered in 1966 when land was being prepared for cultivation. In 1970 and 1971, two seasons of excavation in the synagogue were conducted under the direction of Dan Barag, Yosef Porat, and Ehud Netzer.¹⁴⁰ Yizhar Hirschfeld conducted excavations in the ancient village from 1996-2002.¹⁴¹ The final excavation reports for the site is awaiting publication.

The excavators identified three phases of synagogue use, which they named Strata IIIB, IIIA, and II.¹⁴² The excavators date these phases from the third–sixth centuries, but the dating is tenuous and often relies on presumed architectural typologies, which is a poor criterion for dating a building. Steven Werlin analyzed the published evidence and proposed two phases of synagogue use: the Early Phase (ca. mid-to-late fourth century) and a Late Phase (fifth-sixth/seventh century), beginning with renovations and ending with the destruction of the

¹⁴⁰ See Binyamin Mazar and Ephraim Stern, *En-Gedi Excavations I: Final Report (1961-1965)* (Jerusalem: Israel Exploration Soc, 2007).

¹⁴¹ See Yizhar Hirschfeld and Roni Amir, *En-Gedi Excavations II: Final Report (1996-2002)* (Jerusalem: Israel Exploration Society, 2007).

¹⁴² Dan Barag, “En-Gedi: The Synagogue,” in *New Encyclopedia of Archaeological Excavations in the Holy Land*, vol. 4, ed. Ephraim Stern (New York: Simon & Schuster, 1993), 405-409.

building.¹⁴³

The synagogue containing the zodiac inscription is the later of the two and dates to the fourth–fifth/sixth centuries. The later synagogue complex measures 12 x 15 m and consists of a hall, two aisles, a narthex, and a number of ancillary rooms. The aisles, narthex, and nave are paved with mosaics.¹⁴⁴ Although no anthropomorphic figures are depicted in the mosaics, images of peacocks and storks decorate the center of the nave.

¹⁴³ Steven Werlin, *Ancient Synagogues of Southern Palestine, 300-800 C.E.: Living on the Edge* (Boston: Brill, 2015), 131-133.

¹⁴⁴ See Figure 29 for an image of the En Gedi synagogue mosaic floor.



Figure 29. Mosaic floor of En Gedi synagogue.

In the western aisle, a panel with five Hebrew and Aramaic inscriptions was brought to light.¹⁴⁵ The northernmost inscription lists a genealogy in Hebrew from Adam to Japheth (from Genesis 5 and 1 Chronicles 1:1–4). The second inscription, also in Hebrew, lists the twelve signs

¹⁴⁵ See Figure 30 for image of the En Gedi aisle inscriptions.

of the zodiac followed by the twelve Hebrew months. The third through fifth inscriptions are in Aramaic and pronounce blessings and commemorations for different individuals. The third inscription also contains a curse against those who reveal “the secret of the town to the Gentiles.”¹⁴⁶

The first two panels are of the most interest. They translate as follows:

Panel 1

1. Adam, Seth, Enosh, Kenan Mahalalel, Jared
2. Enoch, Methuselah, Lamech, Noah, Shem, Ham and Japheth

Panel 2

1. Aries, Taurus, Gemini, Cancer, Leo, Virgo
2. Libra, Scorpio, Sagittarius, Capricorn, and Aquarius, Pisces
3. Nisan, Iyar, Sivan, Tammuz, Av, Elul,
4. Tishrei, Marheshvan, Kislev, Tevet, Shevat,
5. And Adar, Abraham, Isaac, Jacob, Peace
6. Hannah, Mishael, and ‘Azariah. Peace unto Israel.

The list of the zodiac in Panel 2 begins with the start of the year in spring with Aries/Nisan and progresses in the expected chronological order. Each zodiac sign matches the

¹⁴⁶ Lee I. Levine, “The Inscription in the ‘En Gedi Synagogue,” in *Ancient Synagogues Revealed*, ed. L. I. Levine (Jerusalem: Israel Exploration Society), 140.

month it represents in the progression of lines 1–2 and lines 3–6.¹⁴⁷ Aquarius is the only zodiac sign to begin with a *vav*, as at Beth Alpha, where the inscriptions of Aquarius and Pisces begin with a *vav*.

¹⁴⁷ See Jodi Magness, “The En-Gedi Synagogue Inscription Reconsidered,” *Eretz-Israel: Archaeological, Historical, and Geographical Studies* 31 (2015):124-125.



Figure 30. Detail of En Gedi inscription. Image rendered by author.

The patriarchs Abraham, Jacob, and Isaac are mentioned following the conclusion of the months, echoing the reminder of the Abrahamic covenant in Genesis 50, Exodus 2:24, and Exodus 32:13. The three names following the patriarchs are likely patrons listed in triplicate to imitate the patriarchal blessing.

The seasons, sun, and moon are the only aspect of the Helios-zodiac panel absent from the inscription. This absence, along with the temporal ordering of the zodiac and months beginning with Aries/Nissan, suggests a calendrical representation of the zodiac. Although the seasons are not listed in the inscription, the fact that it begins with the three spring months and concludes with the three winter months implies a seasonal ordering/understanding.

3.8.2 Wadi Hamam

The ancient village of Wadi Hamam is located in the Lower Galilee, approximately 2 km west of the Sea of Galilee on the slopes of Mt. Nitani across from Mt. Arbel. A nearby natural spring encouraged ancient settlement in the area.¹⁴⁸ Conder and Kitchener first noted Wadi Hamam in the nineteenth century, though they misidentified the site as Khirbet el-Wereidat.¹⁴⁹ Uzi Leibner conducted excavations at the site from 2007-2012 under the auspices of the Hebrew University and Israel Exploration Society. The goal of the excavation was to find support for the traditional Galilean synagogue typology, which I covered in Chapter 1.

Leibner identified four primary strata at Wadi Hamam: Stratum 4 (4500-3300 BCE), Stratum 3 (100-135 BCE), Stratum 2 (ca. 200-400), and Stratum 1 (400-1950). He has dated the synagogue to Stratum 2, but the presence of Kafar Hananya ware in sealed contexts below the

¹⁴⁸ Uzi Leibner, “Excavations at Khirbet Wadi Hamam (Lower Galilee): The Synagogue and Settlement,” *Journal of Roman Archaeology* 23 (2010): 221; Leibner and Benjamin Arubas, “Area A: The Synagogue: Stratigraphy and Architecture,” in *Khirbet Wadi Hamam, A Roman-Period Village and Synagogue in the Lower Galilee. Qedem Reports* 13 (Jerusalem: The Hebrew University, 2018), 57, 374.

¹⁴⁹ Conder and Kitchener, *The Survey of Western Palestine*, 409.

mosaic floor and fourth-century coins in sealed contexts in rooms adjoining the synagogue suggest a date of the fourth-to-fifth century.

While Wadi Hamam contained a Helios-zodiac cycle, only two small fragments of the mosaic survive. The first fragment contains the corners of two trapezoidal frames. Just outside one of the frames is a *mem*, which the excavators suggested may have been part of an inscription identifying Pisces (דגים).¹⁵⁰ The second frame contains a curved border that likely served as part of the circular frame of the Helios medallion.

Although no figures of the Helios-zodiac cycle survive, the location of the preserved borders in the center of the nave along with the trapezoidal frames indicate a Helios-zodiac cycle. Because Wadi Hamam and Huqoq are in close proximity and contain nearly identical scenes (e.g. the Tower of Babel and Red Sea narrative), it is likely that the Helios-zodiac cycles were similar as well. The trapezoidal frames at Wadi Hamam, then, likely did not contain zodiac figures but additional inscriptions that encircled the Helios medallion. At Huqoq, these trapezoidal frames were found encircling the Helios medallion inside the zodiac frames, but too little has been preserved to know what they represent.

The façade of the synagogue is oriented approximately 135 degrees SW and the building appears to have been built to conform to available space. It is unclear if solar alignment had anything to do with the Wadi Hamam synagogue.

¹⁵⁰ Shulamit Miller and Uzi Leibner, “The Synagogue Mosaic,” in *Khirbet Wadi Ḥamam: A Roman-Period Village and Synagogue in the Lower Galilee. Qedem Reports 13* (Jerusalem: Israel Exploration Society, 2018): 172-173.

3.8.3 Yafia

Little remains of the mosaic floor of the synagogue of Yafia, excavated by Sukenik in the summer of 1950 and published shortly thereafter.¹⁵¹ The synagogue is a basilica with a nave flanked by aisles, separated by two rows of columns. Sukenik dated the synagogue to the third century based on architectural and artistic similarities to other Galilean synagogues.¹⁵² I have previously shown that these early dates are incorrect. The Yafia synagogue likely dates to the fourth or fifth century, but a date is unknowable without more information.

A mosaic carpet covered the floor and included a series of panels in each aisle, intercolumnar panels, and a series of panels in the nave. Only a small fragment of the nave panel survives. In the fragment, a bull representing Taurus stands in a roundel, facing to the right. The roundel is bounded by the same woven pattern found at Huqoq. To the right of the Taurus roundel, the edge of the next roundel and the face of an animal survive. The animal is likely the ram Aries, who stands and faces Taurus to the left. The Yafia zodiac, then, likely progressed counter-clockwise. Unfortunately, no other portions of the Helios-zodiac cycle survived.

The synagogue is oriented E-W with its façade facing 90 degrees E. As with other synagogues in this chapter, the eastern facing façade might have allowed the synagogue building to face the rising sun with the same orientation as the Jerusalem temple.

¹⁵¹ Eleazar Sukenik, "The Ancient Synagogue at Yafa near Nazareth: Preliminary Report," *Rabinowitz Bulletin* 2 (1951), 6-24; Dan Barag, "Japhia," in *The New Encyclopedia of Archaeological Excavations in the Holy Land*, vol. 2, ed. Ephraim Stern (Jerusalem: Israel Exploration Society, 1993): 659-660.

¹⁵² Eleazar Sukenik, *The Ancient Synagogue at Yafa Near Nazareth* (Jerusalem: Hebrew University, 1951), 18.

3.8 Summary and Conclusion

The goal of this chapter has been to survey synagogue Helios-zodiac cycles to consider why a shared scene was uniquely depicted across late Roman synagogues in ancient Palestine. In this conclusion, I summarize some ideas raised throughout the chapter.

3.8.1 Clockwise vs. Counterclockwise Zodiac Progression

The zodiac cycles at Na'aran, Huseifa, and Huqoq progress clockwise, while those at Beth Alpha, Sepphoris, and Hammath Tiberias progress counterclockwise. The clockwise progression runs opposite of the expected east to west (i.e. counterclockwise) natural progression of the zodiac, sun, and moon through the sky.

In the summary of Na'aran, I suggested that the clockwise progression reflects the observation of the zodiac from above instead of below. The idea of representing the heavenly sphere as observed from outside originated with Eudoxus of Cnidos in the fourth century BCE in the now lost prosaic works *Enoptron* and *Phaenomena*. In the third century BCE, Aratus of Soli transposed Eudoxus's prosaic works into meter in his own *Phenomena*, in which the positions of the constellations are described in reverse order as if observed from outside the heavenly sphere.¹⁵³ Cicero discusses viewing a physical celestial globe based on Eudoxus's work.¹⁵⁴ An

¹⁵³ See Aratus, *Phaenomena*.

¹⁵⁴ Cicero, *On the Republic*, trans. Clinton W. Keyes, Loeb Classical Library 213 (Cambridge, MA: Harvard University Press, 1928), 1.14.

example of this type of globe can be seen in the Farnese Atlas, an early Roman copy of a Hellenistic work that depicts Atlas holding a celestial globe with mirrored constellations.¹⁵⁵



Figure 31. Farnese Atlas in the Museo Archaeologico Nazionale, Naples. Photo protected under Creative Commons License.

In 1945 Karl Lehman argued that zodiac cycles are two-dimensional attempts at representing the three-dimensional dome of heaven.¹⁵⁶ More recently, Magness has included a

¹⁵⁵ See Figure 31 for an image of the Farnese Atlas.

¹⁵⁶ See Karl Lehmann (1945), “The Dome of Heaven,” *The Art Bulletin* 27, no. 1 (1945).

similar argument concerning synagogue Helios-zodiac panels as an expression of a non-Rabbinic form of Judaism.¹⁵⁷ I would add that that the Helios-zodiac cycle may represent an attempt to depict a celestial sphere—especially when the zodiac runs clockwise—in two dimensions.

3.8.2 Calendrical Aspect of Helios Medallion

When Helios is depicted with a waxing crescent moon or as emerging from or descending into water, the Helios medallion contains an implicit calendrical dimension. The waxing crescent moon marks *Rosh Chodesh*, an appointed time in Numbers where God commands Israel to sound trumpets over sacrifices.¹⁵⁸ The celebration of the first of the month is repeated in Psalm 81:3, where trumpets are instructed to be blown and a feast held on *Rosh Chodesh*. The synagogues of Sepphoris, Hammath Tiberias, and Huqoq contain waxing crescent moons, marking the first day of the new month. Beth Alpha contains a waning crescent moon, which might be a mistake of the mosaicists. In addition, the synagogues of Hammath Tiberias, Sepphoris, and Huqoq depict Helios emerging from or descending into Oceanus, which marks the beginning or end of the day, respectively. Based on the perspective of the viewer with Helios appearing to ride out of the scene in these synagogues, his emergence from the water most likely marks sunrise. Such a depiction is interesting since ancient Jews would have begun celebrating *Rosh Chodesh* the previous night. However, since the scene is a frozen moment in time, it is impossible to determine whether Helios is emerging or descending.

¹⁵⁷ See Magness, “Heaven on Earth,” 1-52.

¹⁵⁸ Num 10:10.

Helios is often depicted with an accompanying star, likely represents the planet Venus, which was the final “star” visible in the morning and the first “star” visible in the evening. Ancient peoples identified the morning appearance of Venus as the goddess Phosphorous while the evening appearance of Venus was identified as the god Hesperus. Since Venus appeared both at night and in the morning, it is impossible to determine which aspect of the planet is represented in the synagogue mosaics. It is noteworthy, however, that Roman depictions of Sol Invictus on coins are often accompanied by a single star.¹⁵⁹

3.8.3 Helios-zodiac Cycles and Synagogue Narratives

The synagogues of Beth Alpha and Sepphoris contain depictions of the *`Aqedah* directly below the Helios-zodiac cycle. The synagogues of Beth Alpha, Hammath Tiberias, and Sepphoris contain depictions of the Ark of the Covenant/Torah Shrine above the Helios-zodiac cycle. Sepphoris contains additional mosaic panel registers involving Abraham and Aaron. A unifying theme throughout all the panels in which a Helios-zodiac cycle occurs—except for at Huqoq—is a divine presence.

The Ark of the Covenant/Torah Shrine scene in synagogue mosaics depicts both the Israelite Ark of the Covenant and the ancient synagogue Torah Shrine. In Exodus 25:10-19, God gives the Israelites instructions to create the Ark to hold the Decalogue. God’s divine presence then rests above the Ark. According to the Jerusalem Talmud, the Ark of the Covenant held not only the decalogue but the Torah.¹⁶⁰ The ancient synagogue Torah shrine served in a similar

¹⁵⁹ See image of Aurelian coin in the Hammath Tiberias in Section 3.5.

¹⁶⁰ y. Šeqal. 49c.

fashion to the Ark of the Covenant in Exodus in that it contained the Torah and was a resting place for the divine presence, often symbolized by the scallop shell *tympanum*. The physical Torah shrine in a synagogue would have stood near the mosaic depiction of the Ark, serving as a historical mirror for God's divine presence.

In the scene of the *'Aqedah* at Beth Alpha, the radiating hand of God extends to stay Abraham's offering of Isaac. Six red rays of light appear around the hand, which may or may not coincidentally be the same number of red rays that radiate from Helios's crown in the Helios-zodiac cycle directly above the *'Aqedah*. If this is not a coincidence, the Helios at Beth Alpha would represent the divine presence orchestrating the movement of the cosmos.¹⁶¹ At Sepphoris, the portion of the *'Aqedah* panel that would have contained the hand of God does not survive, so it is impossible to know how or if it was included in the scene.

Other scenes in the Sepphoris zodiac panel include the divine messengers who visit Abraham and Sarah to announce Isaac's birth and Aaron offering sacrifices before the divine presence at the Tabernacle.

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In the next chapter, I show how Greco-Roman depictions of similar Helios-zodiac cycles functioned in different contexts, including in art, astrology boards, Mithraea, and churches. The goal of the chapter is to contextualize the synagogue Helios-zodiac cycle in the larger Greco-Roman world.

¹⁶¹ See Chapter 5 for a discussion of Martin Goodman's identification of the synagogue Helios as the God of the Jews. See Martin Goodman, "The Jewish Image of God in Late Antiquity," in *Judaism in the Roman World: Collected Essays* (Boston: Brill, 2006), 205-217.

Chapter 4: The Helios-Zodiac Cycle in Its Greco-Roman Context

In this chapter, I survey the contexts in which the Helios-zodiac cycle appears throughout the Greco-Roman world. I have divided the chapter into the following sections: decoration in temple, domestic, and public space; Mithraea; and astrology boards. I have saved the discussion of Helios-zodiac cycles in Christian contexts for the concluding chapter.

In all cases of the Helios-zodiac cycle discussed in this chapter, the presentation of the stars, sun, moon, planets, zodiac, and/or seasons are two-dimensional projections of a three-dimensional reality. In the final section of this chapter, I discuss the study and development of rendering the cosmos in two dimensions. The following survey is not holistic but is meant to provide a context for understanding various functions of the Helios-zodiac cycle in Greco-Roman art and architecture.

4.1 Temple, Domestic, and Public Structures with Helios-Zodiac Cycles

4.1.1 Temple Context

The surviving Greco-Roman cultic Helios-zodiac cycles exist as bas reliefs on two temple *cella* ceilings. More such cultic decorations likely existed in antiquity but did not survive. The first example is Dendera from the second century in Egypt and the second is from Palmyra in the first century in Syria.

4.1.1.a Dendera

A chapel dedicated to Osiris in the Temple of Hathor located in Dendera in upper Egypt,

approximately 36 mi north of Luxor, contains a ceiling bas relief of the *decans*, sun, moon, planets, and an assortment of constellations. The zodiac bas relief dates to the second century, although the arrangement of planets and constellations within the cycle presents the specific arrangement of the sky as it existed during an eclipse during the first century BCE.¹ Although the bas relief is flat, it depicts the three-dimensional dome of heaven, under which a statue of Osiris likely stood.



Figure 32. Sketch of Dendera zodiac by Prosper Jollois and Edouard Devilliers in *Description*

¹ Sylvie Cauville, *Le Zodiaque d'Osiris* (Leuven: Peeters, 1997), 11-13, 20-23.

de l'Égypte Antiquités, v. 4, Pl. 25.

Vivant Denon sketched the Dendera zodiac during the Napoleonic campaign in Egypt from 1798—1801.² In 1820, a group of French archaeologists received permission from the Egyptian ruler Mohamed Ali Pasha to replace the Dendera zodiac with a facsimile and take the original to France.³ It is now on display at the Musée du Louvre in Paris.

