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THE ASTROLOGER'S APPARATUS: A PICTURE OF PROFESSIONAL PRACTICE IN GRECO-ROMAN EGYPT

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Introduction

While personal, natal astrology was certainly of Babylonian origin, as, indeed, many Greek and Roman writers claimed, it was enthusiastically embraced by the Greeks in Egypt during the late Ptolemaic and Roman periods. In Egypt, Greek writers elaborated the basic astrological principles borrowed from the Mesopotamians into a complex system. Elements taken from the Babylonians include the zodiac signs themselves (already borrowed much earlier by the Greeks), the grouping of the signs into triangles (or “triplicities” in modern astrological jargon), the dodecatemoria (which involve subdivisions of the signs), and the doctrine of beneficent and maleficent planets.¹

A major difference between the personal astrology of the Babylonians and that of the Greeks is that the Babylonians made no use of the four *centres* fixed with respect to the horizon — the horoscopic point (or “ascendant”), mid-heaven, setting point, and under-earth — that play an essential role in Greek astrology. Indeed, the *horoskopos*, which for the Greeks meant the rising point of the ecliptic, was so important that it came eventually to stand for the entire chart or method by which forecasts are made. Closely associated with the centres are the twelve *places* fixed with respect to the horizon. Other contributions that appear to be thoroughly Greek include the designation of a pair of zodiac signs as the solar and lunar houses of a planet and — most characteristically — the rationalization of the whole system in terms of natural philosophy.²

Interest in astrology grew rapidly in the first century B.C. as attested by the references to astrology in the Greek and Roman literature of this period. Extensive treatises of astrology were written in Greek and Latin. The oldest extant systematic work is the Latin *Astronomica* of Manilius, written in verse in the first century A.D. Other important extant works include the *Carmen* of Dorotheus of Sidon (first century A.D.), which survives only in a medieval Arabic translation, Ptolemy's *Tetrabiblos* (second century), which is the most rationalized and “scientific” of all ancient treatments of the subject, the *Anthologies* of Vettius Valens (second century), and the Latin *Mathesis* of Firmicus Maternus (fourth century).³ We have also nearly three hundred Greek horoscopes in the astrological writers, as well as in the papyri. The oldest extant Greek horoscopes are for the first century B.C. but the great bulk of them come from the first five centuries of our own era.⁴

The rapidly developing array of astrological doctrines also incorporated native Egyptian elements. The most obvious example of Egyptian influence is the use of the decans. These thirty-six star groups, so characteristic of early Egyptian astronomy,

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were originally used to tell time at night. But in Greek astrology, the decans are simply an alternative fine division of the zodiac. Each zodiac sign is divided into three decans, each 10° wide and with its own magical or divine name. Another astrological doctrine with Egyptian roots is the *dodecaoros*, according to which an Egyptian constellation is associated with each sign of the Greco-Babylonian zodiac. Half-a-dozen ceiling zodiacs in Egyptian temples suggest that these temples were important (though not the only) loci of the practice of astrology. Finally, Demotic horoscopes written on ostraca, though few in number, testify directly to the practice of astrology in the Egyptian language.⁵ Thus, the story of the emergence of astrology in Egypt is complex and is only imperfectly understood: Mesopotamian doctrines were elaborated and embellished in a bilingual culture of Greeks and Egyptians. The difficulty of sorting it out is compounded by the propensity of late Greek writers to somewhat overstate the importance of the Egyptian background. For example, Greek astrological writers were fond of attributing the invention of their art to Nechepso and Petosiris. Nechepso was a king of Egypt and Petosiris was a high priest. According to Manetho, Nechepso was the third king of the twenty-sixth dynasty, which puts him in the seventh century B.C. In fact, horoscopic astrology did not exist at so early a date. It appears, then, that an astrological tract, written in Greek, circulated in Egypt under the spurious names of Nechepso and Petosiris, in the second or first century B.C. Our main source for the astrology of Nechepso and Petosiris is Vettius Valens, who cites them many times, often referring to Nechepso simply as “the king”.⁶

In later Antiquity astrology was but one way of reducing uncertainty about the future and it competed with many other arts. A famous testimony to this fact comes from the *Alexander romance*. This Greek adventure novel, falsely attributed to Callisthenes, exists in several versions, the earliest of which survives in a single manuscript of the third century A.D. In the story, the last king of Egypt, Nectanebo, has foreseen by magic arts that the Persians will conquer his nation. He therefore leaves Egypt and flees to Macedon, where he becomes the advisor of Queen Olympias. It is Nectanebo who, by tricking the queen during one of Philip’s absences, actually fathers Alexander the Great. When the queen asks him to divine the future, Nectanebo replies:

There is a wide choice of method, O Queen. There are horoscope casters, sign solvers, dream specialists, oracular ventriloquists, bird observers, birth-date examiners, and those called magi, who have the gift of prophecy.⁷

It is possible to view the rise of astrology in the Hellenistic world as one symptom, among many, of what Festugière called “the decline of rationalism”.⁸ However, it is important to remember that divination was from remotest times a part of the Greek world view. To some extent, the rise of astrology was a natural consequence of the contact of a receptive Greek audience with eastern wisdom. Moreover, astrology expanded into a partial vacuum left by the decline of the traditional temple oracle. The ancients seem to have realized this themselves. By the end of the first century A.D., the traditional oracles had so declined in Greece that Plutarch attempted to

explain why.⁹ In the second century, Juvenal, in his satire of Roman women, complained that they were especially susceptible to astrologers, for the following reason: "Now that the oracles of Delphi are dumb, mankind is condemned to darkness about the future."¹⁰ In Egypt, the situation was more complex; but transformations of the temple culture resulted in opportunities for astrology within the temples themselves.¹¹ Finally, astrology flourished in Greco-Roman Egypt because it resonated strongly with many other fields of activity: philosophy, Hermetism, traditional religion, magic, and mathematics.

We know a substantial amount about astrological doctrine, but very little about the details of astrological practice. No astrological text tells us in detail how an astrological consultation took place. Who were the practitioners? Where did they practise? What apparatus did they use? In this article I shall show that, by drawing on a wider range of sources, including literary texts, papyri, engraved gems, statuary and mummy portraits, we can sketch a surprisingly detailed picture of the professional practice of astrology in Greek Egypt in the second century A.D.

Two Puzzles from the Papyri and Their Import

The horoscopes on papyrus are particularly significant for the reconstruction of the ancient practice of astrology, because they come to us right out of the ground, without having passed through the hands of systematizers or textbook writers. But the papyrus horoscopes present two puzzles.

First, the horoscopes found on papyrus usually offer no interpretation but limit themselves to bare statement of the astronomical facts, i.e., the positions of the Sun, Moon, planets, and horoscopic point. By contrast, the literary horoscopes (those included as examples in extended treatises, such as the *Anthologies* of Vettius Valens or the *Carmen* of Dorotheus of Sidon) often provide detailed interpretation.

Second, the papyrus horoscopes almost never contain diagrams. It is difficult to see how an astrologer could make a detailed analysis without some sort of visual representation, for the number of positions and relationships that must be taken into account is quite large. The astrologer must note in which sign of the zodiac each planet is located (and even which part of the sign). He must note, as well, in which 'place' each planet is located (e.g., whether it is in the place of the horoscope, or the midheaven). Further, each planet's qualities or influences can be modified by its aspects with respect to the other planets.

These two facts about the papyrus horoscopes give us important clues about the professional practice of astrology. Many of the papyrus horoscopes are probably rough notes made by professional astrologers.¹² If this is so, it is easy to understand why there is rarely any written interpretation: the astrologer interpreted the horoscope orally to his client. Moreover, the astrologer must have displayed the planetary configurations using some sort of apparatus.

Thus we should imagine the following scenario in an astrological consultation. The astrologer worked out the positions of the Sun, Moon and planets in the zodiac at the

moment of the native's birth (or, less often, conception), using planetary tables. He also used a table of ascensions (or some equivalent thereof) to find the position of the horoscopic point. These positions were then displayed on a board, using stone or other markers to represent the planets. The use of stones engraved with names or figures of the planetary gods did not serve only to impress the client. They also allowed the astrologer to call upon the divine associations of the planets. And, if each stone was made of the substance proper to its planet, this allowed the astrologer to invoke the magical properties of the stones themselves. Finally, and perhaps most importantly, the apparatus allowed the astrologer to visualize the multiple relationships among the planets, signs and places.

The Astrologer's Board

One papyrus of the second or third century A.D. provides evidence that this was indeed the case, by mentioning a special board, apparently to be used by an astrologer in consultation with his clients. The astrologer lays out on the board particular stones to represent the Sun, Moon, planets, and horoscopic point:

... a voice comes to you speaking. Let the stars be set upon the board in accordance with [their] nature except for the Sun and the Moon. And let the Sun be golden, the Moon silver, Kronos of obsidian, Ares of reddish onyx, Aphrodite lapis lazuli veined with gold, Hermes turquoise; let Zeus be of (whitish?) stone, crystalline (?); and the horoscope, in accordance with (nature?) ... let it lie....
[PGM CX]¹³

The writer of this papyrus is clearly making a connection between the planets and the magical properties of stones. Probably, we should imagine the board as a circular diagram divided into zodiac signs. Some commentators have regarded the "voice" as incompatible with the technical astrological literature.¹⁴ However, it is worth pointing out that Petosiris was instructed in astrology by a voice that came to him from heaven in the darkness of the night.¹⁵ In *PGM CX*, then, either the astrologer or his client experiences a sort of auditory revelation. As this text is clearly addressed to the practitioner, it seems more likely that it is the astrologer himself who is guided by a divine voice.

A second attestation of an astrologer's board is found in the *Alexander romance*, which was mentioned above. In the A-version of the text, Nectanebo casts the nativity of Olympias, making use of some special apparatus:

While he said these things, he brought out a princely and costly board, which mere words could not describe, and put it on a chair. It was made from ivory, ebony, gold and silver and was engraved with three zones, having on the first circle the 36 decans, on the second the 12 signs of the zodiac, and on the inner one the Sun and Moon. Then he opened a small ivory box, poured out the seven stars and the horoscope made of eight artfully worked stones, and put together the miniature heaven, illuminating it in a small circle. The Sun was of crystal,

the Moon of adamant, Ares of haematite [hematite], Hermes of smaragdus, Zeus of air-stone, Aphrodite of lapis lazuli, Kronos of serpentine and the horoscope of white marble.¹⁶

The elaborate board described by the author of this passage might be regarded as a product of pure imagination — except that examples of just such boards have actually been found.

The most remarkable astrologers' boards that have come down to us are the astrological tablets of Grand, a village in Lorraine. The name of the village is a corruption of Grannus, the name of the Celtic or Gallic god more or less identified with Apollo. At Grand was a sanctuary dedicated to Apollo Grannus, which included baths and elaborate water works, gardens, a temple, a basilica and an amphitheatre. Major construction on the site dates from the first century A.D., but there were additions and restorations later in Antiquity and the sanctuary was still flourishing in the early fourth century. The sanctuary of Grand was a place where pilgrims sought cures for medical troubles and direction from the god. The astrological tablets, made of ivory, were found in pieces at the bottom of a well excavated in 1967.¹⁷

According to Jean-Paul Bertaux, who has analysed the pottery fragments found at the same level in the well, the tablets were destroyed around A.D. 170.¹⁸ It is clear that the destruction was deliberate and methodical: they were smashed into hundreds of pieces (188 fragments were recovered) and thrown down the well, after which stones were thrown down on top of them. Moreover, the well selected was located outside the walls, at some remove from the sanctuary, which may also suggest deliberation. Bertaux points out that the date he has assigned to the destruction of the tablets corresponds to a period of troubles in eastern Gaul. However, the methodical destruction is reminiscent of the destruction of Mithraic shrines, and their conversion to Christian churches, at a somewhat later time. For example, the large cult relief of Mithras at the mithraeum of Koenigshoffen/Strasbourg (not far from Grand) was smashed into at least 360 pieces, perhaps early in the fourth century.¹⁹ Thus, we might suppose that the destruction of the astrological tablets of Grand was the expression, not of someone's philosophical opposition to astrology, but of someone's sense of religious outrage.

When reconstructed, the astrological tablets from the well at Grand proved to be four in number, forming two very similar diptychs. One of the diptychs (called A) is now in the Musée des Antiquités Nationales at Saint-Germain-en-Laye, the other (B) is in the Musée Départemental d'Art Ancien et Contemporain at Epinal (Vosges). Figure 1 shows a view of diptych A. The outer ring of figures carries the thirty-six decans. Inside this is a ring devoted to the zodiac signs. In the centre are busts of the Sun and the Moon. When examined in person, the engravings still show remnants of the colours (red, green, and blue) that were applied to them. According to Bertaux, these colours have substantially faded since the tablets were unearthed in 1967. Moreover, a few small areas of the tablets are decorated with gold leaf, as may be seen in Plate I. It is likely that originally there was considerably more gold leaf, but that much of it flaked off when the tablets were snapped into fragments. The

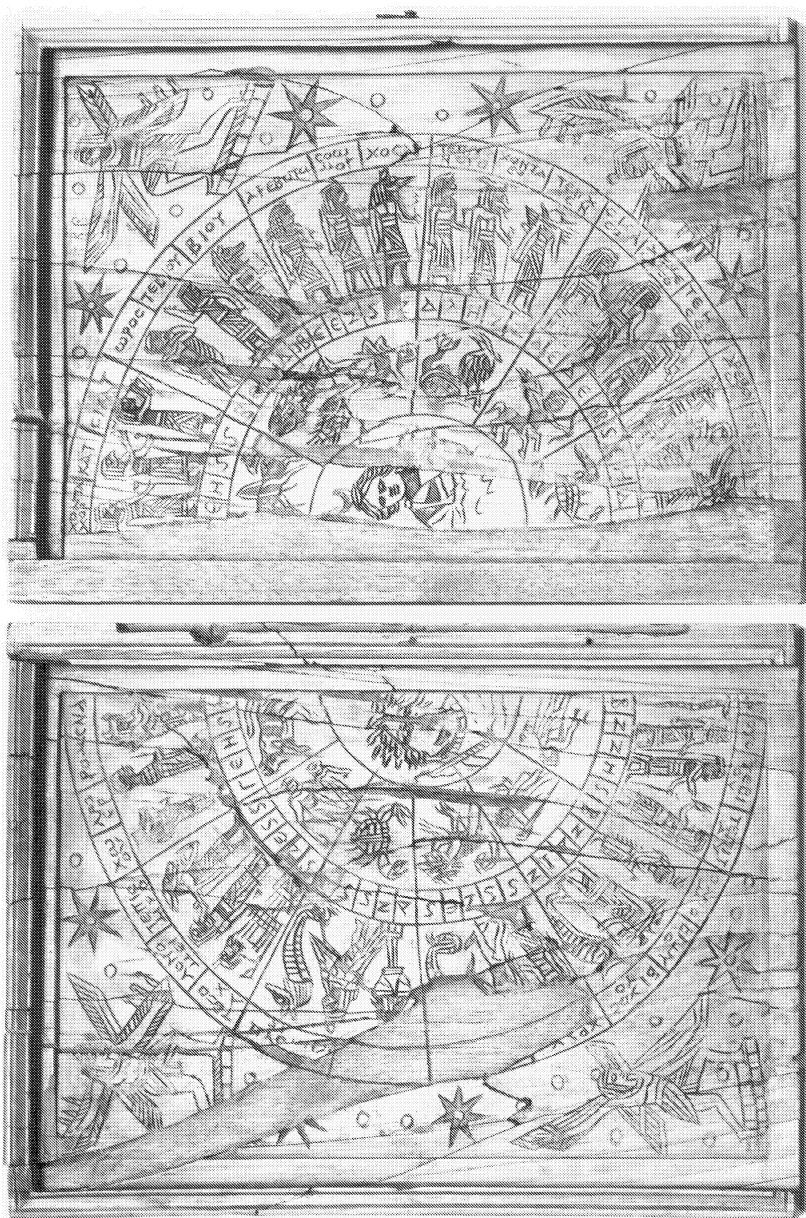


FIG. 1. An ivory astrological board from Grand (Vosges). 28.2 × 19.4 cm, 2nd century A.D. Starting from the outside, the concentric rings show: names of the decans in Greek, figures of the decans, the terms expressed in Greek numerals, the zodiac, and, in the centre, decorative busts of Helios and Selene. Courtesy of Musée des Antiquités Nationales (Saint-Germain-en-Laye), no. inv. 83675.

resemblance between the astrological tablets of Grand and the board of Nectanebo, mentioned in the *Alexander romance*, is striking — even down to the materials (ivory and gold) of which the tablets were made.

In Figure 1, we see that the ring of the decans is two-fold. The outermost part of the ring carries the Egyptian names of the decans, written in Greek, while the inner part carries sketches of these divinities. Between the ring of the figures of the decans and the zodiac ring, we see another thin ring, divided into parts, so that there are five parts to each zodiac sign. These represent the *terms* — one more way of subdividing the zodiac in standard Greek astrology. Each sign is divided into five parts, each of which is ruled by one of the planets. There were several different ways of assigning the terms in Antiquity. The tablets of Grand adopt the system called “Egyptian” by Ptolemy.²⁰ This is not surprising, since the iconography of the tablets indeed suggests that they were manufactured in Greek Egypt. The forms and names of the decans are important evidence of the origin of the tablets. Also significant are the Egyptianizing forms of the four winds engraved in the corners.²¹

While the tablets of Grand are the most spectacular astrologers' boards preserved from Antiquity, they are not the only examples. The *tabula* Bianchini is a marble astrologer's board, found in fragments on the Aventine Hill in Rome in 1705, and now preserved in the Louvre. About one-fifth of the ancient marble board is extant (Figure 2). As we might expect, the Bianchini tablet consists of concentric rings, bearing zodiac signs, terms, and decans (as on the tablets of Grand). But there is also a rather mysterious inner ring that bears twelve animal figures which are not zodiac signs (more of this later). In the centre are images of the constellations of Draco and the Bears (rather than decorative busts of Helios and Selene such as we saw on the tablets from Grand). The system of terms adopted is again “Egyptian”, to judge by the extant terms (all those for Aries, and some of those for Taurus, Libra and Scorpius). Moreover, the corners of the tablet were graced with figures of the four winds, as on the tablets of Grand.²²

A remarkable feature of the Bianchini tablet is its double zodiac. That is, two identical zodiac rings are engraved, one within the other. There is a simple explanation of this feature in terms of standard Greek astrology. In investigating a potential marriage, the planetary configurations at the births of both the husband and wife must be displayed simultaneously. According to Ptolemy, it is especially important to examine the Moon in the man's nativity and the Sun in the woman's nativity. Naturally, the aspects of the husband's Moon to each of his planets must be taken into account, as must the aspects of the wife's Sun to each of her planets. So far, one might still imagine casting completely separate horoscopes. But then Ptolemy goes on to say, “Marriages for the most part are lasting when in both the genitures the luminaries happen to be in harmonious aspect, that is, in trine or in sextile with one another, ... and even more when the husband's Moon is in such aspect with the wife's Sun”.²³ How else might one display all this it but by using two zodiacs? Planetary markers for the husband could be set down on one zodiac ring, and planetary markers



FIG. 2. The Bianchini tablet (detail). Marble, second or third century A.D. Starting from the outside, the concentric rings show: planetary heads, decans, terms, first zodiac, second zodiac, a ring of twelve figures of the dodecaoros, and, in the centre, Draco and the Bears. Musée du Louvre, MA 540. Courtesy of Réunion des Musées Nationaux, photograph by Chuzeville.

for the wife set down on the other zodiac ring. All the pertinent information is thus displayed simultaneously, but without mixing up the separate planetary markers for the two births. A double zodiac would also be of use in any analysis involving friends or enemies.²⁴

Another interesting feature of the Bianchini tablet is its treatment of the decans. As we have seen, the tablets of Grand display the figures of the decans, as well as their names. On the Bianchini tablet, we have no names. However, outside the ring of decans is a ring of the heads of the seven planetary gods, meant to show which planet rules each decan. The planetary assignments follow the regular and repeating sequence: Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon — the ordinary Greek sequence of the planets in terms of their distances from the Earth. The artist, in order to make the planetary identifications clear, has supplemented each bust with an emblem — a sickle for Saturn, sceptre for Jupiter, spear for Mars, rays for the Sun, mirror for Venus, caduceus for Mercury, and a crescent for the Moon.

Finally, let us examine the innermost ring of animal figures on the Bianchini tablet. These represent an alternative, Egyptianizing form of the zodiac, based on a doctrine (mentioned above) known as dodecaoros.²⁵ The dodecaoros scheme associates an Egyptian constellation (not necessarily zodiacal) with each Greek zodiac sign. But because of the vagueness of the iconography of early Egyptian constellations, it is not possible to identify with certainty the star groups represented by the figures of the dodecaoros. Three of the twelve animal figures are completely preserved on the Bianchini tablet, along with parts of four others. Fortunately, a complete dodecaoros ring is figured on the Daressy tablet (discussed below). Moreover, the scheme is known from the *Liber Hermetis*, as well as from medieval astrological manuscripts that preserve fragments of the work of Teucer and Rhetorios.²⁶ Teucer (Teukros), who lived probably in the first century A.D., was an astrological writer particularly keen on incorporating Egyptian elements into Greek astrology. Rhetorios was a late (seventh-century) compiler of astrological doctrines.²⁷ The Egyptian roots of the dodecaoros may be seen plainly in several of the animals — an ibis (associated with Aquarius), a crocodile (Pisces), and a scarab (associated with Cancer). A magical gem in Berlin,²⁸ which has a crab on one side and a scarab on the other, no doubt reflects this same tradition. Finally, a serpent is associated with Gemini. The rather plain serpent on the Bianchini tablet is more clearly the serpent god Agathodaimon on the Daressy tablet.