The Dendera Zodiac consists of a central medallion held by four female figures, possibly representing seasons, cardinal directions, or pillars of the earth.⁴ Between each pair of women are two raven-headed figures who kneel and help support the disc. Inside the medallion, the moon overlaps the sun near the top, indicating an eclipse.⁵ Surrounding the sun and moon is an assortment of constellations, including the zodiac constellations of Aries, Taurus, Scorpio, and Capricorn.⁶ A total of 72 constellations is represented in the medallion, including the 48 constellations described by Ptolemy in the second-century astronomical text *Almagest*.⁷

² Jed Buchwald and Diane Josefowicz, *The Zodiac of Paris: How an Improbable Controversy Over an Ancient Egyptian Artifact Provoked a Modern Debate between Religion and Science* (Princeton: Princeton U Press, 2010), 110-111.

³ Buchwald and Josefowicz, *The Zodiac of Paris*, 237-243.

⁴ Cauville, *Le Zodiaque d'Osiris*, 13-14.

⁵ Cauville, *Le Zodiaque d'Osiris*, 19-23.

⁶ Cauville, *Le Zodiaque d'Osiris*, 16-27.

⁷ For star catalogue and descriptions of the 42 constellations, see Ptolemy of Alexandria, *Almagest*, trans. Gerald Toomer (London: Duckworth, 1984), 7.5.



Figure 33 Dendera Zodiac on display in the Louvre. Image © the Musée du Louvre.

The arrangement of the constellations with the depiction of the moon eclipsing the sun indicates a specific alignment of the sky dating to either March 7, 51 BCE or September 25, 52 BCE.⁸

The 36 Egyptian *decans* surround the disc along the edge of the medallion including a symbol that represents five epagomenal days. Each *decan* represents a cycle of ten days, which together with the five epagomenal days constitute the 365-day Egyptian solar year. The combination of the *decans*, Ptolemy's constellations, and additional Egyptian constellations

⁸ Cauville, *Le Zodiaque d'Osiris*, 11-13, 20-23; Gyula Priskin, "The Dendera Zodiacs as Narratives of the Myth of Osiris, Isis, and the Child Horus," *Enim: Égypte Nilotique et Méditerranéenne* 8 (Institut d'égyptologie François Daumas, Université Paul-Valéry, 2015), 137-138.

provide a syncretistic display of Greco-Roman and Egyptian astronomical knowledge. The scene is a star map which may highlight a significant event in the life of temple, the people who used the temple, or the mythology of Osiris. Sylvie Cauville has argued that the Helios-zodiac cycle at Dendera played a part in the liturgical use of the temple in commemorating Osiris's death and resurrection.⁹

4.1.1.b Palmyra

Robert Wood published his exploration of the ruins of Palmyra in 1753.¹⁰ Wood drew a picture of a zodiac bas relief in the northern *cella* ceiling of the Temple of Bel.¹¹ A dedicatory inscription dates the founding of the temple to 32.¹²

⁹ Cauville, *Le Zodiaque d'Osiris*, 46-77.

¹⁰ Robert Wood, *The Ruins of Palmyra, Otherwise Tedmor, in the Desart* (sic) (London: 1753).

¹¹ Wood, *The Ruins of Palmyra*, Table 19.

¹² Jan Willem Drijvers, "Introduction," in *The Religion of Palmyra*, (Leiden: Brill, 1976), 9.

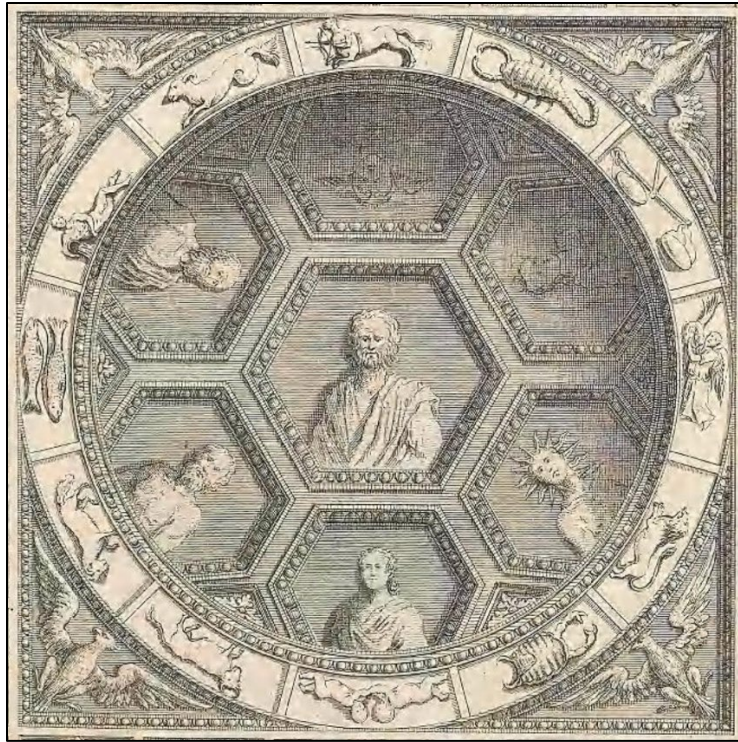


Figure 34. Robert Wood's drawing from *The Ruins of Palmyra*, Table 19.



Figure 35. First-century relief of Palmyrene divine triad of Ba'alshamin (center), Sun (right), and Moon (left) in Roman military dress. Relief discovered near Palmyra and now on display in the Musée du Louvre. Photo © RMN / Hervé Lewandowski.

The bas relief consists of a medallion with a central hexagon-framed Helios, surrounded by six hexagon-framed personifications of the planets. Helios is depicted as an elder, bearded man in profile. He looks down towards the viewer. The planet above Helios in the twelve o'clock position is Mercury, who is personified as a male with wings extending from either side of his head. To the left of Mercury is a clothed, bearded man who personifies Jupiter. Continuing counter-clockwise, next to Jupiter is Mars, who is personified as a fit, bare-chested male. Next to Mars and across from Mercury is Venus, one of only two females in the scene. To the right of Venus is Saturn, who is personified as a male with rays of light radiating from his head and neck. The final figure continuing counter-clockwise next to Saturn is a woman with crescent ornament on top of her head—a personification of the Moon.

This planetary ordering appears random, but it likely represents an unknown auspicious arrangement of the planets.¹³ Ptolemy describes planetary effects based on their position in the zodiac and in relation to one another, but none of Ptolemy's planetary alignments match the arrangement of the planets in the Palmyra Helios-zodiac cycle.¹⁴

A zodiac cycle encircles the Helios and planetary medallion. The cycle begins with Virgo in the right-most, three o'clock position. The zodiac progresses counter-clockwise with Libra who is represented as a beam balance, next to Virgo. The remaining figures are personified/zoomorphied and stand or move with their feet pointing inward toward Helios and the planets. All figures face leftward—the direction of the zodiac's progression—except Pisces

¹³ See Chapter 2 for a discussion of ancient planetary ordering.

¹⁴ Ptolemy of Alexandria, *Tetrabiblos*, trans. Frank Egleston Robbins, LCL 435 (Cambridge: Harvard U Press, 2015), 1.18-20.

and Gemini. Pisces is represented as two fish facing opposite directions with one on top of the other. Gemini is personified as two male infants facing one another and grasping hands. As at Palmyra, the two-dimensional ceiling relief emulates an architectural dome and the dome of heaven.

4.1.2 Domestic and Public Contexts

The Helios-zodiac cycle is depicted on mosaic floors in several domestic triclinia and in a public bath house at Astypalaea, Greece. These two-dimensional representations of the cosmos are orthographic representations of how a domed Helios-zodiac cycle would appear if viewed from below: a square panel serving as the boundary of the scene with a circular Helios-zodiac medallion in the center of the panel.

4.1.2.b Münster

Hermann Wirth-Bernards published a third-century Helios-zodiac floor mosaic in a triclinium in a Roman villa in Münster, Germany in 1939.¹⁵ In the central medallion, a bare-chested Helios with radiant nimbus rides a quadriga pulled by four horses. A chlamys clasped around Helios's neck flutters in the wind. Helios holds a wand in his right hand and a whip in the left. The moon is neither personified nor represented as a crescent in the mosaic.

¹⁵ Hermann Wirth-Bernards, *Über das Heliosmosaik aus Münster bei Bingerbrück* (Bonn: 1939).



Figure 36 Münster Helios-zodiac mosaic from the frontispiece of Wirth-Bernards, Über das Heliosmosaik aus Münster bei Bingerbrück.

Twelve zodiac signs originally encircled the Helios medallion, nine of which survive. The signs are out of celestial order. In the 12:30 clock position, Gemini is represented as two nude, male figures that stretch perpendicularly to the curve of the Helios medallion. Gemini stands upright with the figures' heads pointing to the left and feet to the right. To the right (i.e. clockwise) of Gemini is Taurus, followed by Aries, Pisces, Virgo, and Capricorn. In the night sky, the zodiac constellation Virgo sits between Leo and Libra. In the Münster cycle, however, Virgo and Aquarius have been switched. Another surprising feature in the Münster zodiac cycle is that Virgo is depicted as a nude male holding a sheaf of wheat with a budding branch growing

from his head. Although Virgo is portrayed as a male, he possesses attributes associated with female personifications of Virgo. Virgo and the other surviving zodiac signs on the right half of the cycle point “upward,” indicating counter-clockwise momentum.

The surviving zodiac signs on the left half of the cycle include Scorpio in the 7:30 clock position followed by Aquarius and Libra, all pointing “upward” and moving clockwise. Again, these three surviving symbols do not reflect the constellations’ actual position in the sky but an intentional or mistaken re-ordering of the zodiac. The surviving signs in the left move west-to-east in opposition to the right half of the cycle. Too little survives to speculate which signs would have met at the bottom and top of the cycle, but they might have represented an equinox or solstice.

Two of the four interstitial corners of the panel are intact and contain depictions of a vessel flanked by two fish. The upper-right corner contains an oinochoe flanked by two fish and the lower-right corner contains a krater flanked by two fish or dolphins. Only the body of a single fish survives in the lower left corner. The aquatic theme of the corners might represent the earth-encircling Oceanus out of which Helios arises each morning, which is a common theme in the Helios-zodiac cycles of ancient Palestine and elsewhere in the Greco-Roman world.

4.1.2.c Antioch

Excavated from 1932-1939, the “House of the Calendar” in Syrian Antioch dates to the second century and has a Helios-zodiac cycle in the mosaic floor of its triclinium.¹⁶ A second mosaic panel directly below the Helios-zodiac cycle depicts a personification of Oceanus

¹⁶ Sheila Campbell, *The Mosaics of Antioch* (Toronto: Pontiff Institute of Mediaeval Studies, 1988), 60-62.

suspended in water and surrounded by aquatic life.

The central medallion of the Helios-zodiac panel is nearly destroyed, except for a patch of mosaic depicting a lock of hair. The medallion likely contained Helios personified as a head with radiant crown. Too little of the central medallion survives to discern whether the moon was also depicted. A band surrounding the central medallion contains inscriptions of the months, identifying the twelve figures of the encircling cycle.

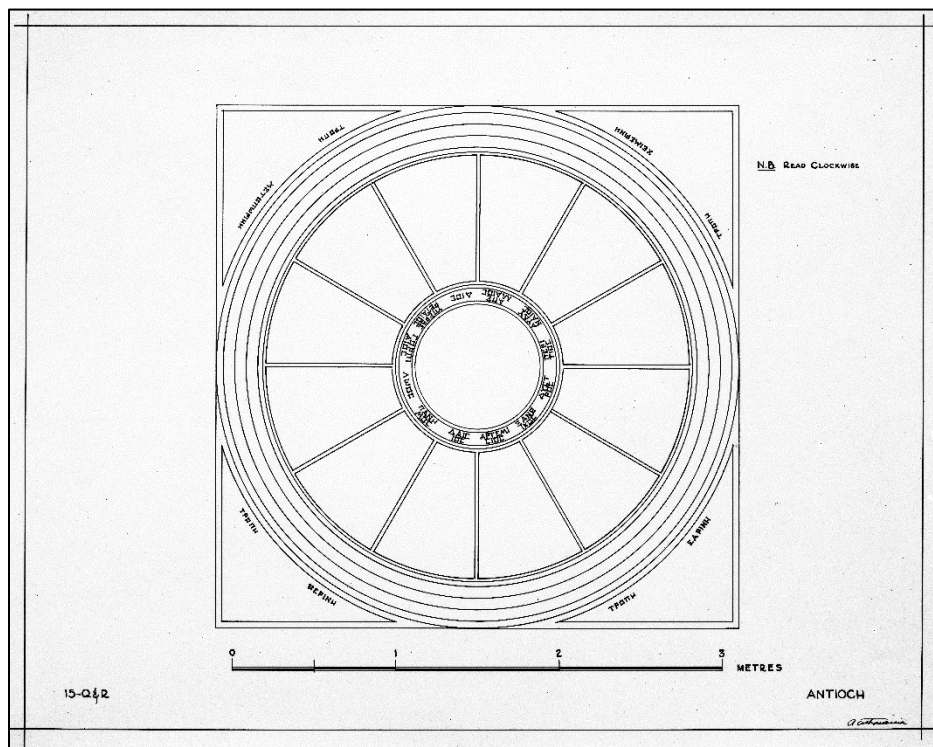


Figure 37. Sketch of Antioch Helios-zodiac cycle with month inscriptions. Image courtesy of Antioch Expedition Archives, Department of Art and Archaeology, Princeton University.



Figure 38. Bottom-left quarter of the Helios-zodiac cycle at Antioch. Photo courtesy of Antioch Expedition Archives, Department of Art and Archaeology, Princeton University.

Only four of the twelve representations of the months survive. The first partially surviving figure is January accompanied by the inscription ΑΥΔΥΝΑΙΟC in the 1:30 clock position. The figure is male and stands facing to the left. In the 2:30 clock position, February is preserved in a few small patches, including the inscription Π[ΕΠΙ]ΤΙΟC. The next three months, of spring, are fairly well preserved. March in the 3:30 clock position is a standing figure facing left. He or she is clothed with tunic and mantle and holds a cup in the left hand and a staff or spear in the right hand. The inscription reads [ΔΥC]ΤΡΟC. The figure in the 4:30 clock position is likely April, though the inscription does not survive. April is personified as a standing male who wears a short tunic and mantle. April also grips the forepaws of a small animal with his

right hand. In the 5:30 clock position, May is identified by the inscription APTE/MEICIO[C] and is portrayed as a male wearing a long tunic, mantle, and sandals. In his right hand he holds a torch pointing toward the ground, and in his left hand he holds a vase.¹⁷

Of the four corner spandrels, only two survive. The bottom right spandrel contains a personification of Winter as a winged female bust with the inscription TPOIIH [XEIMEP]INH. The upper left spandrel contains a personification of Spring as a winged female with the inscription TPOIIH EAP[INH]. These depictions of the seasons as winged female busts identify them as Horai, the daughters of Helios and personified seasons.¹⁸

The allegories of the months are represented under their respective seasonal spandrels. March, April, and May are contained under the Spring spandrel quadrant while January and February are under Winter. The months and seasons progress clockwise, that is, in the west-to-east in opposition to the progression of the zodiac through the night sky. It is possible that this progression of time moves clockwise in imitation of the progression of the shadow of a sun dial or as a mirror-image of the heavens.¹⁹

The appearance of an aquatic scene depicting Oceanus next to the Helios-zodiac cycle is evocative of the aquatic scenes in the Huqoq synagogue discussed in Chapter 3.

¹⁷ Campbell, *The Mosaics of Antioch*, 60-61.

¹⁸ Campbell, *The Mosaics of Antioch*, 61.

¹⁹ Campbell, *The Mosaics of Antioch*, 61-62.

4.1.2.d Sparta

A Helios-zodiac cycle in the mosaic floor of a triclinium was partially uncovered in Sparta during government-led excavations in the 1960s. The mosaic dates to the fourth century.²⁰ The cycle consists of two concentric medallions set within a square. In the central medallion, the bust of a male personification of the sun stands partially overlapping and to the right of a female bust personification of the moon. Helios has curly hair and a cloak cinched over his right shoulder. The Moon wears a peplos cinched at each shoulder, and a crescent ornament with horns pointing upward is visible just behind her head.



Figure 39. Helios-zodiac cycle in a triclinium in Sparta. Image courtesy of the Ephorate of Antiquities of Lakonia.

²⁰ Anastasia Panayotopoulou, "Roman Mosaics from Sparta," *British School at Athens Studies* 4 (1998): 113.

Surrounding the central medallion is the zodiac wheel. The right-most sign in the three o'clock position is Leo, whose feet are planted outwardly and whose head faces left. The zodiac progresses counter-clockwise with Virgo above Leo in the two o'clock position. All the figures face left except for Aquarius and Capricorn, who face right. Pisces is represented as two fish facing opposite directions with one above the other, and Gemini is depicted as two males facing the viewer

The four corner spandrels contain busts of the Anemoi in profile, who are identified by the gusts of wind gusting from their mouths and the wings affixed to their temples.

4.1.2.e Thessaloniki

A partially preserved Helios-zodiac cycle was discovered in the mosaic floor of a triclinium in a villa dating to the fifth century in Thessaloniki.²¹ The villa was partially excavated by the Thessaloniki Ephorate of Antiquities and published in the Greek journal *To αρχαιολογικό έργο στη Μακεδονία και Θράκη* (= *Archaeological Work in Macedonia and Thrace*). The square Helios-zodiac cycle sits within a large mosaic carpet. Surrounding the square cycle are sixteen octagonal frames containing personifications of the months and possibly the four winds.²² The frame on the upper right reads, "APRILOS," identifying it as the personification of April. The frame on the lower-right (i.e. second frame below April) contains

²¹ A coin of Honorius (r. 395-423) found below the mosaic floor provides a *terminus post quem* for the mosaic and villa. See Euterpe Marke, "ΨΗΦΙΔΩΤΟ ΔΑΠΕΔΟ ΜΕ ΠΡΟΣΩΠΟΠΟΙΗΣΕΙΣ ΜΗΝΩΝ ΣΤΗ ΘΕΣΣΑΛΟΝΙΚΗ" (= "Personifications of the Months in a Mosaic Floor in Thessaloniki") in *ΤΟ ΑΡΧΑΙΟΛΟΓΙΚΟ ΕΡΓΟ ΣΤΗ ΜΑΚΕΔΟΝΙΑ ΚΑΙ ΘΡΑΚΗ* (= *Archaeological Work in Macedonia and Thrace*) 12 (1998): 148.

²² Marke, "Personifications of the Months," 148.

the inscription [IOU]NIOS, identifying it as the month of June. The months progress in a clockwise order around the Helios-zodiac cycle, in opposition to the counter-clockwise progression of the zodiac cycle.²³

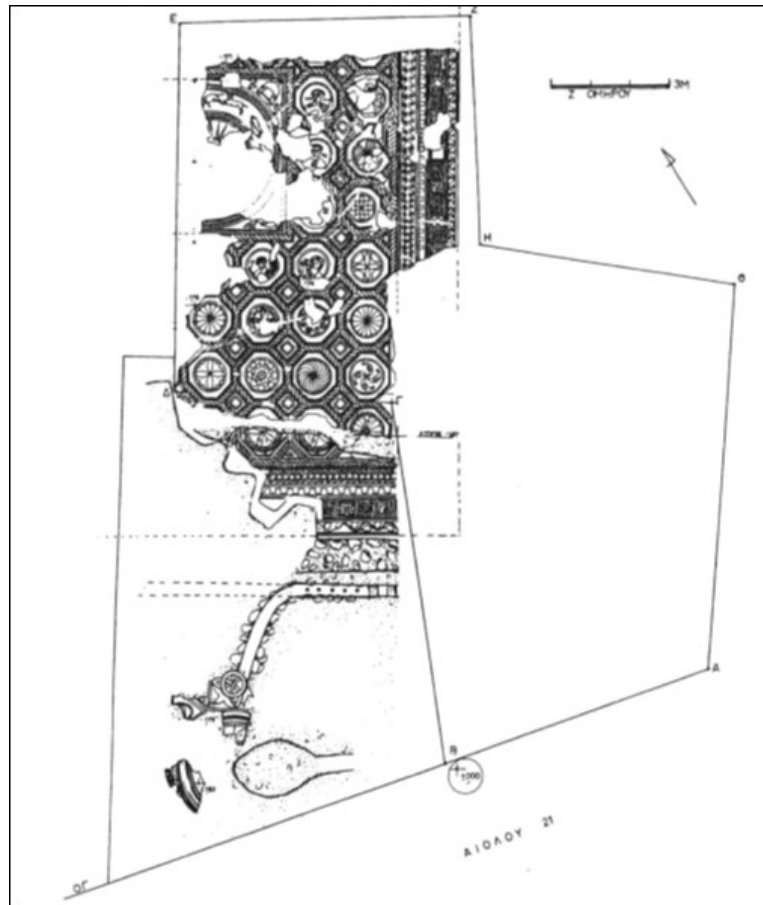


Figure 40. Plan of the triclinium mosaic containing the Helios-zodiac cycle from Marke, “ΨΗΦΙΔΩΤΟ ΔΑΠΕΔΟ ΜΕ ΠΡΟΣΩΠΟΠΟΙΗΣΕΙΣ ΜΗΝΩΝ ΣΤΗ ΘΕΣΣΑΛΟΝΙΚΗ,” 143.

The central medallion of the Helios-zodiac cycle is destroyed except for four rays of light extending from a nimbus, which suggests Helios occupied the center. It is unclear from the damaged portion of the mosaic if the moon was personified as standing next to or behind Helios.

²³ Marke, “Personifications of the Months,” 145.

Surrounding the Helios medallion is a zodiac cycle. Only three zodiac figures survive. In the two o'clock position is Pisces. In the one o'clock position is Aries, facing left. In the twelve o'clock position is Taurus, also facing left. The zodiac progresses counter-clockwise.

In the one surviving corner, a vessel flanked by two birds points toward Helios in the center. No other corners of the zodiac survive.

4.1.2.f Astypalaea

Relatively little has been written about the fifth century Tallaras bathhouse on the Greek island of Astypalaea. Originally excavated by Italian archaeologists in the 1930s, no site plan or excavation report has been published. Ruth Jacoby of the Hebrew University of Jerusalem wrote a brief analysis of a Helios-zodiac panel found in the Tallaras bathhouse along with a summary of the excavations, which she gathered from a colleague who was able to locate scattered records of the excavations.²⁴

²⁴ See Ruth Jacoby, "The Four Seasons in Zodiac Mosaics: The Tallaras Baths in Astypalaea, Greece," *Israel Exploration Journal* 51.2 (2001): 225.



Figure 41. The Helios-zodiac cycle of the Astypalaea bath house. Image courtesy of Michalis Makatounakis.

The mosaic panel, according to Jacoby, measures 2.4 x 2.4 m and sits in the center of a rectangular room, the rest of which is paved with a geometric mosaic carpet.²⁵

In the central medallion, Helios wears a crown with seven rays of light. He has a red cape, holds a globe in his left hand, and extends his right hand, palm out, bent at a 45-degree angle. Helios's stance is reminiscent of Helios as Sol Invictus at Hammath Tiberias.

The twelve signs of the zodiac are all preserved, beginning with Capricorn in the 2:30 clock position. Capricorn is personified as a fish-goat with front feet raised, facing left. Moving

²⁵ Jacoby, "The Four Seasons in Zodiac Mosaics," 226.

counter-clockwise, the next sign is Aquarius, which is personified as a man with a yellow toga pouring water from a vessel. The next sign is Pisces, depicted as two fish swimming in opposite directions. Next is Aries zoomorphied as a ram with front legs raised facing right. Taurus is poorly preserved, but the shape of a bull is clear. Gemini is personified as twin, nude males with yellow hair. Cancer is portrayed as a crab in profile from above. Leo, the lion, raises his two front legs and faces right in opposition to the implied counter-clockwise movement of the zodiac cycle. Virgo is personified as a woman holding a scythe in her right hand and a circular object in her left hand. Libra holds scales extended in his right hand. Libra's left hand is damaged, but it might also have held an object. Scorpio is portrayed as a scorpion in profile from above, facing right. Sagittarius is personified as the legs of a goat and upper body of a man with golden hair, holding a bow and arrow.

The four seasons are personified as women in the corner spandrels of the panel. Each has accompanying items identifying her with a season: Spring has flowers, Fall has a sickle, Summer has grain, and Autumn has fruit.²⁶ The zodiac signs are aligned in the thirty-minute position with three seasonal zodiac signs in each quadrant. For example, the vernal signs of Aries, Taurus, and Gemini are contained in the upper-left quadrant of the cycle. Additional iconography of interest is the wave pattern that separates the zodiac cycle from the seasons. The waves could be an attempt to imitate a Vitruvian scroll pattern or represent Oceanus as often depicted in Helios-

²⁶ Jacoby, "The Four Seasons in Zodiac Mosaics," 226-228.

zodiac cycles.

4.2 Helios-Zodiac Cycle in Mithraea

Mithraism flourished throughout the Roman Empire from the first–fourth centuries. The mystery cult venerated a heavily Romanized form of the Indo-Persian god Mithras. Mithraic initiates met in underground caverns or purpose-built structures modeled to imitate a subterranean setting. In this brief survey of Mithraism, I show that the Persian deity Mithras was adapted to Greco-Roman devotion to the sun and that Mithras served either as a personification of the sun or an associate of Helios. If synagogue Helios-zodiac cycles were at all hermeneutically like the Mithraic Helios-zodiac cycle, it is possible that Helios in the synagogue represents the God of the Jews or a closely associated divine figure.

4.2.1 Textual Evidence

The earliest reference to the deity Mithras in Greco-Roman literature occurs in Xenophon’s fourth-century BCE *Oeconomicus*. In this work, the character Lysander speaks with Cyrus the Great in Susa. Cyrus “swears by Mithras” that he labors for his country every day in war, agriculture, or competition.²⁷ Xenophon predates the development of the Greco-Roman Mithraic mysteries, but his reference to Mithras shows an awareness of the deity in Greece by the fifth century BCE.

In the first century, in the Latin epic *Thebaid* Statius refers to Mithras as a solar deity. Statius mentions Mithras in a collection of solar deities, the others being Apollo, Titan, and

²⁷ Xenophon, *Oeconomicus*, trans. E. C. Marchant and O. J. Todd, LCL 168 (Cambridge: Harvard U Press, 2013), 4.24.

Osiris.²⁸ Statius further describes Mithras as dragging a bull by its horns into “Perseus’s cave,” which suggests Statius was aware of the subterranean aspect of the cult.²⁹

In the early-to-mid second century, Justin Martyr complained that the Mithraic mysteries imitated the Christian rite of eucharist in their initiation ritual. Justin says that a cup of water and portion of bread would be placed before Mithraic initiates prior to an incantation. Unfortunately, Justin did not elaborate on the incantation or purpose of the Mithraic eucharist rite.³⁰

In the third century, the Neoplatonic philosopher Porphyry wrote the most comprehensive description of Mithraic cosmological belief in *About the Cave of the Nymphs*.³¹ Porphyry expands on a passage from the *Odyssey* where Homer describes the geography of Odysseus’s home isle of Ithaca and a cave located there that was home to Nymphs and Naiades.³² In the beginning of the work, Porphyry cites his contemporary Cronius, who had surveyed Ithaca and noted that a cave matching Homer’s description did not exist on the island. Porphyry spends the remainder of the work extrapolating a Neoplatonic, cosmological reading of Homer’s Ithaca cave using Mithraic symbols to interpret the idea of a cave as a microcosm of the world.

²⁸ Alison Griffith, "Mithras, Death, and Redemption in Statius *Thebaid* I, 719-720." *Latomus* 60, no. 1 (2001): 108-109.

²⁹ Statius, *Thebaid: Volume 1: Books 1-7*, trans. Shackleton Bailey, LCL 207 (Cambridge: Harvard U Press, 2004), 1.715-719.

³⁰ Justin Martyr, *The First and Second Apologies*, ed. and trans. Leslie Williams (New York: Paulist Press, 1997), First Apology 66.

³¹ Porphyry, *On the Cave of the Nymphs*, trans. Thomas Taylor (Grand Rapids: Phanes Press, 1991).

³² Homer, *The Odyssey*, trans. Augustus Murray, LCL 105 (Cambridge: Harvard U Press, 2004), 13.355.

Porphyry claims that the ancient Persian prophet Zoroaster was the first to establish a cave for devotion to Mithras, the “maker and father of all things.”³³ In imitation of the original cave of Zoroaster/Mithras, devotees of Mithras in Porphyry’s time practiced the Mithraic mysteries in natural caverns or in purpose-built subterranean structures. Porphyry describes the significance of these structures in detail. For example, he identifies the two latitudinal lines—the Tropic of Capricorn and the Tropic of Cancer—as representing the base and ceiling of Zoroaster’s cave as these lines were also viewed as the base and ceiling of the heavens, respectively.³⁴

Following the establishment of the two tropics as celestial boundaries, Porphyry provides an ordering of the planets as they relate to the tropics. The moon, Porphyry argues, is the closest celestial body and must be associated with the closest tropic: Cancer. Porphyry says that Saturn is the celestial body furthest from the earth and must be associated with the furthest tropic: Capricorn. With these boundaries set, Porphyry provides an ordering of the planets associated with their respective zodiac signs. Because there are only seven heavenly bodies, Porphyry assigns the sun and moon each to a single zodiac house while Mercury, Venus, Mars, Jupiter, and Saturn are each assigned to two zodiac houses.

The following chart relates Porphyry’s assignment of the planets to their attributing (i.e.

³³ Porphyry, *On the Cave of the Nymphs*, 2.

³⁴ The Tropic of Cancer received its name in antiquity because the sun reaches its zenith on the summer solstice each year and appears in the constellation of Cancer. Likewise, the sun reaches its nadir each year on the winter solstice when the sun appears in the constellation Capricorn.

ruling) zodiac houses:³⁵

Zodiac Sign	Attributing Planet
Leo	Sun
Virgo	Mercury
Libra	Venus
Scorpio	Mars
Sagittarius	Jupiter
Capricorn	Saturn
Aquarius	Saturn
Pisces	Jupiter
Aries	Mars
Taurus	Venus
Gemini	Mercury
Cancer	Moon

The houses were significant for Porphyry because they represented physical gates that separated the heavens from the earth. Porphyry, citing Plato, argues that Cancer is the gate through which souls descend to earth from heaven and Capricorn is the gate through which souls

³⁵ Porphyry, *Cave of the Nymphs*, 10.

ascend from earth to heaven.³⁶ Porphyry interprets the deity Mithras as sitting at the equatorial center of the heavens, overseeing the descent of souls through Cancer and the ascent of souls through Capricorn.³⁷

Following the ordering of the planets and zodiac as well as Mithras's role at the equatorial center, Porphyry describes the tauroctony—the scene of Mithras's slaying of a bull. All discovered tauroctonies share several iconographic similarities. Mithras is depicted in the center of the tauroctony, wearing a Phrygian cap and a cape. He holds a bull by the nostrils with his left hand while stabbing the bull with a knife held in his right hand. Below the bull, a dog moves toward the bull's dripping blood. A raven flies above the scene or sits on the back of the bull. Mithras looks over his right shoulder towards a personification of the sun, typically depicted as a bust with radiating nimbus. Opposite the solar bust there is often a female bust of the moon. The torch bearers—Cautes and Cautopates—stand to either side of the bull with Cautes to the right of Mithras with torch raised and Cautopates to the left with torch lowered. Some depictions contain additional icons, such as a lion possibly representing Leo and a snake possibly representing Ophiuchus, Serpens, or Draco.³⁸

According to Porphyry, the images in the scene represent cosmological phenomenon. The blade Mithras uses to stab the bull represents the ram Aries, an aspect of Mars. The bull

³⁶ Porphyry, *On the Cave of the Nymphs*, 11.

³⁷ Porphyry, *On the Cave of the Nymphs*, 10-11.

³⁸ Roger Beck, "Astral Symbolism in the Tauroctony: A Statistical Demonstration of the Extreme Improbability of Unintended Coincidence in the Selection of Elements in the Composition" in *Beck on Mithraism: Collected Works with New Essays* (London: Taylor and Francis, 2017), 257.

represents Taurus, an aspect of Venus. Mithras's struggle with the bull represents the struggle of Porphyry's Demiurge.³⁹ Mithras's right hand signifies the highest extent of heavens because it extends upwards toward the northern hemisphere and the Tropic of Cancer while Mithras's left hand represents the southern hemisphere and the Tropic of Capricorn because it extends downwards. After establishing a hermeneutic for the tauroctony, Porphyry describes the initiation into the Mithraic rites as a descent and re-ascent of the soul.⁴⁰

It is important to note that Porphyry describes Mithraism in Neoplatonic terms that may be more indicative of Porphyry's teachings than reflective of Mithraic practices. Porphyry's description and interpretation of the tauroctony, however, offer details not found elsewhere in antiquity, suggesting that he had personal experience with Mithraism whether an initiate of the cult or not.

Three Mithraea in Europe have been discovered with Helios-zodiac cycles. One cycle was discovered in a tauroctony relief carved from sandstone in ancient Nida, located in modern Hedderheim, a district of Frankfurt, Germany.⁴¹ A second cycle appears on a marble tauroctony recovered in London.⁴² A third cycle was discovered on a stucco ceiling on the

³⁹ Porphyry, *On the Cave of the Nymphs*, 11.

⁴⁰ Porphyry, *On the Cave of the Nymphs*, 3.

⁴¹ See Ingeborg Huld-Zetsche and Walter Meier-Arendt, *Mithras in Nida-Hedderheim Gesamtkatalog* (Frankfurt-am-Main: Museum für Vor- und Frühgeschichte, 1986).

⁴² See John Shepherd, *The Temple of Mithras, London: Excavations by W.F. Grimes and A. Williams at the Walbrook, London* (Northampton: English Heritage, 1998).

Italian island of Ponza, approximately 20 miles west of Naples in the Tyrrhenian Sea.⁴³

4.2.2 Heddernheim Tauroctony

The Heddernheim tauroctony consists of a vertical, two-sided relief that rotates within a stationary, pi-shaped frame.⁴⁴ The obverse of the rotating frame contains a central relief of Mithras slaying a bull within a cave, an arched border above Mithras's head with personified and zoomorphied signs of the zodiac, two spandrels showing Mithras kneeling behind a rock, and an upper register narrative scene of Mithras as Helios or as superior to Helios.

⁴³ See Maarten Vermaseren, *The Mithraeum at Ponza* (Leiden: Brill, 1974).

⁴⁴ Ingeborg Huld-Zetsche and Walter Meier-Arendt, *Mithras in Nida-Heddernheim Gesamtkatalog* (Frankfurt-am-Main: Museum für Vor-und Frühgeschichte), 1986, 73.



Figure 42 The obverse of the Heddernheim Mithraeum tauroctony. Photo courtesy of Demasy Roger.

In the upper-register, Mithras is portrayed in four successive scenes moving from left to right: (1) Mithras emerges from a tree, (2) Mithras drags a bull rightward as a snake slithers away, (3) Mithras greets Helios who wears a radiating nimbus with right hand outstretched and left hand holding a globe in the pose of Sol Invictus, and (4) a nude Helios/Sol Invictus kneels before a standing Mithras.

The curved zodiac cycle on the rotating relief begins with Aries in the left-most position and progresses to the right ending with Pisces. The first six zodiac signs—Aries to Virgo—point to the right, while the last six zodiac signs—Libra to Pisces—point to the left. The two central zodiac signs of Virgo and Libra face one another. This creates a seasonal order of the zodiac in which the zodiac signs for spring and summer are on the left while the signs for autumn and winter are on the right. The joining of Virgo and Libra in the center might represent the fall equinox and Mithras's station at the equatorial center of the heavenly realm as described by Porphyry. The progression of the zodiac from left to right (i.e. Aries to Pisces) reflects a clockwise progression of the zodiac in opposition to the west-to-east/counter-clockwise progression of the zodiac in the night sky.

The reverse of the rotating panel contains two scenes separated by an arched border. The primary scene in the lower two-thirds of the panel depicts a feast involving Mithras and a woman who holds a sheaf of wheat in the crook of her left arm and extends a bowl to Mithras with her right hand. Mithras holds an animal horn in the right hand and extends his left hand with palm facing outward. Between Mithras and the woman is a floating Phrygian cap encircled by a radiating nimbus. The upper register of the scene is badly damaged but appears to contain a scene of a hunt.

The stationary, pi-shaped frame in which the primary panel rotates is decorated with three scenes. The first is a series of square panels on either side of the central tauroctony—four on the right and four on the left—depicting mythological stories of Mithras. The second scene is the upper border of the frame, which is divided by clouds and a tree into two halves. The left half shows the ascent of Helios/Sol Invictus into the heavens in his chariot while grasping Mithras's

hand, and the right half shows the descent of the Moon in her chariot. The four corners of the scene are bounded by roundels of the Anemoi (i.e. the four winds), who are depicted as male busts in profile facing inward with wings extending from their temples and wind blowing from their mouths.

The iconography of the Hedderheim tauroctony depicts a narrative of Mithras ascending to the heavens and becoming Helios, becoming a companion of Helios, or becoming superior to Helios. The zodiac in the cycle represents Mithras's position at the equatorial center of the cosmos, overseeing the progression of time and movement of the zodiac as described by Porphyry.

4.2.3 Walbrook Tauroctony

William Grimes and Audrey Williams excavated the monumental Walbrook Mithraeum in 1954. They originally believed the building to be a church but identified it as a Mithraeum once a head of Mithras wearing a Phrygian cap was discovered. Following the identification of the building as a Mithraeum, a small tauroctony measuring 43.2 x 50.8 x 11.4 cm found near the site in 1889 was re-associated with the Mithraeum.⁴⁵

⁴⁵ John Shepherd, *The Temple of Mithras, London: Excavations by W.F. Grimes and A. Williams at the Walbrook, London* (Northampton: English Heritage, 1998), [awaiting ILL for page number].



Figure 43 Walbrook tauroctony on display in the Museum of London. Photo © Museum of London

The tauroctony is a modular marble carved relief. The central medallion contains Mithras slaying a bull with a dog licking the bull's wound and a scorpion hanging from the bull's testicles. Other figures appear beneath the bull but are too worn to identify. The torch-bearer Cautes stands with his torch pointing upward on Mithras's right. The second torch-bearer Cautopates stands to Mithras's left with torch pointing down.

A zodiac wheel encircles Mithras beginning with Aries at the 2:30 clock position. To the

left of Aries is Taurus at the 1:30 clock position, followed by the remaining signs progressing in their natural, counter-clockwise order. All zodiac signs point and move to the left except for Aries, Capricorn, Sagittarius, and Leo, which point and move to the right.

The upper left corner of the relief depicts Helios ascending in his chariot. The upper-right corner depicts the Moon descending in her chariot. The lower two corners contain busts of men with long hair and wings extending from their foreheads, representing two of the four Anemoi.