The Daressy tablet offers the third clear-cut example of an astrologer's board. This marble disk, 22 cm in diameter, was seen by Georges Daressy around 1901 in a dealer's shop in Cairo. Its present location is unknown, but a squeeze taken by Daressy is preserved in Cairo at the Institut Français d'Archéologie Orientale. All the published photographs of the Daressy tablet are of this squeeze. Outermost is a zodiac ring. Inside this is a ring of the twelve animal figures of the dodecaoros, and innermost are busts of Helios and Selene. The iconography of the Daressy tablet suggests a date in the early empire.²⁹

Along with these three clear-cut examples, we might include, less certainly, the Tanis zodiac, found by Flinders Petrie during the excavation of a house at Tanis in Egypt. It too is dated to the early empire. This plaque of greenish glass, 13 inches square, was shattered into fragments and damaged by fire and only a small part of its decoration can be made out with certainty. However, it carried a ring of twelve zodiac signs, applied in gold leaf. Outside this was a ring of twelve painted male and female heads, whose significance is not clear. A central area inside the zodiac ring was decorated with gold leaf and paint, but the figures cannot be made out. The zodiac ring on a portable plaque could certainly have functioned as an astrologer's board, but paint and gold leaf applied to glass seems rather too delicate a combination for hard use. Perhaps this was only intended as decorative art.³⁰

The extant boards are made of lasting materials — ivory and stone, and perhaps glass. It is possible that astrologers who catered to less well-to-do clients made use of more ephemeral materials. A zodiac could be drawn on something as simple as a sheet of papyrus, as in Figure 9. (However, it should be emphasized that this diagram is part of a literary text. And, according to Alexander Jones, who has looked at as many astronomical papyri as anyone, isolated zodiac circles of this sort do not turn up among the astrological papyri.³¹) One other possibility should also be mentioned. Al-Uqlīdisī, a tenth-century Arabic mathematical writer at Damascus, disparages the use of the *takht* (a board covered with dust or sand) for making arithmetical calculations. Your fingers get dirty, and the results of your calculation may blow away in the wind. Moreover, says Al-Uqlīdisī, it is embarrassing to be caught using a *takht*, “for it is seen between the hands of the misbehaved who earn their living by astrology in the streets”. It is easy to imagine a similar practice centuries earlier in Roman Egypt. But such a board would have left few traces.³²

All the boards we have considered so far have been of the same basic type (let us call it Type 1). The board bears a zodiac circle divided into twelve parts, each decorated with the figure of one sign of the zodiac. Movable markers must be placed on the board to indicate the positions, not only of the planets, but also of the horoscopic point (and perhaps other “centres”, such as the midheaven). But one other possible design should be considered.

In this second possibility (Type 2), the board represents the frame of the local horizon and meridian. In this case, the four “centres” (horoscopic point, midheaven, setting point, and under-earth) would be represented by permanent features on the board. Stone markers to be placed by the astrologer would represent the Sun, Moon, and five planets, as well as at least some of the zodiac constellations. Diagrams in papyrus horoscopes are exceedingly rare. However, we do possess one that is very suggestive. In *P. Oxy.* 235, a horoscope for some time between A.D. 15 and 22 is accompanied by a simple diagram (Figure 3), in which the horizon and meridian are drawn as diameters of a circle. Several astrological diagrams of a similar type have been found as graffiti on the plastered walls of private houses at Dura-Europos (Figure 4).³³ The horoscope diagrams of Dura are for births in the years A.D. 176 and 219, and

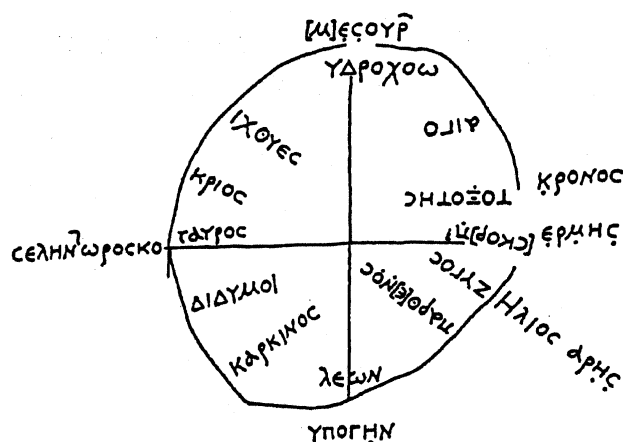


FIG. 3. Diagram in a papyrus horoscope of the first century A.D. The horizontal line represents the horizon, with horoscopic point at left and setting point at right. The vertical line represents the meridian. The horoscopic point, midheaven and under-earth are labelled. The names of the twelve zodiac signs are written in the places occupied by these signs two hours after sunset. The positions of the Moon, Sun, Ares, Hermes and Kronos are also indicated. Sketch by Neugebauer and Van Hoesen, *op. cit.* (ref. 4), after the diagram in *P. Oxy.* 235. Reproduced by permission of the American Philosophical Society.

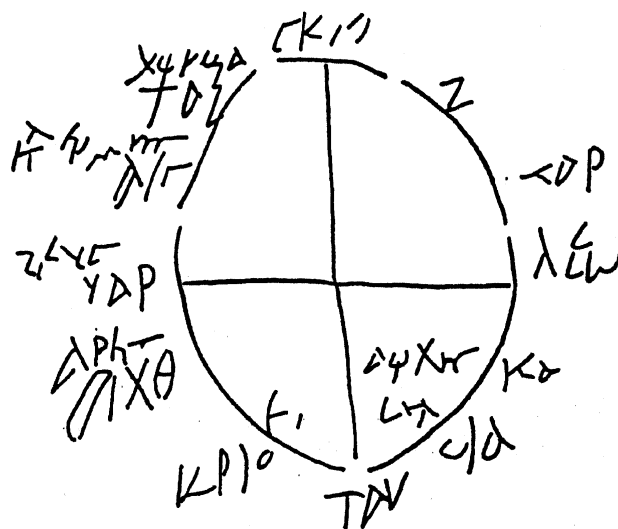


FIG. 4. Graffito horoscope diagram from a private house in Dura-Europos, for a birth date in A.D. 219. The horizon is the horizontal line, with the rising point to the left. The midheaven is at the top. All twelve zodiac signs are labelled, in abbreviated form, with Aries the ram (κριο[ς]) at the 7 o'clock position and Taurus at the bottom. The positions of most of the planets are also indicated. The Moon is represented by the crescent just to the left of the label for Pisces (ιχθ[υες]). From Bauer, *Excavations at Dura-Europos: Fourth season* (ref. 33).

there is one other for a date in the middle of the third century. Thus, the simple design of Figure 3 seems to have been based upon a standard convention. It is possible that these diagrams were modelled on an astrologer's board of the second type. Thus, the board might be as simple as a circle cut by two perpendicular diameters. In Figures 3 and 4, it is important to note that the signs do not constitute permanent features, but are added to the basic frame in the same way that the planets are. The makers of these diagrams clearly thought first of the four centres, which they therefore drew first and which constitute the only fixed features of this standardized figure. But we should also keep open the possibility that a more elaborate version of a Type-2 board could have been divided further to indicate the places.³⁴

No astrologer's board of the second type is known to me. But it seems possible that boards of such design might be found engraved on the floors or roofs (not ceilings) of temples. They would be extremely simple in form. If such a board is found, it will be important to distinguish it from a game board.³⁵ Substantial numbers of eight-sided graffiti game boards are known from the Roman period. They are found, for example, on the steps of the Basilica Iulia in the Roman forum. A popular two-person game of the period involved moving counters on such a diagram, with the goal of getting three counters in a row.³⁶ I do not suggest that these eight-sided graffiti boards are really astrological — but it is worth mentioning that among the Romans a system of eight, rather than twelve, places may sometimes have been favoured.³⁷ Astrology was occasionally suppressed in Rome. I suppose it would have been possible for a surreptitious astrologer of the forum to make use of an eight-sided diagram in a pinch, either by focusing on the four centres, or by using a system of eight places. But, in view of the history of game boards, we will only be sure of having found an astrologer's board of the second type when we find one that resembles Figures 3 and 4 or else is divided into twelve parts.

I have stressed that the astrologer's board serves a genuine function. It helps the astrologer visualize the many relationships that must be taken into account — of the planets to the zodiac signs, of the planets to the horizon, and of the planets to one another. Moreover, the use of divine images — of the decans on the astrological tablets of Grand and of the planetary gods on stone markers — allows the astrologer to invoke the gods. And this is the ultimate meaning of magic, to compel the gods to assist the practitioner. Finally, the materials of which the apparatus was composed themselves had magical associations. Most especially, each planet was associated with particular stones.

Besides all this, we should keep one other psychological aspect in mind. The client would certainly have expected some sort of apparatus to be used. Many of the older forms of divination required ritual readings of particular objects. This was notably the case with extispicy (the reading of entrails). And, to come to the period of the objects we have just examined, the Greek magical papyri are full of recipes for potions and directions for operations on objects.³⁸ Thus the astrologers' boards have affinities with magic and with other kinds of divination apparatus. Some of



PLATE I. One side of an ivory astrologer's tablet from Grand. This is the Helios side of the diptych shown in Fig. 1. Several traces of gold leaf decoration can still be seen, for example, the small gold circular dot about halfway up the left side. Musée des Antiquités Nationales (Saint-Germain-en-Laye). Photograph by the author.

the non-astrological divination apparatus could be spectacular. Most striking is the magical board of Berlin, which was found at Pergamon at the end of the nineteenth century.³⁹ This apparatus is dated on paleographic evidence to the third century A.D. It consists of a triangular bronze stand, a bronze disk engraved with magical (but not astrological) signs, three engraved black stones, and several other small bronze objects. If this is the sort of apparatus a competent magician was expected to possess, we can well imagine that the astrologers' clients had their own expectations. The *mensa Isiaca* (Isis tablet) of Turin may well be another example of a divination board, although scholarly opinion about this object remains unsettled.⁴⁰

Markers for the Planets

It is likely that, among the magical gems, we have markers for the planets of exactly the type described in the texts above. The inscription of stone amulets was, of course, of great antiquity in Egypt. Stones inscribed with magical signs or words of power provided specific protections for the living as well as the dead. The oldest scarabs (an especially common amulet) are from the middle of the third millennium B.C., and amulets continued to be manufactured and used to the end of Antiquity. The Greeks, too, engraved gemstones at an early date. In the archaic and classical periods, gems were engraved with images of the gods, of animals and monsters, or of beautiful young men and women, and used as seals, pendants, ring stones or amulets.⁴¹

The magical gems are, however, a special category. The first distinguishing characteristic is their provenance, for the bulk of them come from Greek-speaking Egypt, with dates of production ranging from the first century B.C. to the third century A.D. Second, while most are inscribed in Greek, the iconography displays many Egyptianizing features. Egyptian divinities are represented with a frequency comparable to that of the Greek gods. Syncretism is common: Sarapis merges with Zeus, Thoth with Hermes. There is also a Jewish influence: $\text{IA}\Omega$ (a Greek rendering of "Yahweh") and $\text{A}\Delta\Omega$ NAI are common inscriptions. The third, and perhaps most important, characteristic of these gems is their affiliation with magic. The typical gem may bear the likeness of a god, a demon, or an animal. It may also be engraved in Greek, with a short, intelligible text, or the name of a divinity, or an indecipherable magical incantation. Unpronounceable magical signs called *charakteres* are also common. These gems are not seals, for the writing is almost always directly readable. Three of the most significant and well-catalogued collections are those of the British Museum (Department of Medieval and Later Antiquities), the Bibliothèque Nationale de France (Cabinet des Médailles) and the Ägyptisches Museum of Berlin. The typical magical gem is of ordinary ('semi-precious') constitution — jasper, bloodstone, carnelian (cornelian) and haematite are common — and measures two or three centimetres across. The quality of the engraving varies from crude to exquisite. In the nineteenth century, these objects were commonly referred to as Gnostic gems, but the association with Gnosticism has been thoroughly debunked, except in the case of a small number of the later gems, which do show Gnostic and other Christian influences. This class

of engraved stones is now more neutrally referred to as the magical gems.⁴²

Among the magical gems we almost certainly possess stone planet markers of the sort referred to in the two Greek astrological texts quoted above. In *PGM CX*, each planet is associated with a stone or metal “in accordance with nature”. The associations of gold with the Sun and of silver with the Moon are obvious. However, the astrologer is apparently excused from the expense of using gold and silver markers for these two bodies. At least this is how I interpret the direction that the stars should be set upon the board in accordance with their nature, “except for the Sun and Moon”. However, we find few agreements between the stone–planet identifications of *PGM CX* and the *Alexander romance*. An obvious and unsurprising concordance is that both texts assign to Mars a stone associated with red. *PGM CX* specifies reddish onyx. The *Alexander romance* specifies haematite, which is steel-gray to iron-black in samples of any thickness, but blood-red in transmitted light through very thin samples; haematite also leaves a dark red streak on a hard, rough surface (the Greek name means “blood stone”). However, the only exact concordance between the two texts is that *both associate Aphrodite with lapis lazuli*. This is a little surprising, since lapis lazuli was a rare stone in the ancient Mediterranean — the only known source was Afghanistan. Consequently, lapis lazuli was but rarely used for Greek and Roman intaglios.⁴³

It struck me very forcibly while working in British Museum's collection of magical gems that many of the Aphrodite stones are, indeed, lapis lazuli. Since the Aphrodite stones are grouped together in one tray, it really jumps out at you. There are very few blue stones in any of the other trays. Since in both the *Alexander romance* and *PGM CX*, Aphrodite is associated with lapis lazuli, these Aphrodite stones provide the crucial clue. The magical gems are, in all likelihood, what the writers of these texts had in mind when they described the planetary markers found among the astrologer's apparatus.

A number of magical gems that might have served as planetary markers in an astrologer's kit are shown in Plates II and III. In what follows, DD indicates a number in the catalogue by Delatte and Derchain of the collection of the Cabinet des Médailles. MM signals a gem in the catalogue (*Mira et magica*) of the Berlin collection recently published by Hanna Philipp. Finally, MG (“magical gem”) indicates a catalogue number of the British Museum collection; these numbers are used in the catalogue recently published by Simone Michel. The dates for the British Museum gems given in the figure caption are due to Michel. Let us examine some characteristic types.

Aphrodite. Her stones are numerous and, as mentioned above, are often of lapis lazuli.⁴⁴ In Plate II(A) and (B), we see typical examples of Aphrodite Anadyomene. This popular representation of Aphrodite shows her rising from the sea, wringing out her hair. It was based on a famous painting by Apelles (late fourth century B.C.). These gems, like all the others illustrated in this article, are intaglios. That is, the figures are cut into the stone. To modern eyes, the images may falsely appear to stand out in relief.



A



B



C



D

PLATE II. A selection of magical gems that might form part of an astrologer's kit. Gems of Aphrodite, Helios and Selene. Gems labelled MG are reproduced by courtesy of the Trustees of the British Museum; those labelled DD, courtesy of the Cabinet des Médailles, Bibliothèque Nationale de France.

A: Aphrodite anadyomene. Lapis lazuli, 3.1 × 2.4 cm. DD 241.

B: Aphrodite anadyomene. Lapis lazuli, 1.5 × 1.15 cm, 3rd century A.D. MG 77.

C: Helios, radiate and surrounded by stars. Heliotrope (bloodstone), 2.7 × 2.1 cm, 3rd century A.D. MG 243.

D: Selene. Heliotrope, 2.4 × 1.6 cm, 1st century A.D. MG 63.



PLATE III. Gems of Hermes, Kronos, Ares and Sarapis. Those labelled MG are reproduced by courtesy of the Trustees of the British Museum; those labelled DD, courtesy of the Cabinet des Médailles, Bibliothèque Nationale de France.

A: Hermes with caduceus and purse. Burnt carnelian (cornelian), 2.0×1.6 cm. DD 229.

B: Kronos as reaper. Haematite, 2.8×2.6 cm. DD 261.

C: Ares, leading Aphrodite in chains. Green jasper, 1.4×1.8 cm. DD 332.

D: Sarapis-Zeus. Carnelian, 1.8×1.4 cm, 2nd century A.D. MG 25.

E: The reverse of the Sarapis gem shown in D. The inscription reads, "Zeus and Serapis are one".

Helios. The Sun is often represented as Helios with rays emanating from his head, and sometimes surrounded by stars, as in Plate II(C). Another common motif has Helios driving a quadriga, while an Egyptianizing alternative depicts the boat of the Sun. It could, of course, be doubted whether any of these have astrological significance. But another common solar motif leaves little room for doubt: Helios is shown surrounded by the twelve signs of the zodiac. Almost equally suggestive are the gems depicting Helios, lion and star (Plate V(B)). This motif takes special significance from the fact that the Lion is the house of the Sun.⁴⁵

The Moon. See Plate II(D) for a gem of the goddess Selene.⁴⁶ Even more suggestive is the simple lunar crescent shown in Plate IV(A), in which the marker has been stripped of conventional religious symbolism.

Hermes may be represented with his caduceus and purse, as in Plate III(A). The inscription on this gem is a sequence of vowels (αη εουω) of the sort that frequently appears as an incantation in the magical papyri. (The seven vowels are sometimes associated with the planets. The most common such incantation is the straight alphabetical sequence αη ιουω — which indeed sounds rather impressive when pronounced.) Hermes may also be depicted as a herm with erect phallus or may appear with the attributes of Thoth.⁴⁷

Kronos was not a very popular god. Astrologically, he is associated with old age and death. Perhaps consequently, his stones are not especially common. Nevertheless, stones of Kronos do figure among the magical gems. Typically, he is shown as a reaper with a sickle, as in Plate III(B). Festugière gave convincing arguments for identifying this reaper as Kronos.⁴⁸ The sickle is, of course, an ancient attribute of Kronos, who used it to cut off the genitals of his father, Ouranos.⁴⁹ The identification of the reaper in Plate III(B) with Kronos seems all the more apt when we recall the sequence of the planetary gods on the outer circle of the Bianchini tablet, in which Kronos is identified by his sickle. See also the zodiac coin of Figure 5C, which will be discussed below, showing Kronos and his sickle above Aquarius, which is his house.

Ares is sometimes represented with Aphrodite in an image of sexual power. In Plate III(C), we see Ares leading Aphrodite in chains. Sometimes the roles are reversed, as with DD 334 and 335; sometimes, the two face each other as equals, as with DD 333 or MG 83.

Zeus or Sarapis. Magical gems of Zeus are very uncommon. The reason appears to be that, in Greek Egypt, Zeus was displaced in the popular consciousness by Sarapis, with whom he was closely identified. In Plate III(D) we see a typical Sarapis gem, on which the god is easily identified by his beard and by the *kalathos* he wears on his head. (The *kalathos*, a grain measure, is a symbol of the harvest and of the fecundity of nature.) That this gem belongs to Zeus himself is clear when we turn to the reverse (Plate III(E)), which bears the inscription EIC ZEYC CEPAPIIC, “One and the same are Zeus and Sarapis”. Sarapis is quite common among the magical gems.⁵⁰ In later Antiquity Sarapis becomes a kind of transcendent god. Thus on one



FIG. 5. Coins from the Alexandria mint, year 8 of Antoninus Pius (A.D. 144/145). Bronze, about 3.5 cm in diameter.

A: Ram with a star over its head, accompanied by a bust of Ares, after Dattari, *Numi Augg. Alexandrini* (ref. 60), no. 2958.

B: Lion with bust of Helios, Dattari 2965.

C: Water-pourer with his jar, accompanied by a bust of Kronos, Dattari 2978.

D: Bull with star and bust of Aphrodite (collection of the author, photograph by Ross Mulhausen).

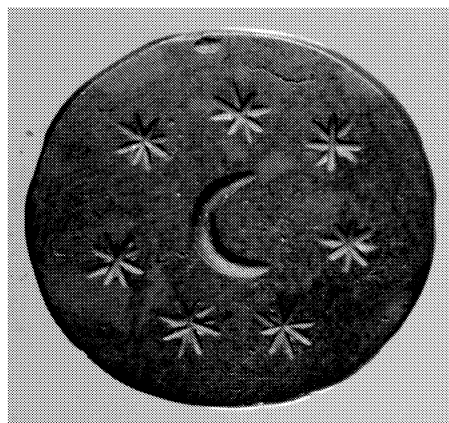
stone of the Cabinet des Médailles (DD 101) we read “Great is the name of Sarapis”. Sometimes, Sarapis merges with Agathodaimon and is therefore represented as a serpent, as in Plate IV(B). Here the astrological significance of the stone is suggested by the crescent Moon and star. As we shall see below, the displacement of Zeus by Sarapis on the magical gems provides important evidence for the locus of astrology in Greek Egypt.

Horoscope. Besides the planetary markers, the astrologer had need of a marker for the *horoskopos*, or rising point of the zodiac. It might be engraved with the word ὠροσκόπος, or with a logogram ω based on the first two letters of the word. This is an abbreviation that appears commonly on papyri and on manuscripts, where it sometimes represents ὥρα, *hour*. On a graffito horoscope found at Dura-Europos it clearly stands for *horoskopos*. According to the *Alexander romance*, the marker for the horoscopic point should be of white marble. No such stone is known to me. We may hope, however, that one will eventually turn up among the scattered and incompletely catalogued collections of engraved gems. The markers for the planets and horoscope are the bare minimum required for an astrologer’s kit. But it could easily be supplemented. Because the *midheaven* often plays a role in prognostication, it could prove handy to have a marker for this point as well.

Lot of Fortune. Also, one might wish to mark the location of the *lot of fortune*. This point serves as a sort of lunar horoscopic point. That is, the lot of fortune is located just as far to the east of the Moon as the horoscope is to the east of the Sun. Gems of Tyche, the goddess of luck, are relatively common. Most probably served simply as talismans for good luck. However, it is possible that some of these stones functioned as astrological markers. For a likely example see Plate IV(C), in which Nemesis or Tyche (their cults were frequently merged) is represented standing on her wheel and pointing upward to seven stars.⁵¹

Of course, it is not the case that all the astrologically significant magical gems were engraved expressly for the use of astrologers. First of all, it is important to remember that these stones belong to a broader class, the great majority of which do not have any astrological significance. Many magical gems served as ring stones, or as amulets or talismans. Some were intended to provide specific cures — whether for medical problems or the problems of love — and some were meant to provide specific protections — for example, from scorpion stings. Many gems were dedicated to gods with no astrological connection.

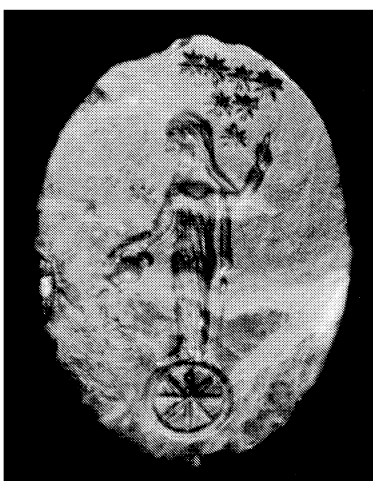
Even among the gems I have offered as likely to be of astrological significance, it is clear that some could serve non-astrological functions.⁵² The gems showing Ares and Aphrodite together may have been used in conjunction with binding spells to compel the desired one to fall under the power of love. A common inscription on the back of the Kronos stones is “I work and do not suffer”. (Indeed, this inscription appears on the back of the stone of Plate III(B).) The bearer of such a talisman then might expect the stooped-over god labouring with the sickle to protect his back. But this also means that the practising astrologer could easily procure a supply of the



A



B



C

PLATE IV. Other magical gems with possible astrological significance. Those labelled MG are reproduced by courtesy of the Trustees of the British Museum; those labelled DD, courtesy of the Cabinet des Médailles, Bibliothèque Nationale de France.