Votive inscriptions are written in the middle of each side of the relief as well as in the interstitial space next to each bust. The inscriptions read, “Ulpus Silvanus / factus Arausione / emeritus leg(ionis) II aug(ustae) / votum solvit,” which translates to “Ulpus Silvanus, emeritus of the Second Legion Augusta, paid his vow; enlisted at Orange.”⁴⁶ Mithraism flourished among the ranks of the Roman military, so it is not surprising to find a tauroctony dedicated by a Roman soldier.

4.2.4 Ponza Mithraeum

In the middle of the nineteenth century, Maarten Vermaseren documented a Mithraeum located in a subterranean chamber on the Italian island of Ponza.⁴⁷ A niche framed by two pilasters likely housed a stucco tauroctony that did not survive. A stucco zodiac cycle on the

⁴⁶ Tomlin, Roger, Mark Hassall, and R. P. Wright. *The Roman Inscriptions of Britain 3* (Oxford: Oxbow Books, 2009), 17.

⁴⁷ Vermaseren, *The Mithraeum at Ponza* (Leiden: Brill, 1974).

ceiling in front of the niche, however, is partially preserved.

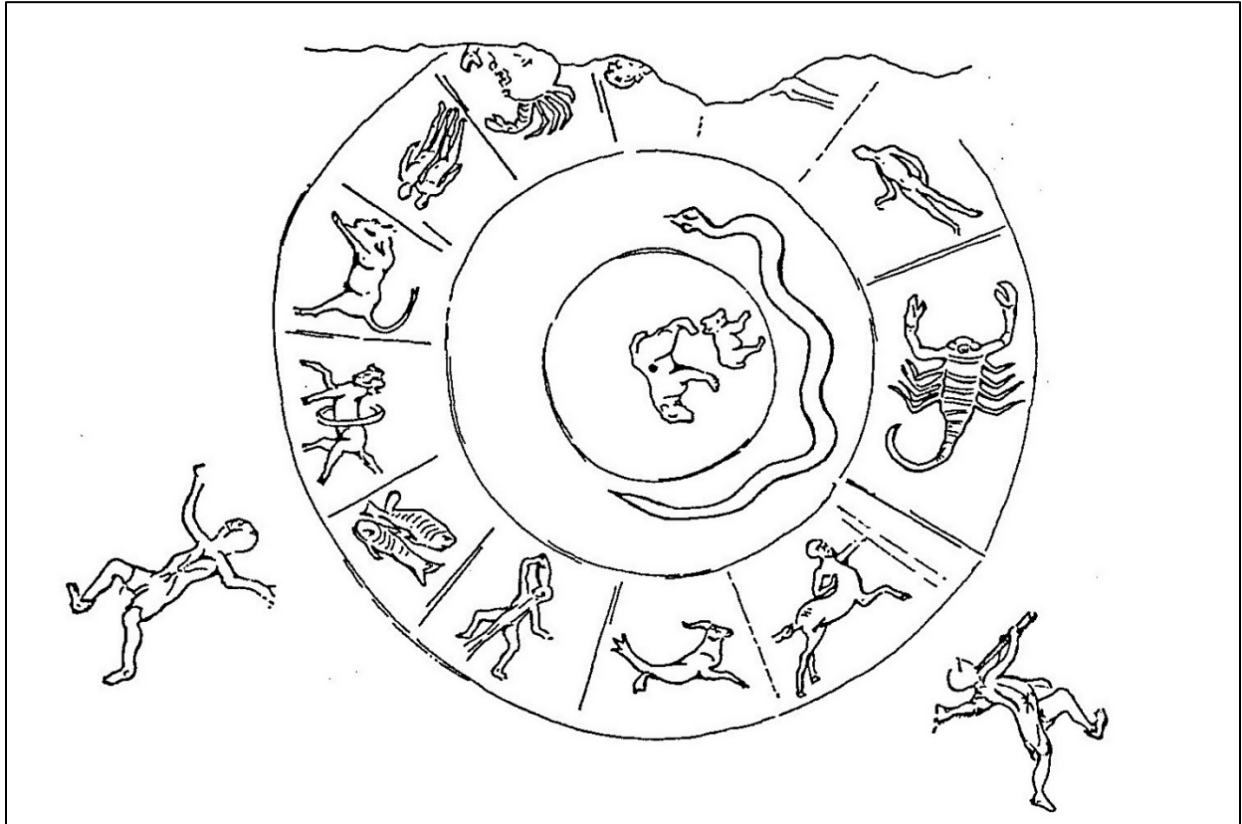


Figure 44 Drawing of the Ponza zodiac cycle from Vermaseren, *The Mithraeum at Ponza*, 9.

In the center of the zodiac cycle is a medallion containing two bears representing the constellations Ursa Major and Ursa Minor. Between the zodiac cycle and central medallion, a snake slithers to the right and occupies half of the circular band.

Surrounding the central medallion are the twelve signs of the zodiac. Aries is located at the 3:30 clock position, followed by Taurus in the 2:30 clock position. The other zodiac signs appear in their natural order, progressing counter-clockwise. The area outside the zodiac wheel is mostly destroyed, but two figures are partially preserved in the corners of the square panel. They

both appear to be male with one depicted as blowing a trumpet, representing the seasonal winds.⁴⁸

Of interest in the Ponza zodiac cycle is the solar scene depicted in the central medallion and circular band. The snake-like figure likely represents Draco, which contextualized with Ursa Major and Minor in the central medallion, suggests a representation of the transition of the “North Star” from the star Thuban in Draco to the star Kochab in Ursa Minor due to the precession of the equinox.⁴⁹ The zodiac at Ponza serves as the celestial backdrop upon which the drama of the precession of the equinoxes takes place, suggesting Mithras was seen as playing a role in the movement of the heavenly bodies.⁵⁰

4.2.5 Two Mithraea in Ancient Palestine

Two Mithraea have been identified in the land of ancient Palestine.⁵¹ Charles Claremont-Ganneau discovered the first in 1874, but it was not identified as a Mithraeum until 2003 by Jodi

⁴⁸ See Figure 43 Drawing of the Ponza zodiac cycle from Vermaseren, *The Mithraeum at Ponza*, 9.

⁴⁹ I define the concept of the precession of the equinox in Chapter 1 and discuss its significance in ancient texts in Chapter 2.

⁵⁰ For a definition and description of the precession of the equinoxes, see Chapter 1.

⁵¹ Of possible interest is a Mithraeum discovered in Dura Europos in close proximity to a synagogue and to a church. The Mithraeum, synagogue, and church of Dura Europos share similar architectural differences, yet their similarity helps to highlight their differences. Because Dura-Europos falls outside the land of ancient Palestine and no Helios-zodiac iconography was found at the Mithraeum, it is not discussed in this dissertation.

Magness.⁵² The second Mithraeum was discovered in 1973 by a team of archaeologists working at Caesarea Maritima.⁵³

Claremont-Ganneau discovered an intact crater and fragments of a second crater dating to the second–third century while excavating an underground hall-like structure located beneath a house on the Via Dolorosa in Jerusalem.⁵⁴ The craters are decorated with iconography often associated with Mithraea, including snakes and personifications of planets. The fact that the vessel was found in a subterranean hall and appears to have been made in a Roman military potters’ workshop in Jerusalem following the conclusion of the Second Jewish Revolt suggests the subterranean hall was a Mithraeum.⁵⁵

The Mithraeum at Caesarea Maritima is more easily identified thanks to a tauroctony depicted on a small marble medallion measuring 7.5 cm in diameter with 1 cm thickness. The Mithraeum was installed in a re-purposed, vaulted subterranean warehouse.⁵⁶ Foundations of

⁵² Jodi Magness, “A Mithraeum in Jerusalem?” in *One Land – Many Cultures, Archaeological Studies in Honour of Stanislaw Loffreda* ofm., eds. G. C. Bottini, L. Di Segni, and L. D. Chrupcala (Jerusalem: Franciscan Printing Press, 2003): 163-171.

⁵³ Jeffrey A. Blakely and Fred L. Horton, *Caesarea Maritima: The Pottery and Dating of Vault 1: Horreum, Mithraeum, and Later Uses* (Lewiston, NY: Edwin Mellen Press, 1987); Hopfe, Lewis Moore and Gary Lease. "The Caesarea Mithraeum: A Preliminary Announcement." *The Biblical Archaeologist* 38, no. 1 (1975): 2-10; Robert Bull, *The Mithraeum at Caesarea Maritima* (Boston: The American Schools of Oriental Research, 2017).

⁵⁴ Magness, “A Mithraeum in Jerusalem?” 163-164.

⁵⁵ Magness, “A Mithraeum in Jerusalem?” 167-169.

⁵⁶ Josephus describes a series of subterranean vaults used for storage in *Antiquities* 15.9.6.

benches and an altar were uncovered as well as partially-preserved frescos and an oculus-like opening cut into the ceiling to allow for a beam of light to enter the structure. The medallion was later discovered to have been set into a north-south bench running along the eastern wall of the vault.⁵⁷ It is likely that this oculus-like opening allowed light to fall upon specific images in or near the altar at an auspicious time of the year following Mithraic mythology, such as on the equinoxes or one of the solstices.



Figure 45. Marble medallion containing the tauroctony found at Caesarea Maritima. Photo © The Israel Museum, Jerusalem.

⁵⁷ Hopfe, Lewis Moore, and Gary Lease, "The Caesarea Mithraeum: A Preliminary Announcement." *The Biblical Archaeologist* 38, no. 1 (1975), 7.

Mithraea and late antique Palestinian synagogue share some notable architectural and iconographic features. First, Mithraea and synagogues often had an apse or niche for housing sacred objects, such as a tauroctony, altar, or Torah shrine, though nearly all synagogues with this feature are much later than Mithraea. Second, the Caesarea Mithraeum made use of an oculus-like opening for liturgical light similar to Bet Alpha, as described previously in Chapter 3. Other Mithraea and synagogues might have had oculus-like openings, but due to the lack of surviving ceilings, roofs, and walls it is impossible to know. The third and most striking similarity is in the use of astral iconography to convey the cosmic location and occupation of the chief deity as overseer of the movement of the heavens and the descent and ascent of souls.

The signs of the zodiac in Mithraea served two primary functions. First, they offered an interpretative hermeneutic for icons within the tauroctony, such as the bull as Taurus and scorpion as Scorpio. Second, the cycle of the zodiac was used to locate Mithras within the narrative of the heavens. Like Mithras, Helios could represent the deity central to the synagogue (Yahweh) or a monolatrous personification of the sun as an angelic figure such as Enoch/Metatron. I address this possibility in further detail in the concluding chapter when the Christian use of the Helios-zodiac cycle is discussed as a hermeneutic against which to understand the Jewish use of the cycle.

4.3 Helios-Zodiac Cycles in Astrology Boards

4.3.1 Literary Context

The fourth-century *Greek Alexander Romance* and a collection of Greek magical papyri ranging in date from the first century BCE to the fourth century describe rectilinear astrology

boards decorated with Helios-zodiac cycles.⁵⁸ *The Alexander Romance* exists in multiple recensions that range in date from the fourth to seventeenth centuries. The earliest Greek manuscript of the *Alexander Romance* dates to the fourth century and contains a story of how the last Egyptian pharaoh, Nectanebo II, fathered Alexander the Great. In the narrative, Nectanebo is famed for his divination and magic. In a vision, he sees that the gods have ordained Egypt's fall to an advancing Persian army. Nectanebo disguises himself in response to his vision and flees to Macedonia, where he becomes a prophet.⁵⁹

The narrative returns to Egypt following Nectanebo's flight, where local prophets foresee a future, younger Nectanebo returning to Egypt to expel the conquering Persians. This younger Nectanebo is a foreshadowed Alexander the Great. Back in Macedonia, Queen Olympias requests that Nectanebo visit the palace to divine the reason for her infertility. Nectanebo performs several divinations, one of which is the casting of Olympias's, Phillip's, and Nectanebo's natal horoscopes.⁶⁰

Nectanebo uses an elaborately decorated writing tablet divided into three zones. The outer circle contains the 36 Egyptian *decans*, the middle circle contains the 12 signs of the zodiac, and the inner medallion frames depictions of the sun and moon. Nectanebo then opens an ivory box containing eight stones which represent the seven ancient planets and a person's

⁵⁸ Hans Dieter Betz, *The Greek Magical Papyri in Translation Including the Demotic Spells*. Chicago: U of Chicago Press, 1986), Papyrus 110.

⁵⁹ *The Greek Alexander Romance*, trans. Richard Stoneman (London: Penguin Books, 1991), 1.3.

⁶⁰ *The Greek Alexander Romance*, 1.4-5.

ascendant zodiac. Nectanebo reads the horoscopes and tells Olympias that Phillip plans to reject her due to her infertility and remarry when he returns from war. Nectanebo tells Olympias she must sire a child with the god Ammon, whom Nectanebo disguises himself as so he might sleep with Olympias. The union between Olympias and Nectanebo-as-Ammon results in the birth of Alexander the Great.⁶¹

A fragmentary papyrus (*Papyri Graecae Magicae* [PGM] 110) provides instructions on how to cast a natal horoscope:

Lay out the stars on the board in their natural order, with the exception of the sun and the moon. Make the sun gold, the moon silver, Kronos of obsidian, Ares of yellow-green onyx, Aphrodite of lapis-lazuli streaked with gold, Hermes of turquoise; make Zeus of a [dark blue] stone, but underneath of crystal. But the horoscope...⁶²

Like *The Greek Alexander Romance*, the stones in PGM 110 representing the seven ancient planets are made from physical materials reflecting the nature of those planets (e.g. the sun is gold and the moon is silver to reflect their appearance.) The instructions indicate that the stones were placed on the board in preparation for reading a person's horoscope.

In addition to the written description of astrology boards in *The Greek Alexander Romance* and PGM, physical remains of five assemblages of astrology boards have been recovered.

⁶¹ *The Greek Alexander Romance*, 1.4-6.

⁶² Betz, *The Greek Magical Papyri*, 312.

4.3.1 Grand/Grannus Astrology Board

The most complete, albeit reconstructed, astrology boards were discovered in the ancient village of Grannus (modern Grand) in the Lorraine region of France. The village of Grannus was established in the first century and flourished through the fourth century. A temple to Apollo Grannus stood in the village and served as a regional center for healing and divination.⁶³ A total of 188 fragments of small, ivory astrology boards was discovered at the bottom of a well just outside the wall of the ancient village. The boards appear to have been smashed intentionally prior to being discarded in the well with rocks cast down to cover the pieces.⁶⁴

⁶³ André Buisson and Joseph-Henriette Abry, *Les tablettes astrologiques de Grand (Vosges) et l'Astrologie en Gaule Romaine, Actes de la Table-ronde du 18 Mars 1992 organisé au Centre d'Études Romaines et Gallo-Romaines de l'Université Lyon III* (Paris: De Boccard), 1993.

⁶⁴ James Evans, "The Astrologer's Apparatus: A Picture of Professional Practice in Greco-Roman Egypt," *Journal for the History of Astronomy* 35.1 (2004), 5.



Figure 46. Grand astrology board housed in the Musée d'Archéologie Nationale et Domaine National de Saint-Germain-en-Laye. Photo © L'Agence Photo RMN Grand Palais.

The ivory pieces represent at least four distinct astrology boards, suggesting they served a standardized cultic function, possibly in the local temple. Conservators were able to reassemble a two-sided, foldable board, measuring 19.1 x 14.1 x 0.8 cm.⁶⁵ Its small size and foldability suggest it was designed for easy transportation. The reconstructed board is decorated with a central medallion with inward facing busts of the personified Sun and Moon. The Sun is male, wears a radiating nimbus, and holds a whip in his right hand. The Moon is female with a crescent

⁶⁵ Conservators' note from the Musée d'Archéologie Nationale et Domaine national de Saint-Germain-en-Laye.

lunar ornament on her head. The Sun and Moon appear to be covered partially by the waves of water.

A zodiac cycle surrounds the central medallion. Aquarius is in the 2:30 clock position, Pisces is in the 1:30 clock position, and the rest of the signs follow in their natural counter-clockwise order. All the zodiac figures face the opposite direction of movement (clockwise) except for Scorpio, Cancer, and Taurus, which face the direction of their progression.

Surrounding the twelve figures of the zodiac is a band of Greek letters that divides each of the twelve signs of the zodiac into five segments, known as *terms*, with a different planet ruling each of the relative zodiac *terms*.⁶⁶ Outside of the band of letters, an additional cycle contains the 36 Egyptian *decans* broken into 12 divisions of three *decans* each.

A four-winged humanoid creature is depicted in each of the four corners outside the band of *decans*. A six-pointed radiant star flanks each creature, which likely represent the seasons or winds.

4.3.2 Bianchini Tablet

The marble Bianchini tablet was discovered on the Aventine Hill in Rome in 1705 and is currently on display in the Louvre. The central medallion of the tablet depicts Draco wrapped around Ursa Major and Ursa Minor in an s-shape. This configuration bears a remarkable resemblance to the central medallion in the Ponza Mithraeum zodiac cycle, likely representing the transition of the North Star from the constellation Draco to the constellation Ursa Major.

⁶⁶ Evans, “The Astrologer’s Apparatus,” 7.

Surrounding the central medallion are six sets of bands. Moving outward from the center, the successive bands depict the following: (1) twelve animals of the *dodecaoros*, that is, Egyptian zodiac constellations often associated with the Greco-Roman zodiac; (2) the twelve zodiac figure, beginning with Gemini in the four o'clock position, Cancer at the 3:00 position, and progressing in the natural order moving counter-clockwise; (3) a second band of identical zodiac figures slightly larger than the previous band; (4) the five *themes* per zodiac represented by Greek letters; (5) three anthropomorphized/zoomorphized *decans* per zodiac sign; and (6) repeated profiled busts of planetary gods—one per *decan*.



Figure 47 The Bianchini Tablet on display in the Louvre. Photo © Musée du Louvre.

The Bianchini tablet has space for two simultaneous astrological readings, likely

reflecting a marriage horoscope outlined by Ptolemy in the *Tetrabiblos*.⁶⁷ Ptolemy stresses the importance of the moon's location for a husband and the sun's location for a wife. Furthermore, the husband's moon and the wife's sun must be in harmonious aspects (60-degrees or 120-degrees apart) for a lasting marriage. If the luminaries are in disjunct signs (180-degree or 90-degrees apart), the marriage likely will end in divorce.⁶⁸

4.3.3 Tanis Astrology Board/Window Pane

Flinders Petrie discovered the remains of a gilded glass Helios-zodiac cycle while excavating the Egyptian city of Tanis.⁶⁹ The fragmentary remains are in the British Museum. This pane contains three concentric circles. The central medallion likely depicted Helios and/or a personification of the moon but is too poorly preserved to determine with certainty. The middle and outermost circles are divided into twelve spaces with the surviving spaces containing depictions of men and women, likely personifications of the zodiac. The four interstitial corners contain female busts, representing either the seasons or winds.

Marie-Dominique Nenna has argued that this astrological board was a window pane, which suggests that sunlight might have played a role in the use of the pane for astrological

⁶⁷ Hans Georg Gundel, *Zodiakos. Tierkreisbilder im Altertum. Kosmische Beziige und Jenseitsvorstellungen im antiken Alltagsleben* (Mainz am Rhein, 1992), 110-112.

⁶⁸ Ptolemy, *Tetrabiblos*, 4.5.

⁶⁹ Flinders Petrie, *Tanis: Part I, 1883-84* (London, 1889), 48-49.

practice.⁷⁰ If it was a window pane, the Tannis board might have been used to imitate an oculus-like projection of light inside the building, similar to the Caesarea Maritima Mithraeum or the Beth Alpha synagogue. Because the glass contains two circles of personifications, it is possible that one circle contained personifications of the months to go along with the personifications of the zodiac or both cycles might have contained identical zodiac cycles to cast marriage horoscopes like the Bianchini tablet.

4.3.4 Daressy Tablet

George Daressy discovered a marble astrology board in an antiquity dealer's shop in Cairo around 1901. While the tablet has been lost, Daressy made a squeeze, which he published in 1912.⁷¹ The marble tablet was a disc measuring 22 cm in diameter and was divided into three concentric circles. The central medallion contains a bust of Helios in profile wearing a radiant crown. A bust of the female Moon wearing a crescent ornament on her head is partially obscured by Helios.

⁷⁰ Nenna, "De Douch (Oasis de Kharga) à Grand (Vosges). Un Disque en Verre Peint à Représentations Astrologiques," *Le Bulletin de l'Institut Français d'Archéologie Orientale* 103 (2003): 367-368.

⁷¹ George Daressy, "L'Égypte Céleste," *Le Bulletin de l'Institut Français d'Archéologie Orientale* 12 (1912): 1-34, plate 2.



Figure 48 Squeeze of Daressy tablet from Daressy, “L’Égypte Céleste,” Plate 2.

Surrounding the central medallion are twelve animals aligned with the twelve signs of the zodiac in the outer ring. The animals of the middle ring reflect the Egyptian *dodecaoros*, which also appear in the Bianchini tablet.

4.3.5 Nakovana Zodiac Cycle

Eight ivory fragments of a zodiac cycle were discovered in 2000 in the Nakovana Cave near Dubrovnik, Croatia. Once reconstructed, the fragments combined to make four ivory zodiac panels that would have been mounted on a flat surface. Each of the four panels was a trapezoidal arc with a curve measuring 28 degrees; the outer arc measuring 55 mm; the inner arc measuring

40 m; and an overall width of 33 mm. The panels ranged in thickness from 2-3 mm.⁷² The entire zodiac cycle would have had a diameter of approximately 21.5 cm, which is similar in size to the reconstructed ivory Grand astrology board. The four zodiac symbols discernible on the reconstructed pieces are Cancer, Gemini, Pisces, and Sagittarius.⁷³

When the width of the zodiac ring is removed from the calculated diameter of the overall cycle, approximately 18.2 cm of space remains inside the zodiac band. This space likely was decorated with previously discussed astrology board elements, such as a central medallion containing personifications of the sun and moon and additional cycles of the zodiac, *decans*, and/or *themes*.

The discovery of the Nakovana zodiac cycle raises several possibilities regarding the circumstances of its deposition in a cave. First, it is possible that these pieces were broken elsewhere and intentionally deposited in the cave. If the entire board had been deposited at once, archaeologists likely would have found additional ivory pieces from other portions of the board. A second possibility is that astrologers—or at least this astrologer—practiced their craft in the cave and the broken pieces were deposited near where they worked. A third possibility is that the zodiac pieces were from an astrological decoration in the cave, which could have served as a Mithraeum.

⁷² Stašo Forenbaher and Alexander Jones, “The Nakovana Zodiac: Fragments of an Astrologer’s Board from an Illyrian-Hellenistic Cave Sanctuary” *JHA* 42.4 (2011), 428.

⁷³ Forenbaher and Jones, “The Nakovana Zodiac,” 428-429.

4.4 Summary and Analysis

The pagan and synagogue Helios-zodiac cycles share a similar iconographic form, which typically depicts Helios and the Moon in a central medallion encircled by the signs of the zodiac set within a square with corner depictions of the seasons as Anemoi or Horai. This form served a multiplicity of uses in antiquity. In cultic contexts, the Helios-zodiac cycle loomed above the heads of worshipers to remind them of the dome of heaven and their relation to it. In domestic and public contexts, the Helios-zodiac cycle was projected as a floor mosaic in triclinia and the Astypalaea bathhouse to provide visitors a grandiose backdrop where they could eat and/or relax. In Mithraea, the Helios-zodiac cycle provided the narrative framework for Mithras's supervision of the rotation of the heavenly bodies and his collaboration with or transformation into Helios. In astrology boards, tablets, and window panes, the Helios-zodiac cycle served as a corresponding link between the heavens and earth.

All the Helios-zodiac cycles discussed in this chapter are two-dimensional representations of the three-dimensional heavenly dome. In the second century, Ptolemy of Alexandria wrote the *Planisphaerium*, a mathematical treatise on the stereographic projection of the cosmos, that is, the two-dimensional planar representation of the three-dimensional celestial sphere. Ptolemy claims that such a two-dimensional representation of the three-dimensional cosmos is useful for many subjects, though he does not specify which.⁷⁴ The *Planisphaerium* survives only in medieval Arabic and Latin translations, although additional medieval

⁷⁴ Ptolemy, Nathan Sidoli, and J. Len Berggren "The Arabic Version of Ptolemy's *Planisphere* or Flattening the Surface of the Sphere: Text, Translation, Commentary in *Sources and Commentaries in the Exact Sciences* 8 (2007): 1.1.

translations are thought to have existed, including a Hebrew translation.⁷⁵ Of course, the two-dimensional representation of the celestial bodies discussed in this chapter does not reflect the degree of accuracy specified in Ptolemy's treatise, but both Ptolemy and the Helios-zodiac cycles discussed so far reflect a similar desire to translate the heavenly dome into a flat medium.

In 1945, Karl Lehmann argued that celestial floor decorations were projections of designs originally developed for ceilings.⁷⁶ More recently, Jodi Magness has argued that synagogues incorporated Helios-zodiac cycles to represent the dome of heaven in two-dimensions due to architectural restrictions of flat or pitched-roof synagogues. The relatively early dates for the ceiling Helios-zodiac cycles at Dendera and the Temple of Bel at Palmyra support Lehmann's and Magness's hypotheses. The synagogue Helios-zodiac cycle, like those discussed in this chapter, provided patrons with a two-dimensional projection of the three-dimensional heavens.

Magness has further argued that the Helios medallion in the center of the cycles represents an oculus through which light would enter a dome, such as in Nero's *Domus Aurea* in Rome.⁷⁷ Ocular light often was engineered to interact with artistic and/or architectural features inside a building.⁷⁸ The oculus-like opening in the Caesarea Maritima Mithraeum likely served a

⁷⁵ Ptolemy, Sidoli, and Berggren "The Arabic Version of Ptolemy's *Planisphere*," 37-38.

⁷⁶ Karl Lehman, "The Dome of Heaven," *The Art Bulletin* 27.1 (1945), 5.

⁷⁷ Jodi Magness, "Heaven on Earth: Helios and the Zodiac Cycle in Ancient Palestinian Synagogues," *Dumbarton Oaks Papers* 59 (2005): 16.

⁷⁸ For evidence of the use of archaeoastronomical lighting, including in Mithraea and the *Domus Aurea*, see Robert Hanna, "The Orchestration of Time in Ancient and Medieval Buildings," in *Archaeoastronomy in the Roman World*, eds. Giulio Magli, et al. (Switzerland: Springer, 2019): 37-56.

cultic function in which light entered and struck a portion of the altar or a decorative feature. Likewise, the Tanis glass pane was used to capture light and project the image of an astrology board in a building for aesthetic, cultic, and/or astrological purposes. In the previous chapter, I argued that a window set in the apse of the Beth Alpha synagogue would have cast light that aligned with the Helios medallion on the summer solstice, winter solstice, or the equinoxes. Although these buildings did not have domed roofs, they used windows to imitate an oculus for sunlight projection inside the building.

A unique aspect of the synagogue Helios-zodiac cycles is the lack of a lunar personification. In pagan contexts that include a representation of the moon, it is always personified as the deity Selene, Helios's lunar sister. Even in Mithraea, Selene is personified as an observer of the tauroctony opposite Helios. In the synagogue, though, the moon is never personified. Instead, the moon—when present—is a waxing crescent appearing next to Helios. The lack of a lunar personification in synagogues suggests a reticence to present the moon as a figured image, which I suggest supports the interpretation of Helios as a divine figure.

Chapter 5: The Helios-Zodiac Cycle in the Landscape of Late Roman-Byzantine Palestine

The question I address in the conclusion is why was the Helios-zodiac cycle depicted in some Palestinian synagogues of the fourth–sixth centuries, that is, what was its significance to these congregations? I argue that the synagogue Helios-zodiac cycle depicts the creation of the cosmos and represents (1) Helios as a divine Jewish figure, (2) the zodiac as a celestial calendar emphasizing Aries/Nissan, and (3) the seasons as a frame representing the journey of the sun between the equinoxes and solstices. To support these claims, I survey evidence of late antique cosmic depictions in pagan, Christian, and Jewish contexts. I then contextualize each aspect of the synagogue Helios-zodiac cycle, that is, the central medallion, zodiac cycle, and spandrel seasons. I conclude with a discussion of the synagogue as an *imitatio templi*, as suggested by Steven Fine, and consider the Helios-zodiac cycle as part of a Late Roman-Byzantine expression of cosmic thought.

5.1 Greco-Roman Cosmic Devotion in Late Antiquity

In this section, I survey evidence of solar veneration in the Roman Empire and consider its influence on the Helios-zodiac cycle in synagogues. The earliest description of Helios in Greco-Roman literature appears in Hesiod's *Theogony*, where the author presents Helios as the

son of Thea and Hyperion and sibling to the goddesses Selene (the Moon) and Eos (the Dawn).¹ Helios next appears in the anonymous seventh–sixth century BCE work the *Homeric Hymn*, where the author describes the deity as emerging from the sea and pausing his journey across the sky after watching Athena spring forth from the head of Zeus.² In the *Homeric Hymns*, Helios is described as wearing a golden helmet and a fine-spun garment that blows in the wind as he travels across the sky. Helios is described as having bright locks of hair that fall from his temples and a chariot with horse bridles made of gold.³

Two ancient authors write that the worship of the sun predated the founding of Rome. In the second century BCE, Varro writes that the Sabines worshipped the sun as Sol, who he associates with the Greek god Apollo.⁴ In the fifth century, Augustine writes in the *City of God* that Titus Tatius, king of the Sabines, introduced the worship of Sol to Rome.⁵ Although these stories are impossible to prove historically, they establish that by at least the second century BCE, a tradition existed about the ancient origin of Roman solar devotion.

In the Early–Late Roman period, multiple emperors introduced the worship of Helios/Sol

¹ Hesiod, *Theogony* in *Theogony. Works and Days. Testimonia*, ed. and trans. Glenn W. Most. LCL 57 (Cambridge, MA: Harvard University Press, 2018), 371-372.

² “Hymn to Athena,” *Homeric Hymns. Homeric Apocrypha. Lives of Homer*, ed. and trans. Martin L. West. LCL 496 (Cambridge, MA: Harvard University Press, 2003), 28.1-18.

³ “Hymn to Helios,” *Homeric Hymns*, 31.9-14.

⁴ Varro, *On the Latin Language, Volume I: Books 5-7*, trans. Roland G. Kent, LCL 333 (Cambridge: Harvard University Press, 1938), 5.68.

⁵ Augustine, *City of God, Volume II: Books 4-7*, trans. William M. Green. LCL 412 (Cambridge: Harvard University Press, 1963), 4.23.

as an official state religion. Nero (r. 54–68) commissioned a colossal statue of himself on the *Via Appia* in front of the *Domus Aurea*. Pliny the Elder writes that the statue was re-dedicated to Sol following Nero's death.⁶ Vespasian (r. 69–79) added a nimbus/solar crown to the statue, and Hadrian (r. 117-138) transferred the statue from the *Domus Aurea* to a location near the Flavian Amphitheater (Colosseum).⁷

Elagabalus (r. 218-222) made Sol the chief deity of the Roman pantheon. Prior to his accession to the throne, Elagabalus had served as high priest to the Syrian solar deity Elagabalus. Cassius Dio writes that in addition to making Sol the chief deity in Rome, Elagabalus was circumcised and abstained from eating pork in devotion to Sol/Elagabalus.⁸ Elagabalus's religious reform was widely rejected and contributed to the brevity of his reign, which ended with his assassination at the age of 18.⁹

Aurelian (r. 270-275) mandated the worship of Sol Invictus as the chief deity of the Roman pantheon in an attempt to unify Rome during the third century crisis.¹⁰ According to the

⁶ Pliny. *Natural History, Volume IX: Books 33-35*, trans. by H. Rackham. LCL 394 (Cambridge, MA: Harvard University Press, 1952), 34.46.

⁷ Suetonius, *Vespasian*, in *Lives of the Caesars, Volume II: Claudius. Nero. Galba, Otho, and Vitellius. Vespasian. Titus, Domitian. Lives of Illustrious Men: Grammarians and Rhetoricians. Poets (Terence. Virgil. Horace. Tibullus. Persius. Lucan). Lives of Pliny the Elder and Passienus Crispus*, trans. by J. C. Rolfe. LCL 38 (Cambridge, MA: Harvard University Press, 1914), 18.

⁸ Cassius Dio, *Roman History, Volume IX: Books 71-80*, trans. Earnest Cary and Herbert B. Foster, LCL 177 (Cambridge, MA: Harvard University Press, 1927), 50.11.

⁹ Cassius Dio, *Roman History*, 5.11.

¹⁰ Avi-Yonah, *Jews under Rome and Byzantine Rule* (Jerusalem: Magnes Press, 1984), 91-92.

sixth century author Zosimus, Aurelian built a temple to Sol Invictus which contained a statue of Helios, a statue of the Assyrian god Belus, and spoils taken from a solar temple in Palmyra.¹¹

Constantine the Great (r. 306-337) was a devotee of Sol Invictus/Helios prior to his conversion to Christianity. The coins of Constantine bear the image of Sol, and an arch constructed by Constantine decorated with reliefs of Sol framed the Colossus of Sol (previously Nero's Colossus), which remained standing next to the Flavian Amphitheater throughout Constantine's reign.¹²

In the fourth century, Julian (r. 355–363) converted from Christianity to paganism with devotion to a neoplatonic form of Helios. Julian recounts his conversion in a letter written to the population of Alexandria and implores Christians in Alexandria to convert to the worship of Helios.¹³ Julian wrote a hymn celebrating Helios in which he describes Helios as the perfection of the Platonic good and the bringer of salvation to the world through the birth of his son Asclepius.¹⁴ Julian's earlier Christian teaching undoubtedly influenced his conception and worship of Helios.

¹¹ Zosimus, *Historia Nova: The Decline of Rome*, trans. James Buchanan and Harold Davis (San Antonio: Trinity University Press, 1967), 1.61.2.

¹² See Figure 22 for a depiction of Sol on coin of Constantine; Elizabeth Marlowe, "Framing the Sun: The Arch of Constantine and the Roman Cityscape," *The Art Bulletin* 88, no. 2 (2006): 229-233.

¹³ Julian, *Letters. Epigrams. Against the Galilaeans. Fragments*, trans. Wilmer C. Wright. LCL 157 (Cambridge: Harvard University Press, 1923), Letter 47.

¹⁴ Julian, *Orations 1-5*, trans. Wilmer C. Wright. LCL 13 (Cambridge: Harvard University Press, 1913), 4.153.

Solar veneration was not restricted to the elites of Rome and Byzantium. Emmanuel Friedman documents evidence of pagan solar veneration in late antique Palestine, including temples to Helios which stood until the early fifth century, fourth century coins bearing Helios's image, and dedicatory inscriptions to various solar deities.¹⁵ Solar veneration in third century Palestine was so prevalent that rabbinic sages condemned Jewish participation in solar worship in the Mishnah and Tosefta, which I address in greater detail below.

Devotion to Helios/Sol Invictus was not the only pagan expression of solar veneration in the later Roman Empire. Stephen Mitchell has argued for the emergence of a Late Roman pagan monotheism with particular solar devotion to Theos Hypsistos.¹⁶ Mitchell cites an inscription of an oracle of Apollo from Oenoanda in Lycia that refers to a monotheistic deity "not contained in a name" who "dwells in fire."¹⁷ Later in the inscription, devotees of the unnamed god are instructed to gather at dawn, face the sunrise, and pray.¹⁸ The inscription was placed in a spot in the city wall that received the first light of sun, likely indicating where devotees of the deity gathered.¹⁹ Mitchell has interpreted this god to be Theos Hypsistos, and his devotees as

¹⁵ For the evidence, see Friedman, "Sol Invictus in the Severus Synagogue at Hammath Tiberias: The Rabbis and Jewish Society: A Different Approach," *Review of Rabbinic Judaism* 12.1 (Boston: Brill, 2009), 97-107.

¹⁶ Stephen Mitchell, "The Cult of Theos Hypsistos between Pagans, Jews, and Christians," in *Pagan Monotheism in Late Antiquity*, eds. Polymnia Athanassiadi And Michael Frede (New York: Oxford University Press, 1999), 81-148.

¹⁷ Mitchell, "The Cult of Theos Hypsistos," 86.

¹⁸ Mitchell, "The Cult of Theos Hypsistos," 86-89.

¹⁹ Mitchell, "The Cult of Theos Hypsistos," 87-89.

members of a sect known as the Hypsistarians to which later Roman and Christian authors refer, often describing their practices and beliefs as a perversion of Judaism and/or Christianity.²⁰

Mitchell surveys additional evidence, including an inscription to Theos Hypsistos from Bosphorus found in a supposed Jewish προσευχή (“prayer hall”) that invokes Theos Hypsistos along with Zeus, Gea, and Helios.²¹

Mithraic practitioners also participated in solar and cosmic veneration in a monolatrous or monotheistic devotion to Mithras as Helios.²² Of course, as described in Chapter 4, no Mithraic literature—if any such literature ever existed—has survived from antiquity. The iconography of recovered tauroctonies and Porphyry’s description of the cosmological beliefs of Mithraism depict Mithras as closely connected to Helios or as Helios himself.²³

The influence of Greco-Roman solar veneration on Judaism is evident in the fourth–early fifth century “Severos Synagogue” at Hammath Tiberias. As discussed in Chapter 3, the representation of Helios at Hammath Tiberias portrays the sun as the Roman god Sol Invictus by depicting the figure wearing a radiant crown, holding a globe in his left hand, and extending his arm at a 45-degree angle with an open palm.²⁴

²⁰ Mitchell, “The Cult of Theos Hypsistos,” 91-128.

²¹ Mitchell, “The Cult of Theos Hypsistos,” 114; *Packard Humanities Institute: Corpus Inscriptonum Regni Bosporani* [CIRB] 1123 and 1261. <https://inscriptions.packhum.org/book/231?location=367>.

²² David Ulansey, *The Origins of the Mithraic Mysteries: Cosmolgoy and Salvation in the Ancient World* (Oxford: Oxford University Press, 2011), 22.

²³ Ulansey, *Mithraic Mysteries*, 22-25.

²⁴ See Figures 18-22 for the portrayal of Sol Invictus on coins of the second-fourth centuries.

Solar veneration was a mainstay of the later Roman Empire. Figures such as the Colossus of Sol and Constantine's Arch stood near the Roman Forum. Coins depicting Sol were minted well into the fourth century and remained in circulation for a time. Byzantine works such as Julian's "Ode to Helios" and Nonnus's *Dionysiaca* describe a cosmic hierarchy. These images and texts, along with the Helios-zodiac cycles discussed in Chapter 4, provided a visual framework for conceiving of the cosmos in late antiquity. It is no surprise, then, that when Jewish congregants wished to depict the cosmos in synagogue art, they used contemporary cosmic and iconographic vocabulary.