A: Lunar crescent and seven stars. Red jasper, 1.5 × 1.3 cm, 3rd century A.D. MG 92.

B: Sarapis as serpent, with crescent Moon and star. Sardonyx, 3.3 × 2.3 cm. DD 223.

C: Nemesis or Tyche, the goddess of luck, standing on her wheel, with seven stars above. Yellow and brown jasper, 2.1 × 1.55 cm. DD 255.

necessary gems from artisans who made and sold them. It means, as well, that the astrologer's client would be confronted with engraved gems that were commonly believed to have either ritual significance or inherent powers.

As we have seen, key evidence that the magical gems are the right general group in which to seek the astrologers' planetary makers comes from the agreement between the Aphrodite gems and the two texts that refer to stone markers for the planets. Both the *Alexander romance* and *PGM CX* say that her stone should be of lapis lazuli, which is just what we find in many cases.⁵³

A second piece of evidence comes from concordances of provenance and dating. The ivory astrological tablets of Grand certainly originated in Egypt and are probably of the first or second century A.D. The two texts that refer to the planetary markers are of the same period. *PGM CX* is of the second or third century. The oldest text of the *Alexander romance* is of the third century, although it certainly reflects older material. Although provenance of the magical gems is sometimes difficult to establish in particular cases, a great many certainly did originate in Greco-Roman Egypt. Dating depends almost entirely on style and iconography, especially in comparison with coins, which often can be dated securely. All of the magical gems from the British Museum that I have cited have been dated by their cataloguer, Simone Michel, to the first, second or third centuries A.D.

A third argument that the magical gems are the correct set of stones depends on the almost complete displacement of Zeus by Sarapis among these gems, as well as the fact that the temples of Sarapis were important loci for the practice of astrology among the Greek-speaking population of Egypt. The second part of this argument — placing astrology in the temples of Sarapis — will be made below.

A fourth argument that the magical gems are the correct set of stones can be made from the resemblance between the figures of the decans on the astrological tablets of Grand and images of the same gods that turn up on magical gems. For example, as Abry has shown, one of the decans of Leo on the tablets from Grand corresponds closely to DD 53, a gem bearing the image of Khnoumis; one of the decans of Virgo corresponds to DD 44, bearing an ibis-headed god; and one of the decans of Pisces corresponds to DD 116, bearing the image of Anubis.⁵⁴ The shared iconography suggests that the magical gems and the astrological tablets of Grand emerged from a common milieu. Thus, there is excellent reason to believe that we have the right group of stone markers. As Goyon has recently suggested, we should therefore consider the possibility that gems of the decans might also have served as astrological apparatus.⁵⁵

Markers for the Zodiac Constellations

The magical gems include a number of stones engraved with figures of zodiac signs. That these stones had some sort of astrological significance has long been obvious. However, the twelve zodiac constellations are certainly not represented with equal frequency among the magical gems.

Crab. Magical gems bearing crabs are relatively common. Of course, a crab appearing by itself (as on MG 95) does not necessarily require an astrological interpretation. The astrological significance of such stones becomes more apparent when we consider Plate V(A), which shows a crab and the lunar crescent. The Crab is the house of the Moon.⁵⁶

Lion. Lions are common, and often involve solar symbolism, as in Plate V(B), in which a lion carries a solar god. A small star lies above the lion's head. Astrologically, the Lion is the house of the Sun.⁵⁷

Ram. The Ram is not represented with great frequency. However, Plate V(C) is a nice example, with the ram shown looking back over its own shoulder — the standard representation of the constellation Aries. The astrological significance of this stone is confirmed by the eight-rayed star and lunar crescent. The stone also carries the name $\text{BPACA}\Xi$ (i.e., Abrasax). Abrasax (or Abraxas) is a divinity very common in the magical papyri. He has the head of a cock and has snakes for feet. On amulets he is usually armoured. Abrasax has also a connection with the Sun, revealed in the fact that the letters of his name sum to 365. In the usual Greek alphanumeric notation, $\alpha = 1$, $\beta = 2$, $\xi = 60$, $\rho = 100$, $\sigma = 200$, and so $\alpha\beta\rho\alpha\sigma\alpha\xi = 365$. This solar connection probably explains the presence of the name of Abrasax on a stone for the Ram: the Ram is the beginning of the zodiac and is also the sign of the Sun's exaltation.

Scorpion. Plate V(D) shows a deeply incised scorpion and eight-rayed star. Scorpion gems are very common. Indeed, Scorpions are more plentiful than one might expect purely on astronomical grounds.⁵⁸ One reason is likely connected with the astrological significance of the Scorpion. In a common association, signs of the zodiac are associated with parts of the human body: we move around the zodiac and down the body, starting with Ram-head and ending with Fishes-feet. In the universal scheme, the Scorpion is associated with the genitals — always objects of interest and concern.

Capricorns are not uncommon, and can hardly have anything but astrological significance.⁵⁹ However, the remaining zodiac signs seem to occur scarcely, if at all.

As Plate V suggests, the astrological significance of a figure engraved on a gem, such as a ram or a scorpion, is often emphasized by a star, which shows that the celestial animal was intended, and not some earthly creature. The correctness of this interpretation is confirmed beyond all doubt by comparison with coinage. In the eighth year of Antoninus Pius (A.D. 144/145), the Roman mint at Alexandria had a sort of astrological extravaganza. Among the issues of this year was a series of twelve bronze coins, each figured with one sign of the zodiac. In each case, the zodiacal figure has a star placed over its head. Each zodiac sign is also accompanied by the bust of the planetary god whose house the sign is. See Figure 5 for coins of Aries and Leo (which may be compared with Plate V), as well as Aquarius and Taurus. The year is indicated by LH. (H is the ordinary Greek numeral for 'eight' and L is a symbol for 'year' very common on Alexandrian coinage.) The obverse of each coin bears the head of the emperor.⁶⁰

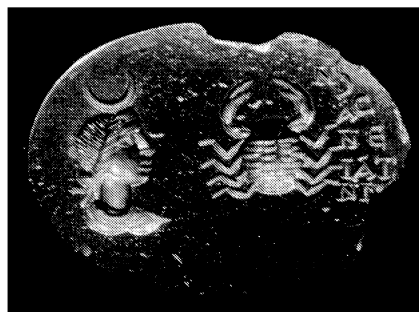
The complete sequence of zodiac signs in the Alexandria coin series, so clearly modelled on gems, strongly suggests that there did exist gems representing all the zodiac signs. So here is an instance in which coinage helps us fill out the picture of the gem tradition, since gems for some signs appear to be wanting. Moreover, the close correspondences between the gems of Plate V and the coins of the Alexandria zodiac series (Figure 5) can help us identify gems of possible astrological significance that have not always been recognized as such. For example, on gems the Dioskoroi (sons of Zeus, identified with Castor and Pollux) are frequently represented with stars over their heads. Such gems can clearly represent the sign of Gemini, exactly as we find on the coin for Gemini from year 8 of Antoninus Pius (Dattari 2962). And, to take some less obvious examples, even gems that are lacking stars might have astrological connections. In the coin series, Virgo is represented with the attributes of Demeter; thus we might look for gems of Virgo among those of Demeter, whether they carry stars or not. Finally, the male figure holding a small balance on MG 582 is reminiscent of the coin for Libra in the Alexandria zodiac series (Dattari 2970).⁶¹

If the astrologer's board was divided into zodiac signs (as are all boards known to me), we can readily understand the uses of planet markers; but it is not so clear what function might be served by stones engraved with zodiac signs. Moreover, while we have textual evidence for the use of the planetary gems, we have none for gems engraved with zodiac signs. Perhaps in some cases the astrologer wished to emphasize the power of one or several signs. Then a stone marker might have been added to the display. Of course, it is also possible that the gems engraved with zodiac signs were not actually a part of the usual apparatus for astrological prognostication.

However, it might be the case that plainer apparatus existed than the elaborate tablets from Grand. A board of the conjectural Type 2, which represented the horizon and meridian, and perhaps the twelve places as well, would call for stone markers to represent the signs of the zodiac, as well as the planets. Most important would be the Crab and Lion, the houses of the Sun and Moon. Even if only these two signs were marked, the astrologer could easily visualize the solar and lunar houses of the other planets. Since the horizon and meridian would be permanent features of the board, the astrologer would have no need for a stone to represent the horoscope in using a board of Type 2.

Astrology in the Temples

In *L'Égypte des astrologues*, Franz Cumont gave an argument for situating astrology in the temples of Egypt. Cumont analysed the writings of Greek and Latin astrologers, sifting them for information about the culture in which they lived and worked. He believed that he perceived the temple and the priesthood in the foreground and argued that, by comparison, the interior life of the Greek city was scarcely represented. Hermetic texts, especially, often associated the astrologers with the priests.⁶² While Cumont focused exclusively upon texts, the ceiling zodiacs of Egyptian temples provide support for his thesis. It is important to note that these are few in number



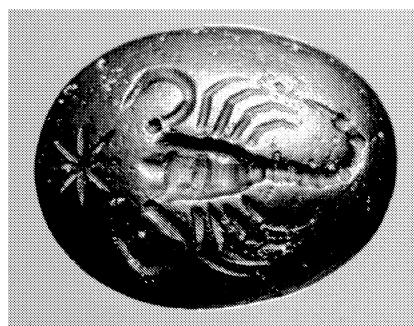
A



B



C



D

Plate V. Magical gems engraved with zodiac signs. Those labelled MG are reproduced by courtesy of the Trustees of the British Museum; those labelled DD, courtesy of the Cabinet des Médailles, Bibliothèque Nationale de France.

A: Crab with Selene and lunar crescent. Green and brown jasper, 2.5 × 3.5 cm. DD 387.

B: Lion, ridden by a solar god. A star appears above the Lion's head. Haematite, 1.8 × 1.4 cm. DD 313.

C: Ram with star, crescent and the name Brasax (Abraxas). Dark green jasper, 1.4 × 1.6 cm, 3rd century A.D. MG 341.

D: Scorpion and star. Haematite, 1.4 × 1.1 cm, 3rd century A.D. MG 344.

and that they began to appear only in the second century B.C. — well into the Greek period and at about the time of the rise of astrology. The earliest known Egyptian zodiac, from about 200 B.C., came from the temple of Khnum near Esna. It is now lost, but is known through an engraving published by Napoleon's Egyptologists. The best known Egyptian zodiac, the round zodiac of Dendera, is dated to about 50 B.C. In all such zodiacs, we see the Greco-Babylonian zodiac constellations Egyptianized, as well as the incorporation of other Egyptian religious and astronomical symbolism. The presence of these zodiacs in chapels of Osiris (as at Dendera) suggests that the traditional functions of the Egyptian temples had recently expanded to include horoscopic astrology.⁶³

However, until recently, we had few hard facts about the cultural setting of astrology in Greek Egypt or the details of its practice. The papyri are, in almost all cases, discarded documents, excavated from trash heaps (as at Oxyrhynchus). These documents can teach us very little about the settings in which astrology was practised. However, there also exist a small number of horoscopes on ostraca that have been excavated from temples. These horoscopes offer especially important evidence, since they appear to have been recovered from the places where they were actually used. Most significant is a group of seventeen Greek ostraca excavated from the temple of the serpent god Hermuthis in the village of Narmuthis (today Medinet Madi) in the Fayum. Palaeographic analysis puts these ostraca in the second half of the second century A.D., and one ostrakon explicitly mentions a date in "year 3 of Antoninus" (probably Antoninus Pius, which would correspond to A.D. 140).

These ostraca may be best described as work-orders for horoscopes. Some ostraca bear only the date to be investigated. One of them contains two different dates written in Greek, one immediately below the other, and nothing else:

13th [year], 3rd of Pauni, 8th hour of the day.
25th [year], 5th of Mechir, 5th hour of the day.

This double-dated ostrakon may have resulted from the request for the investigation of a prospective marriage. In some cases, the ostrakon bears a name, either of the native or of the client. One of them is for "Tachme", another for "Sabouris", another for "Demetria", yet another for "the daughter of Betiris". Sometimes the day of the year is indicated in terms of the Sun's place in the zodiac, rather than by month and day:

Thaesis [the client's name], 15th [year], Capricorn 4°, 7th [hour of the] night.

But there is never any information about the planets' positions.⁶⁴ It is clear that these ostraca were the notes made by the temple astrologer at his clients' request. The client had then to go away while the astrologer worked out the planet positions from tables. The client returned, perhaps the next day, for consultation. A similar ostrakon in Demotic also has been found at Narmouthis,⁶⁵ which gives us another tantalizing glimpse of the bilingual character of astrology in Roman Egypt. Nor is

the Narmouthis group unique, for a similar Greek ostrakon from Tebtunis was found adjacent to the sanctuary of Soknebtynis, and dated to year 22 of either Commodus or Caracalla (A.D. 182 or 214).⁶⁶

It may also be significant that the astrological tablets of Grand were found in near association with a sanctuary. Of course, one might wonder whether the tablets of Grand were really associated with the temple complex. Might they not have been the property of an itinerant Hermetist who got into trouble with the locals? Of course, there is no way of knowing to whom these tablets belonged. But it is noteworthy that one other piece of elaborate astronomical apparatus has been discovered at the same site. This is a small bronze fragment of an anaphoric clock. These astronomical clocks were described by Vitruvius but only two have been found — one near Salzburg and the other at Grand. This does seem to confirm an interest in things astrological at the sanctuary of Grand.⁶⁷

Astrology in the Cult of Sarapis

It is likely that we possess a contemporary portrait of a Greek astrologer. Greeks in Egypt adopted many Egyptian customs, including mummification of the dead. By the Roman period there arose the custom among well-to-do families of commissioning a portrait of the departed; typically the portrait was painted life-size, or a little smaller, on a thin wooden plaque, which was placed over the face of the wrapped mummy. I shall argue that the mummy portrait in Plate VI is a likeness of an astrologer who was a priest in the cult of Sarapis, and shall make a case for situating astrology in Greco-Roman Egypt in the temples of Sarapis.⁶⁸

Sarapis originated as the hypostasis of Osiris and the Apis bulls entombed at the necropolis of Saqqara, just outside Memphis. Plutarch says that, according to the priests, Apis is the bodily image of the soul of Osiris, which gives us some idea of how to think about a union that, to us, might otherwise appear strange. Rituals of the cult were performed at the Memphis temple complex rebuilt under Nectanebo I and II (380–343 B.C.), and there pilgrims sought oracles, dream interpretation and cures through incubation. The first Ptolemies (the Macedonian dynasts who ruled Egypt after the death of Alexander) quickly recognized the importance of the cult of Sarapis and promoted it among the Greeks as well as the Egyptians. They founded a Sarapieion at Alexandria and popularized Sarapis as the divine Greco-Egyptian patron of their dynasty. The cult also served a social-engineering function, for it was intended to promote unity between the Greek and Egyptian populations of the kingdom. Plutarch no doubt refers to this aspect of the cult's history when he says that Sarapis is a god of all peoples in common. Not surprisingly, in view of its history at Alexandria, the cult of Sarapis became the most Hellenized of Egyptian cults. This is clear in the extant portraits of Sarapis priests, who are always shown with full heads of hair (as opposed to the shaven heads associated with the priests of most Egyptian cults) and in Hellenized costume. Although at Memphis Sarapis had begun as a god of the underworld, at Alexandria he sometimes fused with Helios or with Dionysos.

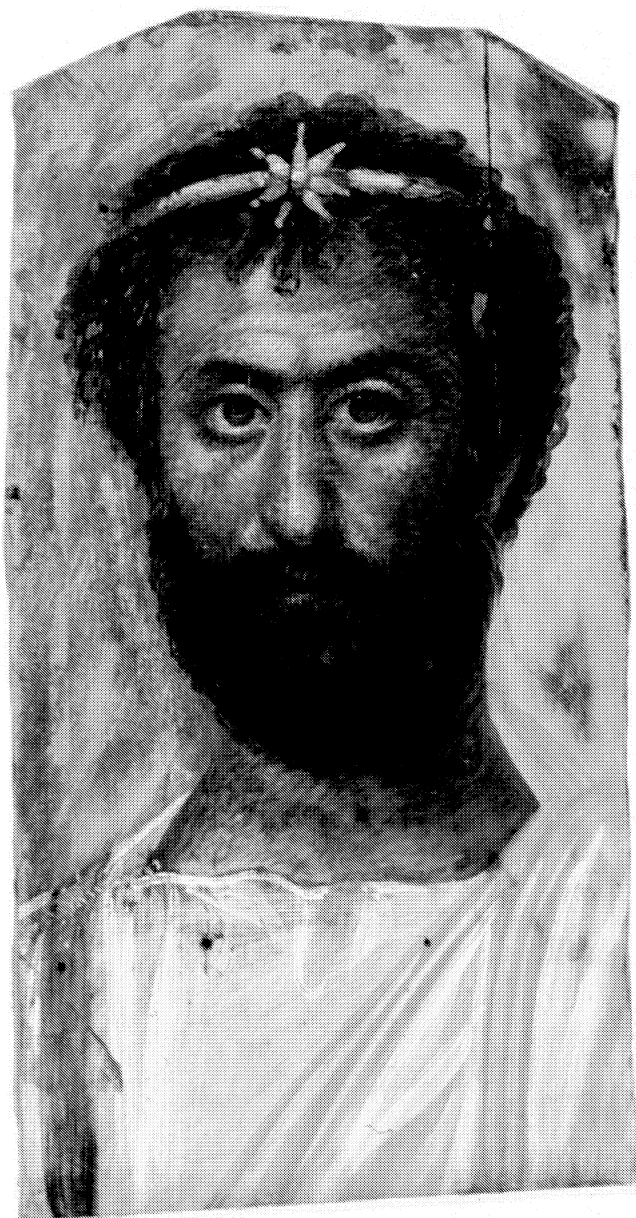


PLATE VI. Portrait of a Sarapis priest and a likely astrologer. Encaustic on limewood, 42.5 × 22.2 cm, from Hawara in the south-east Fayum (Egypt), 2nd century A.D.. British Museum, EA 74714. Reproduced by courtesy of the Trustees of the British Museum.

In his expansion into the Greco-Roman world, he became a transcendent god, often identified with Zeus. In the iconography, he is often enthroned.⁶⁹

The portrait of Plate VI has often been interpreted as that of a priest. About ten portraits (most in the form of statuary) with similar diadem and seven-rayed star are known from the Roman imperial period. In the statuary portraits, the seven-rayed star typically lies on a disk affixed to the diadem, as in Figure 6. The seven-rayed star and especially the disk have sometimes been interpreted as solar symbols, so scholars first identified these portraits as those of priests of Helios. However, the extant portraits have been analysed in detail by Goette, who has made the convincing case that they are portraits of priests of Sarapis.⁷⁰ Since many of the extant portraits originated in Egypt, and since in Egypt Sarapis was often given the attributes of a solar god, one need not reject the interpretation of the disk as a solar symbol in order to accept the identification of the portrait as that of a priest of Sarapis. Manifestations of the fusion of Sarapis and Helios include images of Sarapis radiate (e.g., with rays emanating from his head) on lamps, coins and gems, as well as in statuary.⁷¹ But, as Goette points out, there is also a good deal of far more direct evidence for placing these portraits in the cult of Sarapis. The disk and star turn up on other objects with unmistakable links to Sarapis. For example, in the case of a statue in the Museo della Villa Borghese in Rome, Sarapis holds a disk in his hand. On lamps and gems, Sarapis is sometimes shown flanked by stars, or by a star and a crescent.⁷² And on gems we find Sarapis with a star over his head, as in Figures 7A and 7D. This I take to be a reference to the star emblem worn on the foreheads of the priests in the extant portraits. Thus, there is excellent reason to concur in the now widely-accepted identification of these portraits as those of priests of Sarapis.

By itself, the star in the mummy portrait may not seem to be adequate proof of an astrological association. Might it not merely symbolize Sarapis's cosmic significance? Here it is important to note that generic stars on Greek coins and gems most often carry six or eight rays.⁷³ As all the extant portraits of Sarapis priests agree in giving the star seven rays, this number is clearly significant — and most likely represents the seven planets. In the cult of Mithras, too, the number seven carried associations with the planets. (For example, the members of the cult of Mithras were divided into seven grades, each under the protection of a planetary god; and the staircases descending into Mithraic temples often had seven steps.⁷⁴) Thus it would be unwise to take the seven-rayed star worn by the priests of Sarapis *merely* as a solar symbol or as a symbol of cosmic importance.⁷⁵

Fortunately, we have many objects in which the links of Sarapis to astrology are quite clear. On gems, the bust of Sarapis is sometimes surrounded by a ring of the twelve zodiac signs, as in Figure 7B. Yet again, one could object that the mere presence of a zodiac is not proof of astrology. The zodiac might simply allude to Sarapis's role as a solar god or as *kosmokrator*. For we do find gems of other solar gods (such as Apollo) surrounded by zodiacs. So, as Aratos (*Phainomena*, 410–11) says of weather prediction, we must look for sign confirming sign. The head of the



FIG. 6. Head of a Sarapis priest wearing a diadem with a disk and seven-rayed star. The base of the statue carries a zodiac ring. Limestone, from Roman Carthage, 3rd century A.D. Musée du Louvre, MA 1833. Courtesy of Réunion des Musées Nationaux, photograph by Chuzeville.



FIG. 7. Gems demonstrating the cosmic and astrological associations of Sarapis.

A: Sarapis with a star over his head. Carnelian (cornelian), 2.0×1.5 cm, 1st century A.D. (inscription later). MG 26, from Michel, *Migischen Gemmen* (ref. 42).

B: Sarapis surrounded by the twelve zodiac signs. Carnelian, 1.1×1.4 cm, 1st or 2nd century A.D. Staatliche Münzsammlung München, 2664.

C: Sarapis surrounded by the twelve zodiac signs and the seven planetary gods. Amythest, 1.7×1.3 cm. British Museum, 1907.7-17.1. Reproduced by courtesy of the Trustees of the British Museum.

D: Sarapis with star over his head, surrounded by twelve zodiac signs and seven planetary gods. From *Expedition Ernst Sieglin*, iii/1 (Leipzig, 1923), Abb. 128.

Sarapis priest shown in Figure 6 constitutes significant further evidence, for the base of the statue carries a zodiac ring — which connects the zodiac not only to Sarapis *but also to his priests*.