5.2 Cosmic Veneration in Antique Christianity

The conflation of Christ with cosmic phenomena begins in first century New Testament texts and appears sporadically throughout the Late Roman-Byzantine period. In this section, I briefly survey cosmic portrayals of the resurrected Christ and ultimately interpret the development of Christian cosmic motifs in a similar light to Judaism, in that both religious traditions drew from a shared Greco-Roman cultural milieu.

The earliest Christian authors associated Christ with cosmic phenomena. In the Gospel of Matthew's birth narrative of Jesus, Parthian/Assyrian astrologers interpret a "star at its rising" as the birth of the "king of the Jews." This "star" likely refers to an auspicious alignment of planets within an ascendant zodiac.²⁵ In the Gospels of Matthew and Mark, Jesus restates a passage from Isaiah that foresees an apocalyptic future in which the sun is darkened, the stars fall

²⁵ Matt 2:1-12.

from the sky, and the heavenly bodies are shaken, which is nearly identical to the apocalyptic account in *Sibylline Oracle 5* discussed in Chapter 2.²⁶ In the Gospel of John, the author cites Christ twice referring to himself as “the light of the world,” conflating Jesus with the sun as a metaphor to understand his teachings.²⁷ During Jesus’s crucifixion in the synoptic gospels, the sun becomes dark, presenting the death of Jesus as a cosmic event.²⁸

Christian art is non-existent prior to 200 but began to develop soon after. Paul Corby Finney has argued convincingly that because Christians did not constitute a protected Roman ethnic identity, they lacked the funds, the land, and legal freedom necessary to construct art.²⁹ He suggests that the earliest Christians may have “Christianized” Greco-Roman motifs such as Orpheus, Helios, and Asclepius as images of Christ during this period, but are indistinguishable as they would have appeared identical in Christian and Greco-Roman art.³⁰

Beginning in the third century, Christians engaged in an art program that borrowed heavily from Judaism and Greco-Roman iconography. Two early Christian works dating to the late second–early fourth centuries associate the resurrected Christ with Helios. The first appears in the second–third century writings of Clement of Alexandria and the second is a third–fourth

²⁶ For the prophecy from Isaiah, see Isa 13:10; 34:4; for the gospel passages, see Matt 24 and Mark 13.

²⁷ John 6:51, 8:12.

²⁸ Matt 24; Mark 13; Luke 23.

²⁹ Paul Finney, *The Invisible God: The Early Christians on Art* (New York: Oxford University Press, 1997), 99-108.

³⁰ Finney, *The Invisible God*, 188-191.

century mosaic in the Roman catacombs.

The second–third century theologian Clement of Alexandria wrote the *Exhortation* to convert pagans to Christianity. Early in the work, Clement ridicules pagans for worshiping the stars, sun, and moon.³¹ Later in his work, however, Clement portrays the resurrected Christ as

Helios:

For the Sun of Righteousness, who drives His chariot over all, pervades equally all humanity, like His Father, who makes His sun to rise on all men, and distils on them the dew of the truth. He has changed sunset into sunrise, and through the cross brought death to life; and having wrenched man from destruction, He has raised him to the skies, transplanting mortality into immortality, and translating earth to heaven.³²

Clement describes Christ as Helios in a metaphor to compare the resurrection to the rising of the sun.

Mausoleum M in the Tomb of the Julii beneath St. Peter’s Basilica in the Vatican contains a domed, ceiling mosaic depicting Christ as Helios riding in a chariot, wearing a radiating crown with seven beams of light.³³ In his left hand he holds a globe. His right lower-arm is destroyed, but from the angle of his shoulder, it is likely that his right arm was at a 45-degree angle with the palm out in the pose of Sol Invictus. Two of the four horses driving the chariot are preserved. The horses rear on their hind legs and face inward. Grapevines surround

³¹ Clement of Alexandria, “Exhortation to the Heathens,” in *Ante-Nicene Fathers*, vol. 2, ed. Alexander Roberts, James Donaldson, and A. Cleveland Coxe, trans. William Wilson (Buffalo, NY: Christian Literature Publishing, 1885), 2.

³² Clement of Alexandria, “Exhortation to the Heathen,” 11.

³³ John Beckwith, *Early Christian and Byzantine Art* (New Haven: Yale University Press: 1979), 19.

Christ-as-Helios, reflecting a passage from John 15:1 where Jesus claims, “I am the true vine, and my Father is the gardener.” Other mosaic icons in the tomb identify the figure of Helios as Christ, including a man fishing, Jonah being swallowed by a fish, and a shepherd carrying a lamb.³⁴ The image of Helios in the tomb of the Julii should be understood as a metaphor for resurrection, personifying Christ’s words in John, “I am the light of the world.”³⁵ This interpretation is similar, then, to the portrayal of Christ as the Good Shepherd elsewhere in the tomb, which embodies Christ’s words, “I am the good shepherd,” in John 10:11.

³⁴ Kurt Weitzmann, *Age of Spirituality Late Antique and Early Christian Art, Third to Seventh Century* (New York: Metropolitan Museum of Art, 1979), 522-523.

³⁵ John 8:12.

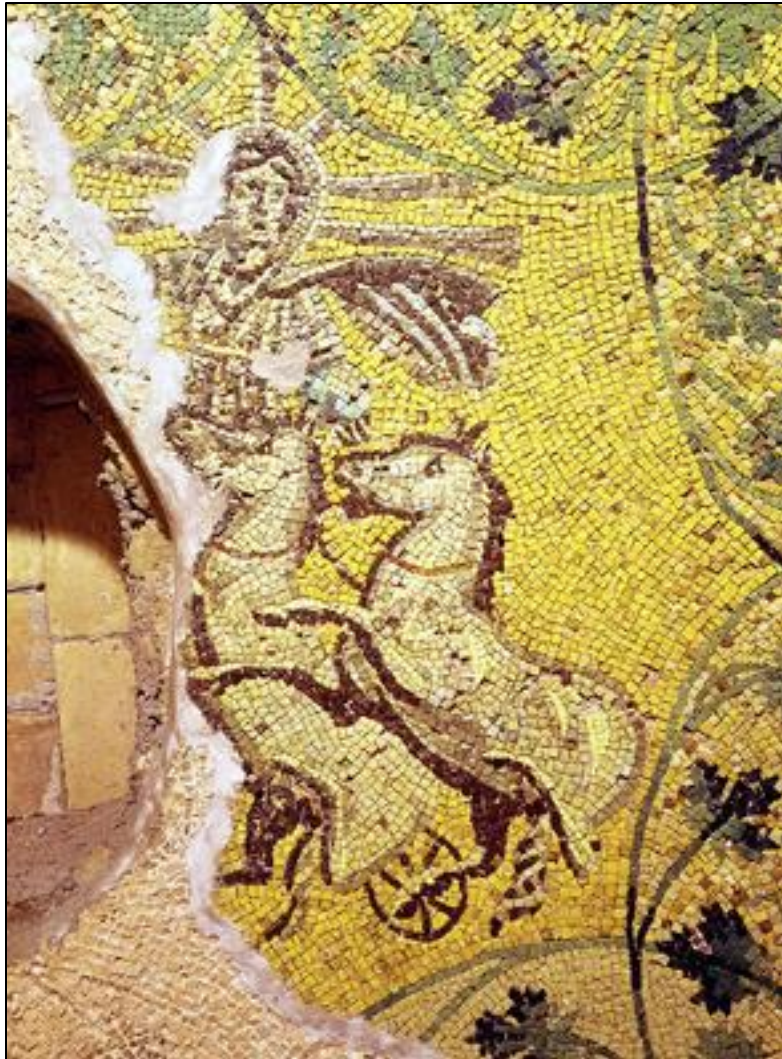


Figure 49. Helios surrounded by vines in Tomb of the Julii. Photo copyright Ronald Wiedenhoft.

Another possible representation of Christ as a cosmic being occurs in the fourth-century basilica of Saint George, Sofia in modern Bulgaria. The basilica dome has three successive frescoes painted one on top of the other. The earliest fresco dates to the construction of the

church and depicts angelic figures flying in a circle around the base of the dome.³⁶ No more of the original fresco survives, but it is likely that a heavenly scene was depicted with Christ at the center.

A sixth-century *ampulla* from Monza, Italy is believed to have been brought back by a pilgrim from Jerusalem.³⁷ On the lowermost scene of the *ampulla*, the twelve disciples flank the Virgin Mary, who is in a stance of prayer with open palms. Above the disciples and Mary, four angels uphold Christ, who is seated on a throne and wears a radiant nimbus similar to Helios. This scene uses cosmic iconography to depict the ascension of Christ in Acts 1, such as the radiant nimbus of Helios and four winged figures upholding a central icon.

³⁶ Elka Bakalova and Tsvetan Vasilev, "Images and Texts across Time: The Three Layers of Mural Paintings in the Church of St George in Sofia," *Изкуствоведски четения* (English: *Artistic Readings*) 1 (2007): 171-192.

³⁷ Jean Lassus, *Early Christian and Byzantine World* (New York: McGraw-Hill, 1967), 37-38.



Figure 50. Sixth-century ampulla from Monza, Italy. Photo from Jean Lassus, Early Christian and Byzantine World, fig. 55.

Cosmic portrayals of Christ are limited during the Late Roman–Byzantine period, but when they occur, they present Christ as Helios metaphorically as “the light of the world.” It is impossible to draw any corollary between Christ as Helios and the Helios-zodiac cycle in synagogues as Christians do not appear to have used the Helios-zodiac cycle as standard iconography. The Christian Helios motifs, then, are best understood as Christians using common Greco-Roman cosmic iconography to convey aspects of their developing traditions.

5.2 Israelite and Jewish Cosmic Veneration

In Chapter 2, I documented ancient Jews' wide-ranging interest in astronomy and astrology as early as the Babylonian Exile. For some Jewish movements, such as the Qumran community and the author of *I Enoch*, a key astronomical interest was to maintain a correct calendar, whether by the moon, sun, or a mixture of the two. For the pre-70 Jewish priestly class, as documented in the writings of Philo and Josephus, the stars provided a hermeneutic to understanding the cosmic representation of the temple implements and high priestly vestments. Still other authors, such as the those who composed the *Testament of Solomon* and *Sepher Ha-Razim*, viewed the heavenly bodies as divine/demonic beings. A further group of writings yet to be discussed is the somewhat overlapping Hekhalot and Merkabah literature, which describes visionary ascents to heavenly palaces and the throne of God, respectively. In this section, I survey evidence of ancient Israelite and Jewish cosmic veneration and consider its implications for understanding the Helios-zodiac cycle in synagogues.

The earliest evidence of Jewish cosmic veneration can be found in a passage from Deuteronomy, which dates to the exilic or post-exilic period but could reflect earlier Israelite law. The passage forbids the worship of astronomical deities:

And when you look up to the heavens and see the sun, the moon, and the stars, all the host of heaven, do not be led astray and bow down to them and serve them, things that the Lord your God has allotted to all the peoples everywhere under heaven.³⁸

³⁸ Deut 4:19.

This passage presumes the worship of astronomical deities throughout Canaan but prohibits the people of Israel from participating.

The next evidence of Israelite cosmic veneration is in Josiah's cultic reform in 2 Kings. As part of the reform, Josiah ordered the destruction of vessels housed in the Jerusalem temple used for the worship of Baal, Asherah, and the hosts of heaven. Priests who offered sacrifices to Baal, the sun, the moon, the constellations, and the host of the heavens were deposed. The most enigmatic part of the reform is described in 2 Kings 23:11:

He removed the horses that the kings of Judah had dedicated to the sun, at the entrance to the house of the Lord, by the chamber of the eunuch Nathan-melech, which was in the precincts; then he burned the chariots of the sun with fire.

The text is unclear whether the chariot represented the God of Israel or another deity worshiped in the temple. What can be said, however, is that 2 Kings 23:11 depicts a tradition of Judahite solar veneration and an eventual priestly and/or scribal rejection of the practice.

In the exilic book of Ezekiel, God guides the prophet on a tour of Judah's sins that resulted in the Babylonian exile. At one point in the vision, God brings Ezekiel to the former Jerusalem temple:

And [God] brought me into the inner court of the house of the Lord; there, at the entrance of the temple of the Lord, between the porch and the altar, were about twenty-five men, with their backs to the temple of the Lord, and their faces toward the east, prostrating themselves to the sun toward the east.³⁹

³⁹ Ezek 8:16.

The text identifies these twenty-five men as Judahites and a key reason for the downfall of Judah. The Judahites appear to bow to the morning sun as it rises from the east, possibly as a continuation of the type of ritual Josiah had supposedly ended.

Josephus interprets several Jewish practices in relation to solar veneration. In one example, Josephus views an Essene pre-dawn prayer as a supplication for the sun's rising:

For before sun-rising they speak not a word about profane matters, but put up certain prayers, which they have received from their forefathers, as if they made a supplication for its rising.⁴⁰

Josephus also describes the Jerusalem temple as facing the “rising sun” and says that God commanded the Israelites to construct a “sunrise facing” altar following the defeat of the Amalekites in Exodus 17.⁴¹ Josephus does not interpret the directionality of Israelite/Jewish cultic structures any further, but coupled with his cosmological interpretation of high priestly garments and temple implements discussed in Chapter 2, his writings suggest a priestly tradition of conflating devotion to the God of the Jews with the sun.

Solar veneration also appears in spells that invoke Jewish figures throughout the Greek Magical Papyri (ca. first century BCE–fourth century) discussed in Chapters 2 and 4. In one spell, an aspect of Helios is named “Sabaoth Adonai,” a title for God in the Hebrew Bible and in

⁴⁰ Josephus, *The Jewish War, Volume I: Books 1-2*, trans. H. St. J. Thackeray. LCL 203 (Cambridge, MA: Harvard University Press, 1927), 2.128.

⁴¹ Josephus also describes God instructing the Israelites to construct an altar to face the rising sun following the defeat of the Amalekites from Exodus, in *Jewish Antiquities, Volume III: Books 7-8*, trans. Ralph Marcus, LCL 281 (Cambridge, MA: Harvard University Press, 1934), 8.44.

the LXX meaning “Lord of Hosts.”⁴² In another spell, Helios and the archangels Gabriel, Michael, and Raphael are invoked to bring the spell caster victory in a race.⁴³ In another spell, Helios is invoked by a number of names in different languages, including the name “Enoch.”⁴⁴

Another corpus of ancient Jewish literature that describes solar and cosmic veneration is Hekhalot and Merkabah mystical texts. Many of these texts have dates of composition ranging from the second–tenth centuries, which means they might have been composed after the construction of the synagogues discussed in this study. If that is the case, it is possible that depictions of the Helios-zodiac cycle in synagogues influenced the cosmological conceptions of the authors of the Hekhalot and Merkabah texts. Of course, if the mystical texts were written prior to the construction of synagogues with Helios-zodiac cycles, they might have influenced how some congregants interpreted the Helios-zodiac cycle.

One Hekhalot and Merkabah mystical text discussed briefly in Chapter 2 is the fifth century work *3 Enoch*, which depicts the visionary ascent of Rabbi Ishmael who views the transformation of Enoch into the angel Metatron. In the text, Metatron is identified as the “lesser YHWH” and the angel of presence that led the people of Israel into the Promised Land.⁴⁵ In *3*

⁴² Hans Dieter Betz, *The Greek Magical Papyri in Translation Including the Demotic Spells* (Chicago: U of Chicago Press, 1986), 4.1596-1715; Eleni Pachoumi, “The Religious and Philosophical Assimilations of Helios in the Greek Magical Papyri,” in *Greek, Roman, and Byzantine Studies* 55 (2015): 396-397.

⁴³ Betz, *Greek Magical Papyri*, 7.1017-1026.

⁴⁴ Betz, *Greek Magical Papyri*, 13.64-89. The editor notes that “Enoch” might not refer to the biblical character.

⁴⁵ See Exodus 23:20-21; *3 Enoch* 12:1-5; Andrei Orlov, *The Enoch-Metatron Tradition* (Tübingen: Mohr Siebeck, 2005). Metatron is mentioned three times in the Babylonian Talmud

Enoch, Rabbi Ishmael identifies discrete levels of the cosmos ruled by named angelic figures. The angel Galgalliel watches the sun, Ophaniel watches the moon, Kokbiel watches the planets, and Rahatiel watches the zodiac.⁴⁶ Venus is also referenced as “the Morning Star” to characterize the shining brightness of a set of crowns made for the four winds who rise in the east.⁴⁷ In another part of the text, Metatron describes the princely angel Seraphiel as being the image of “the Greater Light,” a reference to the sun in Genesis 1.⁴⁸

Hekhalot Rabatti, another mystical text, dates to the eight–ninth century and contains passages which might date as early as the third century.⁴⁹ *Hekhalot Rabati* uses cosmic language to describe the ornamentation of God in an expansion of Isaiah 6:

Who is like our King? Who is like our Former? Who is like YHWH our God? The sun and the moon rule and lead forth the crown of His head. The Pleiades, Orion, and the Morning Star, groups of stars, and stars and constellations drip and go forth from the robe of Him who is garlanded and He is enthroned in it upon the throne of His glory and it emits a great light between His eyes.⁵⁰

In another passage from *Hekhalot Rabati*, the angel Hadriel shows Rabbi Ishmael a host of

and is characterized as the second, lesser power in heaven with the God of Israel being the first. For references, see b. Hagigah 15a, Sanhedrin 38b and Avodah Zarah 3b.

⁴⁶ 3 En 14:4.

⁴⁷ 3 En 21:4.

⁴⁸ 3 En 26:4.

⁴⁹ For the dating of this text, see James Davila, *Hekhalot Literature in Translation: Major Texts of Merkavah Mysticism* (Boston: Brill, 2013), 42; Ra’anan Boustan, *From Martyrs to Mystics: Rabbinic Martyrology and Making of Merkavah Mysticism* (Tübingen: Mohr Siebeck, 2005), 278-293.

⁵⁰ Davila, “Hekhalot Rabbati,” in *Hekhalot Literature*, paragraph 105.

angels preparing crowns. One crown is adorned with the twelve signs of the zodiac, the sun, and the moon. When Rabbi Ishmael inquires to its purpose, Hadriel tells him it is meant for David while the others are meant for Israel.⁵¹

One of the earliest Hekhalot texts is *Hekhalot Zutarti*, which could date as early as the second–third century. In the text, God’s presence is described as carrying a scepter and riding hooved beasts, iconography that is often associated with Helios, as seen in Chapters 3 and 4.⁵²

Using the Hekhalot and Merkabah texts to interpret the Helios-zodiac cycle in synagogues is tenuous since the date of composition of many of the texts ranges from the third–tenth centuries. However, the earlier Hekhalot and Merkabah texts show a desire to understand the hierarchy of the cosmos during the period when the mosaics depicting the Helios-zodiac cycle in synagogues were made.

The rabbinic sages of Palestine strongly condemned solar worship, which suggests it was a prevalent enough occurrence to warrant discussion. Mishnaic debate prohibits the use of images in worship, with Rabbi Meir saying that only images depicting a person holding “a staff or bird or sphere in its hands” are prohibited.⁵³ Rabbi Meir’s reference corresponds to the image of Sol Invictus on Roman coins from the second–third century and the later image of

⁵¹ *Hekhalot Rabati: The Greater Treatise Concerning the Palaces of Heaven*, trans. Morton Smith, ed. Gershom Scholem and Don Karr, trans. Don Karr, <http://www.digital-brilliance.com/kab/karr/HekRab/index.htm>, 6.