Moreover, some gems show Sarapis surrounded by two concentric rings, one of which bears the twelve zodiac signs and the other, the seven planetary gods, as in Figure 7C. Here the astrological message can hardly be doubted. A bronze coin of the reign of Antoninus Pius, issued from the Alexandria mint, carries a similar motif (Figure 8A). Finally, on the gem of Figure 7D, we have zodiac and planets as well as the star, which ties together all the previous motifs.⁷⁶

But perhaps the strongest proof comes from the coin of Figure 8B, which shows Sarapis and Isis surrounded by a double zodiac. As we have seen, the double zodiac is useful in certain kinds of astrological investigations, including prospective marriages, and represents a clear echo of actual astrologers' boards, for example, the Bianchini tablet shown in Figure 2.⁷⁷ That the double-zodiac coin of Figure 8B was inspired by actual apparatus is confirmed by yet another coin in the same series. In Figure 8C we see the busts of Helios and Selene surrounded by the zodiac, a strikingly clear echo of the *Alexander romance* and the astrological tablets of Grand, with which we began our investigation. The comparisons with gems, texts and astrologers' boards demonstrate that the coin series faithfully represents astrological apparatus and practices of the second century. The testimony of the coins (Figures 8A and 8B) associating astrological doctrines and apparatus with the cult of Sarapis is therefore particularly compelling.

It is easy to imagine how the practice of astrology entered into the temples of Sarapis. We know that already in the early Ptolemaic period the Sarapieion of Memphis served pilgrims in several ways. A limestone stele of the third century B.C., found near the temple of Anubis, in the Sarapieion complex at Memphis, announces the services of an interpreter of dreams. The stele has holes in the back, apparently to permit its hanging up as an advertisement. A picture of the Apis bull naturally associates this stele with the cult of Apis and Sarapis. The inscription reads:

I interpret dreams
having a commission from
the god. With good fortune!
A Cretan is he who
interprets these things.⁷⁸

So we should picture an immigrant from Crete, who has set up shop in or near the temple with some sort of official sanction. Although this stele is of the third century B.C. and thus too early for astrology, we can well imagine a similar sort of arrangement for astrologers a few centuries later.

Moreover, we have documentary evidence that zodiacal prognostication was associated with Sarapis before the middle of the second century B.C. This remarkable story concerns the history of the papyrus known as the *Art of Eudoxus*. This famous papyrus, conserved in the Louvre, is the oldest existing Greek astronomical document with



FIG. 8. Coins of Antoninus Pius issued from the Alexandria mint. Bronze, about 3.5cm in diameter. After Dattari, *Numi Augg. Alexandrini* (ref. 60).

A: Sarapis surrounded by a ring of the twelve zodiac signs and a ring of the seven planetary gods. Year 8 of Antoninus (A.D. 144/145). Dattari 2982.

B: Isis and Sarapis surrounded by a double zodiac. No date. Dattari 2983.

C: Sun and Moon surrounded by the twelve zodiac signs. Dattari 2984.

illustrations. Apparently, it was composed by a certain Leptines as an introduction to astronomy for members of the Ptolemaic court. The papyrus we have is 1.8m long and was thus undoubtedly used as a roll. To judge by the large number of spelling errors, it may not be the original written by the author himself, but rather a copy. The name of the astronomical tract on the recto comes from an acrostic poem on the verso, in

which the initial letters of the twelve lines of verse spell out *Eudoxou Techne*, Art of Eudoxus. The contents of the recto, however, are certainly not by Eudoxus. Rather, the tract is a brief and rather choppy account of standard astronomical (not astrological) matters. The text includes a short parapegma, an account of the progress of the Sun and Moon around the zodiac, descriptions of the circles on the celestial sphere, a discussion of eclipses, and values for the lengths of the four seasons according to various authorities. The last column of text ends with the season lengths and then two rubrics: “Celestial circle” and “Oracles of Sarapis”. These seem to refer to the zodiac figure in the following column, which is reproduced in Figure 9. Inside the circle are repeated the two rubrics that ended the preceding column: “Celestial circle/ Oracles of Sarapis”. Underneath the zodiac circle is the colophon “To the kings, the *Celestial Teaching (ouranios didaskalea)* of Leptines”. A second hand has interspersed the following lines among the lines of the colophon: “Work O men, in order [to work] no longer. Oracles of Sarapis. Oracles of Hermes.”⁷⁹

The dedication “to the kings” suggests a date of composition between 170 and 164 B.C., when Ptolemy VI, Cleopatra II and Ptolemy VIII ruled jointly.⁸⁰ Moreover, a latest possible date for the astronomical tract is provided by the material on the verso. For, some time after the copyist wrote the astronomical text and drew its illustrations on the recto, he used the verso as so much blank space for recording copies of various bits of bureaucratic and private correspondence. Some of these letters contain dates, in both the Egyptian and the Macedonian calendars, which place them in 163 and 164 B.C. Finally, it seems that the papyrus somehow entered the archive of papers of a certain Ptolemaios the son of Glaukias, who was a permanent resident (a “detainee”) at the Serapieion at Memphis. According to Dorothy J. Thompson, the identification of this papyrus as belonging to the Serapieion archive is based on the marginal annotations on the verso in the hand of this Ptolemaios, son of Glaukias, whose hand is known from many letters found in the same archive.⁸¹ He must have read, and perhaps valued, the astronomical treatise, for on the outside of the roll, as a label, he wrote, “Within, the concerns of Hermes”.

The association with Hermes, patron god of astronomers and astrologers, is unsurprising. More important for our argument is the association of the astronomical tract with Sarapis. Tannery conjectured that the writer began but left unfinished some sort of astrological prognostication that was to make use of the zodiac circle he had drawn. Because there is little other evidence for Greek horoscopic astrology at so early a date, we need not assume that the writer was at work on a full-fledged horoscope. Nevertheless, we can see that oracles of Sarapis were associated with the zodiac by the time the papyrus was written, i.e., before 163 B.C.: some sort of zodiacal prognostication (even if not yet full-fledged horoscopic astrology) was already being practised in the temples of Sarapis. Since ceiling zodiacs appeared in other Egyptian temples by about 200 B.C., this is not implausible.⁸² Moreover, it provides us some insight into the transitional stage, when Greco-Egyptian astrology was just emerging.⁸³

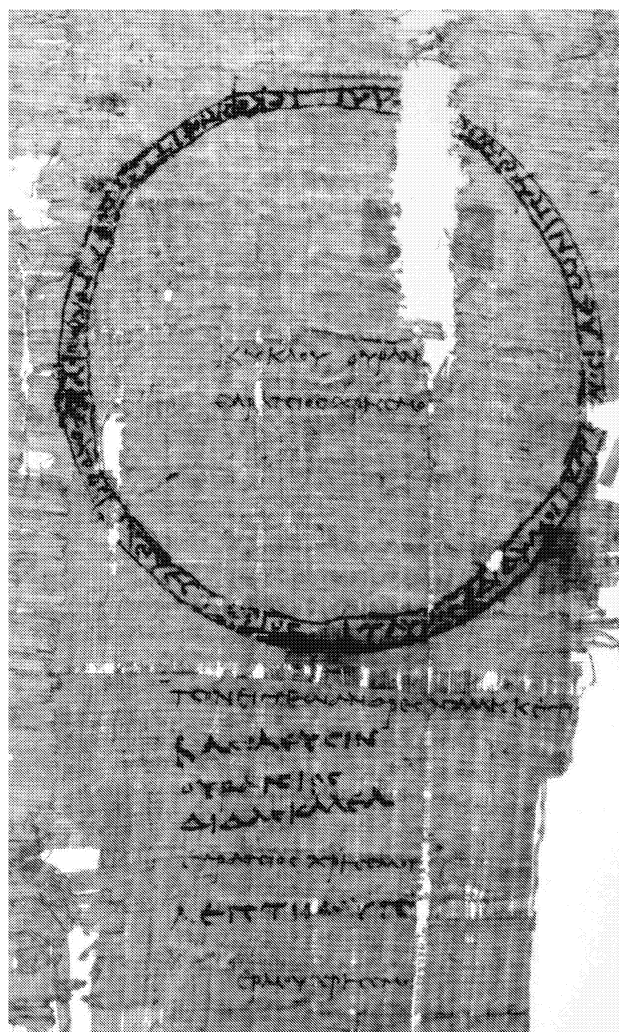


FIG. 9. Final column of the papyrus text familiarly known as *The art of Eudoxus* (first half of second century B.C.). The circle is labelled with the signs of the zodiac, with Aries and Taurus at the bottom. Inside the circle is the rubric "Celestial circle/Oracles of Sarapis". Underneath the circle, the original copyist has written in bold letters and a second hand has interspersed text in lighter strokes:

Work O men in order to work no longer

To the kings

The celestial teaching

Oracles of Sarapis

of Leptines

Oracles of Hermes.

Musée du Louvre, Département des Antiquités Egyptiennes, N 2325. Photograph by Chuzeville.

Finally, there are two details of astrological doctrine that may have roots in the cult of Sarapis. As we have seen, Sarapis is sometimes merged with Agathodaimon (or Agathos Daimon), the good demon. In this guise, he is represented as a serpent with the head of Sarapis, including beard and kalathos (or sometimes a crown). Now, there were several schemes for naming the *places*, but in one popular version, the eleventh place (starting from the horoskopos, counting eastward around the zodiac) is named the place of the Agathos Daimon. The eleventh is an important place, third in significance behind the horoskopos and the midheaven. It is important for friends, hopes, gifts, children and accomplishment. The fact that only this one, of all the twelve places, is given the name of an Egyptian divinity suggests a connection with a cult involving the gods around Agathodaimon, i.e., the cult of Sarapis. Second, in the case of the dodecaoros, as we have seen, a serpent is associated with Gemini. On the Bianchini tablet, it is a plain serpent, but on the Daressy tablet, it is Agathodaimon, recognizable by his headgear.

Conclusion

I have shown that, in the case of Greek Egypt, there is a large body of evidence for placing astrology in the temples of Sarapis. Moreover, it is possible to reconstruct in considerable detail the circumstances of an astrological consultation. We now have a detailed picture not only of the person of the astrologer and the place of his practice, but also of the apparatus he used. The details of the picture I have sketched are valid for Greek Egypt, in the first, second and third centuries A.D. We should not expect all the details to apply in other places. However, the fact that the best examples of astrologers' boards have been found in France and in Italy suggests that at least some of the conclusions are exportable. The particular class of engraved gems that we have linked to astrological practice in Egypt (the magical gems) is appropriate to Egypt. But we could easily imagine their Roman counterparts being used in the West.⁸⁴

That priests of the Hellenized cult of Sarapis often functioned as astrologers does not mean that Greco-Egyptian astrology first arose in this particular cult. As we have seen, the evidence of ceiling zodiacs and astrological ostraca also locates astrology in the temples of more traditional Egyptian gods. Nor does it gainsay the practice of astrology in other Greek and Roman cults. While Mithraic remains are relatively rare in Egypt, they are common in other parts of the Roman Empire and we have good reason to suppose that astrology played an important part in this cult. Moreover, in Gaul, as we have seen, astrological tablets and an astronomical clock are associated with a sanctuary dedicated to Apollo Grannus. Thus not only Sarapis but also other gods smiled upon the craft of astrology. Moreover, at least in Egypt, Hermes stands always in the background. Nor need we confine astrology to the temples themselves. As we have seen, diviners of various sorts set up shop near the temples, sometimes with official sanction. We also have evidence that unofficial opportunists preyed on the flock of the faithful. These opportunists may have flourished because the price they asked was less than the donation expected for a horoscope cast in the temple

by a priest using the full apparatus of his craft. Plutarch mentions the “the tribe of wandering soothsayers and rogues that practised their charlantanry about the shines of the Great Mother and of Sarapis”.⁸⁵ And it is likely that astrologers of the street practised in the squares and markets. But this branch of the craft would have left no physical traces to compare with the evidence from the temples.