⁵² For the date of this work, see Davila, *Hekhalot Literature*, 193-194; “Hekhalot Zutarti,” in *Hekhalot Literature*, paragraph 356.

⁵³ m. ‘Abod. Zar. 3.

Helios in the Hammath Tiberias “Severos synagogue,” which postdates the compilation of the Mishnah by at least a century. In the same Mishnaic passage, when a group of Romans ask rabbis why God does not destroy idolatrous images, the sages reply that people worship the sun, moon, stars, and planets, so if God were to destroy all idols, He would have to destroy the universe as well.⁵⁴

The rabbinic sages cited in the third century Tosefta, identify those who worship the sun as following a “foreign way”:

[A person] that sees the sun, the moon, the planets and the constellations says the following blessing: Blessed are You Hashem, our God, King of the world, Who performs creation. Rabbi Yehudah says, “[If] a person says a blessing on the sun, [he follows] a foreign way.”⁵⁵

This “foreign way” is one of many Jewish practices condemned by the rabbis. A passage in the same tractate of the Tosefta condemns solar and cosmic worship in Judaism:

If one slaughters [an animal] in the name of the sun, in the name of the moon, in the name of the stars, in the name of the astrological signs, in the name of Michael, the prince of a great host, or [even] in the name of a small worm, such are the flesh of sacrifices of the dead.⁵⁶

Although the Jerusalem temple was in ruins, this passage suggests that some Jews still offered sacrifices to cosmic deities, including the archangel Michael, who is described as the “prince of the great host.”

Rabbinic writing was both prescriptive and descriptive of late antique Judaism. In other

⁵⁴ m. ‘Abod. Zar. 4.

⁵⁵ t. Ber. 6.

⁵⁶ t. Ber. 6.

words, rabbinic literature describes “what was” in effort to establish “what should be.”⁵⁷

Rabbinic literature, then, reflects a cosmic interest in the Late Roman-Byzantine period. The Helios-zodiac cycle in synagogues is best understood in a similar light to the Christian use of Helios, in that Jews made use of Greco-Roman cosmic iconography to convey their own concepts and world views. I now turn to an examination of the Helios-zodiac cycle in synagogues as a hybridized Jewish and Greco-Roman motif.

5.4 The Contextualized Synagogue Helios-Zodiac Cycle

As introduced in Chapter 1, interpretations of the Helios-zodiac cycle in synagogues have varied widely but fall into three general categories: (1) a narrative of the sovereignty of the God of the Jews, (2) a calendar reflecting the 24 priestly courses and/or the agricultural cycle, and (3) Helios as a divine figure surrounded by the heavenly cosmos. I wish to propose an amalgam of these three interpretive summaries and suggest the Helios-zodiac cycle portrays the moment of the world’s creation which contextualizes the providence of Israel within cosmic history. To support this interpretation, I examine each part of the synagogue Helios-zodiac cycle in the following order: the central medallion, the zodiac cycle, and the spandrel seasons.

5.4.1 The Central Medallion

When preserved, the central medallion of the Helios-zodiac cycle in synagogues portrays the sun as Helios riding his quadriga and the moon as a waxing crescent.⁵⁸

⁵⁷ See Mira Balberg, “Ritual Studies and the Study of Rabbinic Literature,” *Currents in Biblical Research* 16, no. 1 (October 2017): 71–98.

⁵⁸ While the Sepphoris synagogue presents Helios as a radiant sun, I argue in Chapter 3 this figure is best understood as a personification.

Interpretations vary widely as to the identity of Helios. As discussed in Chapter 1, Martin Goodman argues that Helios represents the God of the Jews, Jodi Magness argues that Helios represents Metatron—the lesser YHWH—as a fusion of sacred space and sacred time, and Lucy Wadeson argues that Helios represents Elijah in the divine chariot.⁵⁹ Other possible identifications include Helios as the archangel Michael as alluded to in the Tosefta, the Greco-Roman deity Helios as venerated in the Greek Magical Papyri and *Sepher Ha-Razim*, or another solar angelic figure from Hekhalot literature. Whoever the figure represents, the scene portrays the moment of the world’s creation—the *thema mundi*—described in Chapter 3 in relation to the Susiya synagogue inscription. To understand the Helios-zodiac cycle in synagogues as a type of *thema mundi*, it is important to understand the portrayal of the waxing crescent moon and Venus in the central medallion.

When the moon appears and/or is preserved in the central medallion of the Helios-zodiac cycle in synagogues, it is never personified. In contrast, in all pagan Helios-zodiac cycles that include the moon, it is personified as the lunar goddess Selene. So why does the Helios-zodiac cycle in synagogues represent the moon as a waxing crescent instead of Selene?⁶⁰

The appearance of the waxing crescent moon in the sky initiated the start of a new month

⁵⁹ Magness, "Heaven on Earth: Helios and the Zodiac Cycle in Ancient Palestinian Synagogues," *Dumbarton Oaks Papers* 59 (2005), 49-50; Goodman, "The Jewish Image of God in Late Antiquity," in *Judaism in the Roman World: Collected Essays* (Boston: Brill, 2006), 205-218; Lucy Wadeson, "Chariots of Fire: Elijah and the Zodiac in Synagogue Floor Mosaics of Late Antique Palestine," *ARAM* 20 (2008): 1-41.

⁶⁰ Beth Alpha portrays the moon as a waning crescent (i.e. the phase before the New Moon), which I argue in Chapter 3 is a mistake of the mosaicists.

in ancient Judaism. The first day of the month—*Rosh Chodesh*—is a minor festival, which according to the Mishnah, Jerusalem Talmud, and Babylonian Talmud was celebrated in the synagogue.⁶¹ There are strict rules in rabbinic literature regulating how a waxing crescent moon can be observed and who officially can do the observing. In the Mishnah, two witnesses are required to observe the waxing crescent moon before it can be reported to begin the new month.⁶² Rabbi Gamaliel is said to have hung images of lunar phases in his home to question witnesses who claimed to have observed the waxing crescent moon.⁶³ In the Babylonian Talmud, Rabbi Yehoshua stresses that the new month can only be declared when the waxing crescent has become visible in the sky, which is a process of calculating the start of the month taken for granted in the Mishnah and Jerusalem Talmud.⁶⁴

In addition to the moon, the Helios-zodiac cycles of Hammath Tiberias, Sepphoris, and Beth Alpha portray a unique/set-apart star, which I argue should be interpreted as the planet Venus in Chapter 3.⁶⁵ Venus was closely associated with dawn as the planet is the last visible object in the sky at sunrise. Venus is also the third brightest object in the sky behind the sun and moon. In the Jerusalem Talmud, the appearance of Venus—referred to as the “Morning Star”—

⁶¹ m. Meg. 4:2.

⁶² m. Roš. Haš. 2:1-6.

⁶³ m. Roš. Haš. 2:8.

⁶⁴ b. Roš. Haš. 2:25a; y. Roš. Haš. 2:6. The explanation in the Babylonian Talmud suggests a possible alternate form of declaring the start of the month in Babylonia, hence the need to stress when the new Jewish month begins.

⁶⁵ It is possible that additional Helios-zodiac cycles in synagogues depicted Venus but have not survived.

at dawn indicates the end of night and beginning of the day.⁶⁶ If the star in the central medallion of the Helios-zodiac cycles at Hammath Tiberias, Sepphoris, and Beth Alpha represents Venus, the specific scene displayed would be dawn on the first dawn of a new month as Helios emerges from the waters of Oceanus in his journey across the sky. It is likely that the other synagogues with Helios-zodiac cycles indicate dawn on *Rosh Chodesh*, though too little of the central mosaic medallion is preserved or they displayed the scene using only the emergence of Helios from Oceanus under a waxing crescent moon.

The appearance of Helios with the crescent moon in the central medallion is suggestive of a soli-lunar calendar—as discussed in Chapter 2—with emphasis on the solar figure because Helios is (1) the only figure personified, (2) the largest figure in the scene, and (3) the indicator of the time of day. The spandrel seasons, which I discuss below in more detail, emphasize the solar aspect of the calendar as they divide the Helios-zodiac cycle into four equal quadrants, representing the quarterly movement of the sun from solstice to equinox and equinox to solstice. Although this day-break scene might represent a generic first day of a month to commemorate *Rosh Chodesh*, I maintain that it represents the *first* of first months, marking dawn on first day of earth’s creation and symbolizing a narrative of God’s creative power.

As discussed in Chapter 3, the day of creation was a topic of debate in rabbinic works, including the second–third century *Seder Olam*. The debate focused on whether the world was created on 1 Nissan (vernal equinox) or 1 Tishrei (autumnal equinox).⁶⁷ Whichever date one

⁶⁶ y. Ber. 1:9.

⁶⁷ *Seder Olam: The Rabbinic View of Biblical Chronology*, trans. Heinrich Guggenheimer (New York: Roman and Littlefield Publishers), 4; b. Roš. Haš. 10b-11a; y. Roš. Haš. 1-2.

viewed as correct, the sky would look the same: a waxing crescent moon on the first of the month with the sun either setting or rising, depending on how the day-night cycle was reckoned with creation.⁶⁸

The Helios-zodiac cycle in synagogues presents a *thema mundi* with the orientation of the heavenly bodies—including the zodiac—at the moment of creation. This moment could reflect the fourth day of creation and start of the calendar when the heavenly bodies were placed in the sky, or it could represent an iconographic, Romanized amalgam of the Jewish creation account whose goal was to use standard Greco-Roman motifs to depict the biblical account of creation.⁶⁹ The zodiac cycle, to which I now turn, emphasizes the zodiac sign Aries, which corresponds to the month of Nissan.

5.4.2 The Zodiac Cycle

The synagogue zodiac cycle represents the recurring, orderly progress of time, reflecting other Greco-Roman depictions of the zodiac from the second–fifth centuries surveyed in Chapter 4. The zodiac cycle in the synagogue serves thematically as a celestial backdrop for the moment of creation. In the chart below, I provide a comparison of the zodiac cycles in synagogues to structure the ensuing discussion. The comparison includes the direction of zodiac progression (clockwise or counterclockwise), the orientation of the zodiac cycle (30-minute or 1-hour), the

⁶⁸ Rachel Elijor has argued that a solar calendar used by the First and/or Second Temple priests observed the start of day in the morning. See Elijor, *The Three Temples: On the Emergence of Jewish Mysticism* (2004), 85.

⁶⁹ Gen 1:14-18.

sign in the right-most position, and the century of synagogue construction. Any bracketed zodiac figure signifies the most likely figure to be in the given position, though the figure did not survive. Hyphens in the chart signify that too little of the Helios-zodiac cycle remains to reconstruct the zodiac cycle. En Gedi is included with an asterisk because it is not a cycle but an inscriptional list of the zodiac signs and month names.

Synagogue	Progression	Positions	Sign at 2:30/3:00	Date (By Century)
Beth Alpha	Counterclockwise	30-minute	Taurus	Sixth
Sepphoris	Clockwise	30-minute	Libra	Early Fifth
Hammath Tiberias	Counterclockwise	30-minute	Capricorn	Late Fourth-Early Fifth
Huqoq	Clockwise	1-hour	[Gemini]	Early Fifth
Na'aran	Clockwise	30-minute	Taurus	Fifth
Huseifa	Clockwise	30-minute	[Leo]	Late Fifth
Yafia	-	-	-	Fourth-Fifth
Wadi Hamam	-	-	-	Early fourth (Leibner) Late Fourth (Magness)
Susiya	-	-	-	Fifth-Sixth
*En Gedi	Counterclockwise	n/a	Aries	Second Half of Fifth Century

Of the seven synagogues with enough of the zodiac cycle preserved to determine the general arrangement of the signs, four cycles progress clockwise while three progress counterclockwise. This directionality, as discussed in Chapter 3, reflects a variety of possible

cosmological views. The counterclockwise progression imitates the relative position of the zodiac in the sky as observed from earth. The clockwise progression is a mirror image of the zodiac, which could represent the cycle as viewed by an outside observer from the heavenly realm or a mirror image of the cosmos as described by Eudoxus of Cnidos and displayed in the Farnese Atlas.⁷⁰ The clockwise/counterclockwise zodiac progression is reflected in the various Greco-Roman depictions of the zodiac in Chapter 4. For example, the zodiac cycles of the Astypalaea bathhouse and Spartan triclinium progress counterclockwise whereas the Walbrook Tauroctony zodiac progresses clockwise.

Of interest in the progression of many of the synagogue zodiac cycles is the position of Aries. At Beth Alpha, Aries is the “ascendant zodiac” in the right most position in the cycle with the cycle progressing counterclockwise. At Sepphoris, Aries is the “ascendant zodiac” in the left most position with the cycle progressing clockwise. At En Gedi, Aries is the first name appearing in the zodiac inscription. At Na’aran, Aries may be portrayed as the “ascendant zodiac” in the right most position, although the zodiac progresses clockwise. At Huqoq, Aries would have been portrayed as the “mid-heaven zodiac” sharing the highest spot in the cycle with Pisces. 0.

Aries represents the month of Nissan, which is indicated in a partially preserved inscription in the Sepphoris zodiac cycle and the En Gedi inscription. So, if the synagogue Helios medallions depict dawn on the first day of the month and many of the zodiac cycles in synagogues signify the importance of Aries, the specific date portrayed in the Helios-zodiac

⁷⁰ See Chapter 3, Figure 31.

cycle is likely 1 Nisan, which again is both the first day of the year and the day of creation in *Seder Olam Rabbah*, the Jerusalem Talmud, and the Babylonian Talmud.⁷¹

The significance of Aries for Jews is attested outside of ancient Palestine. In the second-century work *Tetrabiblos*, discussed in Chapter 2, Ptolemy of Alexandria associates specific zodiac signs and planets as ruling over geographic regions. Ptolemy assigns the zodiac Aries and planet Mars as rulers over Coele Syria, Idumea, and Judea because the people of these lands are, “bold, godless, and scheming.”⁷² The accusation that Jews were “godless” is prevalent in the ancient world, and it appears Ptolemy’s characterization is aimed specifically at Jews.⁷³ Ptolemy likely was aware that Aries/Nissan was significant to Jews, and his assignment of Aries as ruling over them should be understood as his interpretation of an already established tradition.

Another aspect of the zodiac that warrants discussion is the possibility that the zodiac signifies the twelve tribes of Israel. As discussed in Chapter 2, Exodus 28 equates each stone of the High Priest’s breast plate with one of the twelve tribes of Israel. Josephus equates the same stones with the twelve signs of the zodiac.⁷⁴ Josephus wrote nearly two centuries prior to the first known depictions of the Helios-zodiac cycle in synagogues. If a cosmological priestly interpretation of the temple existed in the second century, such interpretations might have been

⁷¹ b. Roš. Haš. 10b-11a; y. Roš. Haš. 1-2; *Seder Olam Rabbah* 4.

⁷² Greek: θρασεῖς τέ εἰσι καὶ ἄθεοι καὶ ἐπιβουλευτικοί; Ptolemy, *Tetrabiblos* 2.3

⁷³ See Josephus, *Against Apion* in *The Life. Against Apion*, trans. H. St. J. Thackeray. LCL 186 (Cambridge, MA: Harvard University Press, 1926), 2.15.

⁷⁴ Josephus, *Antiquities*, 3:179-187; Exodus 28:15-30.

incorporated into synagogues beginning in the fourth century. Sukenik identified the twelve roundels of the Yafia synagogue as symbols associated with the twelve tribes of Israel. I argue in Chapter 3, however, that Sukenik misinterpreted the symbols of Aries and Taurus, which are best understood as signs of the zodiac similar to those at Huqoq and Wadi Hamam. While the zodiac as representative of the tribes of Israel is an intriguing possibility, too little evidence currently exists to support the hypothesis.

5.4.3 The Seasons

Of the nine synagogue mosaics that contain Helios-zodiac cycles with personified seasons, four—Beth Alpha, Sepphoris, Hammath Tiberias, and Na'aran—preserve enough to allow the identification of a counterclockwise chronological progression of the seasons. Furthermore, the synagogues of Beth Alpha, Sepphoris, Hammath Tiberias, Na'aran, and Huseifa personify the seasons as the Horai—the seasonal goddesses. The Huqoq synagogue personifies its seasons as the Anemoi—the seasonal wind gods. Personifications of the seasons as the Horai and the Anemoi were prevalent in antiquity, as shown in Chapters 3 and Chapter 4.

The Horai originally were a triad of goddesses described in the *Iliad* as the daughters of Zeus and Themis, the sisters of the Moirai, and the keepers of Zeus's heavenly gates.⁷⁵ Ovid refers to three seasons as women in *Metamorphoses*, although he does not identify them with a general name such as “Horai.”⁷⁶ In the fourth-fifth centuries, Nonnus and Quintus Smyrnaeus

⁷⁵ Homer, *Iliad, Volume I: Books 1-12*, trans. A. T. Murray, rev. William F. Wyatt, LCL 170 (Cambridge, MA: Harvard University Press, 1924), 5.749-751.

⁷⁶ Ovid, *Metamorphoses, Volume I: Books 1-8*, trans. Frank Justus Miller, rev. G. P. Goold, LCL 42 (Cambridge, MA: Harvard University Press, 1916), 2.34.

identify four Horai in their respective works, which I discussed in Chapter 3.

The Anemoi were originally depicted as a triad of wind gods that brought seasonal change throughout the year.⁷⁷ At some point, a fourth wind was added to the triad to reflect the quarterly division of the solar year. Mithraic tauroctonies, as shown in Chapter 4, often depicted the seasons as the Anemoi—winged males with gusts of wind blowing from their mouths. The only known Helios-zodiac cycle in a synagogue portraying the seasons as the Anemoi is Huqoq. The reason why the Anemoi are used instead of the Horai at Huqoq is impossible to determine without additional evidence. The importance of the seasonal personifications, however, lies in the division of the Helios-zodiac cycle into four quadrants, which reflects a solar calendar.

Four celestial seasons are described in *I Enoch* and in the *Tetrabiblos*. The author of *I Enoch* divides the year into four solar seasons of three months, totaling 91 days each and resulting in a 364-day solar year. A season in *I Enoch* is the traversal of the sun from equinox to solstice and solstice to equinox. Ptolemy establishes the same seasonal divide in *Tetrabiblos*, although he does not attribute any set number of days to the seasons.⁷⁸

Whether using the Horai or Anemoi, the seasons in the Helios-zodiac cycles in synagogues divide the cycle into four quadrants, reflecting the celestial path of the sun from equinox to solstice and solstice to equinox.

⁷⁷ Hesiod, *Theogony*, 368, 869.

⁷⁸ Ptolemy, *Tetrabiblos*, 1.10-11.

5.5 The Location of the Helios-Zodiac Cycle and Creation

The centrality of creation is reflected in the physical location of the Helios-zodiac cycle in or near the center of each synagogue's hall. Most often, the cycle is flanked above and/or below by mosaic panels. At Beth Alpha, the Helios-zodiac cycle is flanked by the scene of the *'Aqedah* below and by a scene of the Ark of the Covenant in the Holy of Holies above. At Hammath Tiberias, the cycle is flanked below by a series of inscriptions and above by the Holy of Holies. At Sepphoris, the cycle is flanked below by Abrahamic scenes—including the *'Aqedah*—and above by scenes of the Tabernacle and the Holy of Holies. The Na'aran Helios-zodiac cycle is flanked above by the Holy of Holies and below by a geometric carpet. The Huqoq Helios-zodiac cycle is flanked above by a scene of the destruction of Pharaoh's army in the Sea of Reeds and below by a scene of Jonah being swallowed by three successively larger fish. Too little survives of the Wadi Hamam, Huseifa, and Yafia mosaics to know which scenes flanked their Helios-zodiac cycles, but they likely were meant to tell a holistic narrative with the Helios-zodiac cycle as the literal and metaphorical center of the narrative. The multiple depictions of the *'Aqedah* and Holy of Holies alongside the Helios-zodiac cycle suggests an interpretation of the Helios-zodiac cycle in conjunction with these narratives.

In the temple scenes depicted in synagogue mosaics, *menorot* and temple implements flank a central ark. The ark is a dual depiction, representing the Ark of the Covenant in the Jerusalem temple and the Torah shrine that would have stood in the synagogue building, just above the temple mosaic panel. In rabbinic literature, the Ark of the Covenant sat on top of a

rock named שתייה (*shetiyah*) out of which the world was created.⁷⁹ The significance of the *shetiyah* also appears in a fourth-century Christian pilgrim journal. When the pilgrim visits the temple mount, he sees the following:

There are two statues of Hadrian, and not far from the statues there is a perforated stone to which the Jews come every year and anoint it, bewail themselves with groans, rend their garments, and so depart.⁸⁰

The scene of the temple as the center of the universe further contextualizes the Helios-zodiac cycle as a type of *thema mundi* that not only portrays the moment of creation (i.e. 1 Nissan) but the temple mount as the locus of creation as well. According to rabbinic tradition, Abraham's sacrifice of Isaac on Mount Moriah occurred on the same stone where the Ark of the Covenant would one day rest and from which spot God created the universe.⁸¹ The *'Aqedah* and cultic scenes at Beth Alpha and Sepphoris, then, further contextualize the Helios-zodiac cycle as reflecting God's creative power and providence, emphasizing the Temple Mount as the center of the world.

Scenes like the *'Aqedah* and Holy of Holies provide an interpretive framework to understand the Helios-zodiac cycle as a distinct motif of the creation of the cosmos. Whether or not the Helios-zodiac cycle appears alongside temple or biblical scenes, the message conveyed by the Helios-zodiac cycle is that the God of the Jews created the universe with the Temple

⁷⁹ b. Yoma 54b; y. Yoma 5:3

⁸⁰ *Itinerary from Bordeaux to Jerusalem: The Bordeaux Pilgrim: 333 A.D.*, trans. Aubrey Stewart (London: Adelphi, 1887), 21-22.

⁸¹ y. Senhedrin 1:3; *Genesis Rabbah* 39:8, 55:7.

Mount as the pivot of the cosmos. Furthermore, the fact that the synagogue Helios-zodiac cycle represented not only creation but the Temple Mount as the center of creation is a key reason why the Helios-zodiac cycle does not appear in Late Roman-Byzantine Christian churches, since the Temple Mount was of no significance to Late Roman-Byzantine Christianity.

The Helios-zodiac cycle as a *thema mundi* presents the synagogue as a type of re-conceived temple. Steven Fine describes the “templization” of the synagogue as *imitatio templi*, arguing that rabbinic sages characterized the synagogue as an institution which connected sacred space and sacred time from the temple’s destruction to a future messianic reconstruction.⁸² These rabbinic characterizations should be viewed as descriptive and prescriptive, as they reflect the physical reality of the synagogue but inject a rabbinic hope of a future, messianic temple into the depiction of the synagogue. The Helios-zodiac cycle, then, presents the cosmos as the creative effort of God and the history of Israel as a providential aspect of that creation.

In the concluding chapter, I have shown that Judaism—like Christianity—developed its cosmic iconography from a Greco-Roman cultural milieu. Unlike Christianity, however, Judaism transformed the Greco-Roman Helios-zodiac cycle into a motif that presented its God as the creator of the universe with the Temple Mount as the center of that universe. Furthermore, the synagogue Helios-zodiac cycle emphasizes the role of the sun in keeping orderly, cosmic time, although the moon is still used as the cosmic body for reckoning the new month. The presentation of the Helios-zodiac cycle in synagogues, often in conjunction with other Jewish

⁸² Fine, *Art and Judaism in the Roman World: Toward a New Jewish Archaeology: Revised Edition* (New York: Cambridge University Press, 2012), 209; *This Holy Place: On the Sanctity of the Synagogue during the Greco-Roman Period* (Notre Dame, IN: Notre Dame University Press, 1997), 79-94.

narratives, presents the totality of time and space as the creation of the God of the Jews.

At the outset of this dissertation, I established three goals: (1) to identify narratives of Jewish cosmological thought/practice, (2) to contextualize the synagogue Helios-zodiac cycles with Jewish cosmological thought/practice and comparable Greco-Roman material, and (3) to examine archaeoastronomical evidence for synagogue orientation and the appearance of the Helios-zodiac cycle.

I addressed the first goal in Chapters 2 and 3 by showing that Jewish texts and synagogue Helios-zodiac cycles actively participated in Greco-Roman astronomical knowledge. I addressed the second goal in Chapter 4 by contextualizing the Helios-zodiac cycle in synagogues with its multivalent use in the Greco-Roman world. I addressed the third goal in Chapter 3, where I explored possible solar alignment in the ancient synagogue. My archaeoastronomical analysis does not shed light on how ancient congregants experienced the synagogue. However, it does suggest the possible orientation of individual synagogues to face the rising sun in imitation of the Jerusalem temple or to use sunlight in the building akin to other ancient structures such as the *Domus Aurea*, the Pantheon, and the Caesarea Mithraeum.

It has been my goal in this dissertation to demonstrate that the synagogue Helios-zodiac cycle combined Greco-Roman astronomical knowledge with Jewish traditions to create a Jewish cosmological narrative of God's creative power. By compiling Jewish and Greco-Roman evidence into a single study, along with introducing a digital methodology for analyzing synagogue orientation, I hope to have contributed to the cosmological understanding of late antique Judaism.

APPENDIX

In this appendix, I provide instructions on how to access and operate the digital component of this project as well as a detailed summary of how each component was made.

Access

Because there is not a central academic hosting platform for 3D media and data generated from 3D models, I rely on external hosting for the dissertation's digital data. All the data generated for this dissertation can be accessed at the following links in the chart below:

Content	Platform	Website
Photogrammetric synagogue models	Sketchfab	https://skfb.ly/WBHQ
Orthographic synagogue photos	Flickr	https://flic.kr/s/aHskTQnvab
Planetarium software	Stellarium	https://stellarium.org/
Synagogue planetarium data	Google Drive	http://bit.ly/2TWU2U1
Synagogue planetarium data (backup)	Carolina Digital Repository	https://cdr.lib.unc.edu/collections/c247dx48q?locale=en

The synagogue files made to be imported into Stellarium can be downloaded through Google Drive as a single folder titled “scenery3d”. This folder can then replace the “scenery3d” folder in the Stellarium directory to access the synagogue models within Stellarium. If the Google Drive link goes down, the files are also accessible through the UNC Digital Repository, though they will need to be unzipped before being added to the Stellarium folder.

Photogrammetry

Photogrammetric modeling/photogrammetry is the process of photographing a site or object and generating a referenced, measurable model of the subject from those photos. After making a photogrammetric model, a user can render a rectified image of the model from any angle, including an aerial shot, otherwise known as an orthophoto. I use my work at Beth Alpha as an example of how a photogrammetric model and orthophoto are generated

The photogrammetry project at Beth Alpha began with the taking of 200 photographs of the synagogue's architectural remains and mosaic floor using a DSLR camera. Each image was then loaded into the photogrammetry program Agisoft Metashape.

To create models, Agisoft Metashape uses a set of algorithms that examines and compares every portion of each picture to each portion of every other picture. The program detects and traces identical features of an object from photo-to-photo, such as the corners of a door. After identifying and tracing points—often numbering in the thousands—between photos, the software combines those points in three dimensions, creating a point cloud and then a 3D model. At this point in the process, known dimensions and GIS points can be used to ensure the final model is scaled accurately.

Once I completed the Beth Alpha synagogue photogrammetry model, I generated an orthophoto from within Metashape. I then exported the model as an OBJ file and exported the orthophoto as a JPEG.

3D Modeling

As in the previous section on photogrammetry, I use the ancient synagogue of Beth Alpha as an example to describe the methodology for 3D modeling ancient environments. The

modeling of the Beth Alpha synagogue relied on a close reading of Sukenik's excavation report with an eye to details that relayed the dimensions and styles of recovered architectural features. Architectural top plans of Beth Alpha were scanned and loaded into AutoCAD, a drafting software application. With the architectural top-plans loaded, a correct scale for the model was set and each feature of the structure (e.g. walls, benches, columns, etc.) was traced and extruded in three dimensions.

The next step in the modeling process was to export the scaled base model from the drafting software into a 3D modeling program. The drafting software is ideal for producing generic details, but a 3D modeling program is required to fine-tune the model and add unique aspects, such as fine details, animations, and textures. The open-source 3D modeling platform Blender was used for this step. Many of these models were stripped of their detail and re-sized with walls set to a height of 50 cm so that celestial observations could be made once the models were added to the open-source planetarium software Stellarium.

Stellarium

I used Stellarium 0.19.3 and the plugin "3D Sceneries" to analyze potential solar alignment of synagogue art architecture. Each model exported for use in Stellarium required an initialization file titled, "scenery3d.ini". Each initialization file included the following parameters: name of synagogue, GIS coordinates of synagogue, and orientation of synagogue. All GIS data, including relative elevations, was generated using Google Earth.

To open the synagogue files in the Planetarium software, please follow the Google Drive link above to download the folder "scenery3d". This folder contains ten subfolders, each named after the synagogue discussed in this dissertation. Each folder contains an OBJ 3D model file, a

MTL material file, a texture, an initialization file, and a TXT file of instructions that are rendered within the model once opened in Stellarium. Once downloaded, move the “scenery3d” file to the Stellarium main folder, which can be accessed on a PC by going to “This PC” → D: (or whatever your install drive might be) → Program Files → Stellarium. If you do not see a folder labeled “scenery3d”, follow the instructions in the images below and then complete these steps again. If you do see a folder labeled “scenery3d,” replace it with the new “scenery3d” folder just downloaded from Google Drive.

In case the Google Drive folder is not accessible, all files for each synagogue can be downloaded through the Carolina Digital Repository Link. Each set of files should be placed in a separate folder once downloaded. All folders should then be placed in a new folder titled, “scenery3D,” which should then be added to the Stellarium directory as directed above.

Once the files are opened in the software, users stand inside the synagogue models with a first-person perspective. The date and time of day can be edited by following instructions in Figure 54 below.

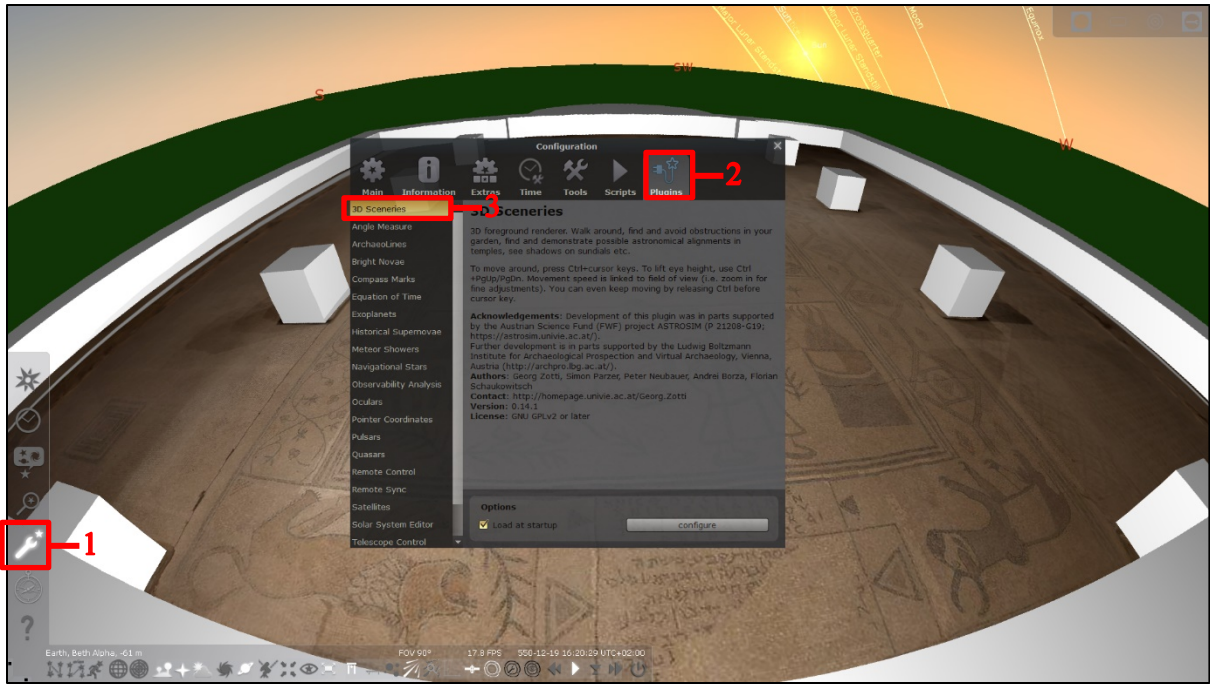


Figure 51. Once opened, select the wrench icon in the left menu (1), select the "Plugins" option (2), select "3D Sceneries" (3), check "Load at Startup" (4). The software may need to be restarted.

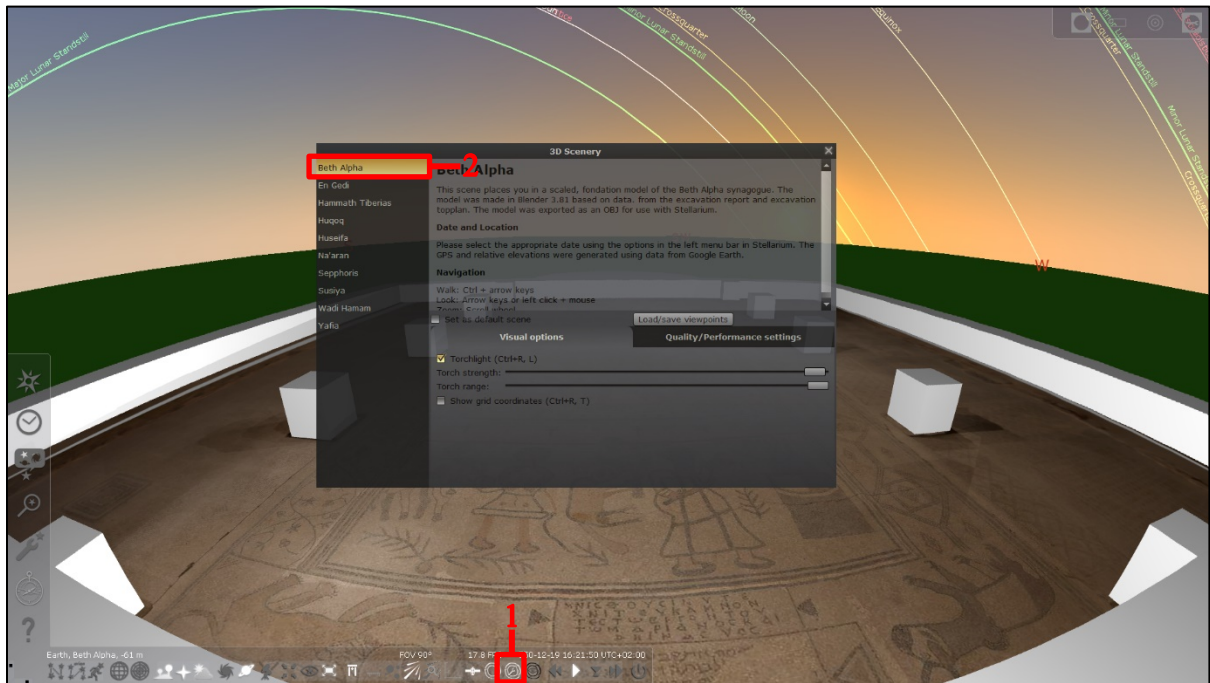


Figure 52. Select the "3D Scenery" option in the lower menu (1), choose which synagogue to view (2). The synagogue will load at this point. You can follow the on-screen instructions on navigating the model.

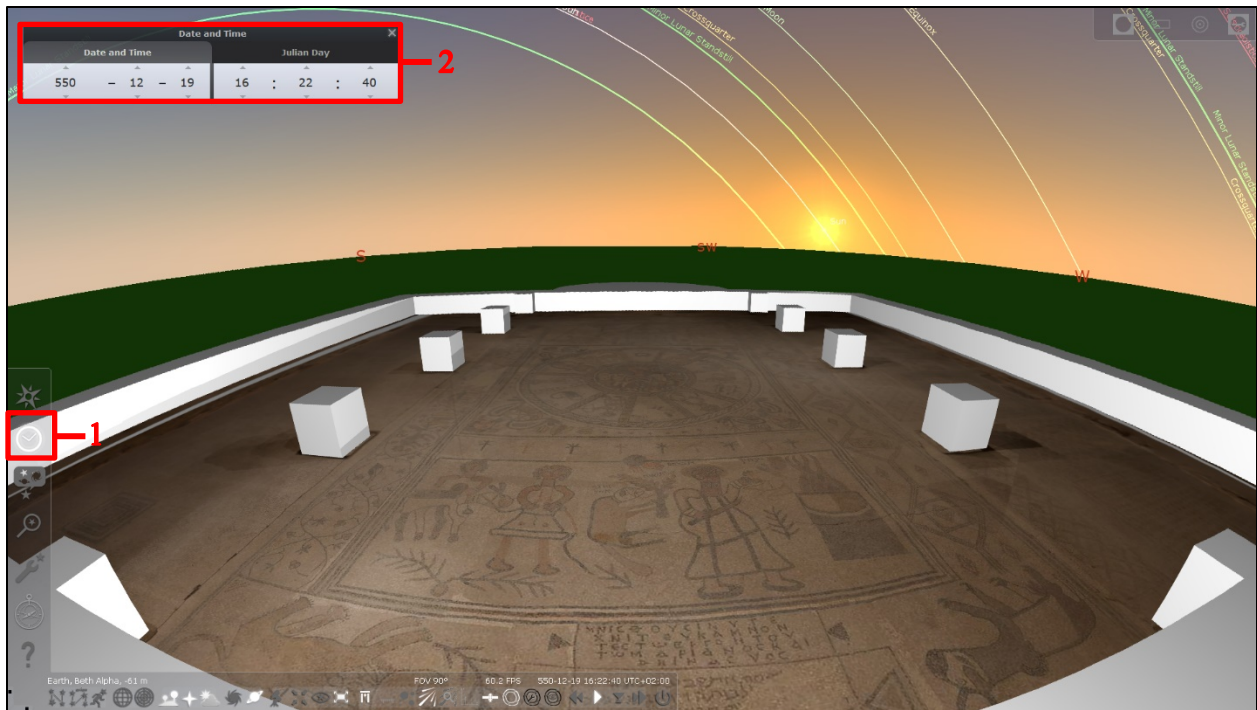


Figure 53. To edit the date and time, select ‘Date/time window’ (1) and edit the year, month, day, and time (2).

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