An astrological consultation in second-century Egypt must have been a psychologically powerful experience. One entered a dark chamber of the temple, illuminated by a flickering lamp that might be decorated with images of the Moon and stars and the face of Sarapis. In the small circle of light lay the astrologer's board, made of marble or of ivory and gold, engraved with numbers, sacred names, and the figures of zodiac signs. The priest was austere and impressive with the golden seven-rayed star of Sarapis on his diadem. He lay aside the sheaf of papyrus planetary tables he had previously consulted, retaining only the sheet on which he had summarized the results of his computations. Then he took out a small amulet casket or box, perhaps of ivory, as in the *Alexander romance*. Opening it, he poured out the coloured stones, engraved with magical signs and the names and images of the planetary gods.⁸⁶

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the order Venus, Mercury, Jupiter, Saturn, Mars; and so on. A user of the Grand tablets would need a separate list of the order of precedence of the planets in each sign, for this information the tablets do not bear.

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28. Hanna Philipp, *Mira et Magica: Gemmen im Ägyptischen Museum der Staatlichen Museen, Preussischer Kulturbesitz, Berlin-Charlottenburg* (Mainz am Rhein, 1986), no. 115.
29. Georges Daressy, "Notes et remarques, No. CLXXXI", *Recueil de travaux*, xxiii (1901), 126–7, and Georges Daressy, "L'Égypte céleste", *Bulletin de l'Institut Français d'Archéologie Orientale*, xii (1916), 1–34 and Plate II. See also O. Neugebauer and R. A. Parker, *Egyptian astronomical texts* (Providence, 1969), iii, 103, and Gundel, *Zodiakos* (ref. 17), no. 62, pp. 226–7.
30. W. M. Flinders Petrie, *Tanis*, Part 1, 1883–84 (London, 1889), 48–49. For a colour painting of the surviving fragments, see Neugebauer and Parker, *Egyptian astronomical texts* (ref. 29), iii, Plate 47C, with discussion on pp. 102–3. See also Gundel, *Zodiakos* (ref. 17), no. 104. The Tanis zodiac is in the British Museum, Egyptian Department, Inv. 29137.
31. Alexander Jones (personal communication).
32. A. S. Saidan (ed. and transl.), *The Arithmetic of Al-Uqlidisi* (Dordrecht and Boston, 1978). My thanks to Len Berggren for this source.
33. See P. V. C. Bauer and M. I. Rostovtzeff (eds), *The excavations at Dura-Europos: Preliminary report of the second season of work* (New Haven, 1931), 161–4 and Plate 51; P. V. C. Bauer *et al.* (eds), ... *fourth season* (New Haven, 1933), nos 232 and 235–9, pp. 105–10 and 115–19; and M. I. Rostovtzeff *et al.* (eds), ... *sixth season* (New Haven, 1936), no. 736, pp. 246–7. These horoscopes are discussed (without the diagrams) by Neugebauer and Van Hoesen, *Greek horoscopes* (ref. 4), where they are assigned nos 176 and 219,1 and 250,1.
34. A graffito horoscope for A.D. 353 (Neugebauer and Van Hoesen, no. 353), found at Abydos in the temple of Sethos I, has a circle divided into twelve equal parts. But these seem to me clearly to represent the signs, not the places. Thus I take this drawing to be modelled on the boards of Type 1. See Paul Perdrizet and Gustave Lefebvre, *Les graffites grecs du Memnoneion d'Abydos* (Nancy, Paris and Strasbourg, 1919), 114 and Plate 16A.
35. For game boards incised into the roofing slabs of a temple at Kurna in Egypt, see H. J. R. Murray, *A history of board games other than chess* (Oxford, 1952), 19.
36. For the eight-sided game boards, see Marco Fittà, *Giochi e giocatelli nell'antichità* (Milan, 1997), 162 and Figs 266 and 272.
37. The existence of an eight-place system in Roman astrology is controversial. Manilius (*Astronomica* II, 856–970) has been read as endorsing a system of eight places, as by Bouché-Leclercq in *L'astrologie grecque* (ref. 2), 276–80. But this has been questioned by other scholars. See Goold,

- Manilius* (ref. 3), pp. lxi–lxii. However, Firmicus Maternus (*Mathesis* II, 14) seems clearly to describe a system of eight places before going on to the system of twelve.
38. For the use of objects in magical operations, see Fritz Graf, *Magic in the ancient world*, transl. by Franklin Philip (Cambridge, MA, 1997), especially chap. 5, “Curse tablets and voodoo dolls”, as well as Roy Kotansky, “Greek exorcistic amulets”, in Marvin Meyer and Paul Mirecki (eds), *Ancient magic and ritual power* (Leiden, 1995), 243–77.
 39. Hilde Hiller, “Zaubergerät”, in Klaus Vierneisel (ed.), *Römisches im Antikenmuseum* (Berlin, 1978), 39–43.
 40. Enrica Leospo, *La mensa Isiaca di Torino* (Études Préliminaires aux Religions Orientales dans l’Empire Romain, lxx: Catalogo del Museo Egizio di Torino, Serie Prima; *Monumenti e testi*, iv (Leiden, 1978)).
 41. For a recent survey see Carol Andrews, *Amulets of ancient Egypt* (London and Austin, 1994). For a survey of Greek gems of the archaic and classical periods — i.e., before Egypt and magic began strongly to influence Greek style — see John Boardman, *Greek gems and finger rings: Early Bronze Age to Late Classical* (London, 1970), or Richter, *Engraved gems of the Greeks*, Part 1 (ref. 16), 1–124.
 42. Simone Michel, *Die magischen Gemmen im Britischen Museum* (2 vols, London, 2001); A. Delatte and Ph. Derchain, *Bibliothèque Nationale: Cabinet des médailles et antiques. Les intailles magiques gréco-égyptiennes* (Paris, 1964); and Philipp, *Mira et magica* (ref. 28). For the pioneering study in the interpretation of these objects, see Campbell Bonner, *Studies in magical amulets, chiefly Graeco-Egyptian* (Ann Arbor, 1950).
 43. V. I. Sarianidi, “The lapis lazuli route in the ancient East”, transl. by L. H. Kowalski, *Archaeology*, xxiv (1971), 12–15, and Max Bauer, *Precious stones*, transl. by L. J. Spencer (2 vols, New York, 1968; first publ. 1904), 441–2. On the rarity of lapis lazuli among the intaglios see Spier, *Ancient gems* (ref. 16), 6.
 44. Blue-stone Aphrodites in the British Museum collection include MG 77, 78, 79, 80 and 85. The preponderance of blue and bluish stones of Aphrodite in the collection of the Cabinet des Médailles has been noted by Delatte and Derchain, *op. cit.* (ref. 42), 184), who point to DD 241, 243 and 245.
 45. For a gem similar to that of Plate IIC, see MM 35. Helios is depicted driving a quadriga on DD 295, 296 and 297, as well as MM 33. The boat of the Sun: DD 294. Helios, three stars and lunar crescent: DD 301. Helios surrounded by the signs of the zodiac: MG 245, 246 and 247. Helios, lion and star: DD 313 and 321. Helios, lion and cock: MM 32.
 46. The inscription MYPΘ on the stone of Plate IID is an example of a frequently puzzling aspect of the magical gems. This might be the verb “I weep”, except that this should normally be in the middle rather than the active voice. Or, as Michel suggests (*Mira et magica*, 41), it might be an allusion to myrrh, the burning of which is associated with love-spells in the magical papyri. Or it might be a word whose significance was clear only to a magician of first-century Egypt.
 47. Hermes as ithyphallic herm: DD 230. Hermes-Thoth: MG 51–56, DD 184–94. For other Hermes gems see MM 36, 37 and DD 233.
 48. A.-J. Festugière, “Amulettes magiques à propos d’un ouvrage récent”, *Classical philology*, xlvii (1951), 81–92, pp. 84–86. Other gems of Kronos as reaper are DD 262–5 and 268, as well as MG 425–9.
 49. Hesiod, *Theogony* 176 ff.
 50. For plentiful examples of Sarapis gems see MG 25–39, MM 55–59, DD 100 and 101.
 51. See also DD 256 and MG 86, 87.
 52. The use of astrological gems as phylacteries is mentioned by the lapidary attributed to Damigeron and Evax. See Robert Halleux and Jacques Schamp, *Les lapidaires grecs* (Paris, 1985), 232. The lapidary of Damigeron and Evax was composed in Greek, but survives only in a Latin translation, probably made in the fifth or sixth century (p. 227). This work contains one list associating zodiac signs with stones, and another associating planets with stones. However the list of signs

contains only seven, from which it is clear that it really functions as another list of planet–stone correspondences. For each of the seven signs, one should simply substitute the planet whose house it is, as noted by Halleux and Schamp (p. 219). See also Joachim Friedrich Quack, “Zum ersten astrologischen Lapidar im Steinbuck des Damigeron und Evax”, *Philologus*, cxlv (2001), 337–44, on the Greco-Egyptian roots of these associations.

53. There are many ancient and medieval lists associating the planets with particular stones or particular metals. There is very little agreement between lists. Most such lists have no bearing at all on the problem here under discussion. What is special about *PGM CX* and the *Alexander romance* is that the texts specifically say the stones are to represent the planets *on an astrologer's board* and that the texts come from the same period as the extant boards. However, for a survey of these lists, see Pingree, *Yavanajataka* (ref. 27), ii, 253–9. For similar lists in medieval manuscripts see Lynn Thorndike, “De lapidibus”, *Ambix*, xviii (1960), 6–23. Medieval lapidaries can tell us little about the ancient Greek astrological gems. However, from time to time, we do find Venus associated with “sapphire”, as in a Bodleian manuscript (Laud. Misc. 203, fol. 107r–v; see Thorndike, *op. cit.*, 11).
54. J.-H. Abry, “Les diptyques de Grand, noms et images des decans”, in Abry, *Tablettes astrologiques de Grand* (ref. 17), 85.
55. Jean-Claude Goyon (personal communication).
56. Other magical gems bearing a crab include MG 93, 96, MM 115, and DD 385 and 386. For another gem with crab and crescent see MG 94.
57. An almost identical gem is MG 260. Gems with lion and stars include MG 255 and 256. It should also be pointed out that there are a number of gems engraved with a lion and a lunar crescent, including MG 253, 254 and 264. Either these gems are not astrological in meaning, or else they represent a non-standard astrological doctrine.
58. Scorpion gems include DD 388, 389, 390 and 391, as well as MG 342, 3343, 344, 345 and 346.
59. Magical gems with Capricorns include MM 25 and DD 393 and 394.
60. Three of the photographs in Figure 5 are reproduced from *Monete imperiali greche: Numi Augg. Alexandrini. Catalogo della collezione G. Dattari compilato dal proprietario* (Cairo, 1901). See also Reginald Stuart Poole, *A catalogue of the Greek coins in the British Museum: Catalogue of the coins of Alexandria and the Nomes* (Bologna, 1964; reprint of the 1892 edn), nos 1080–90 and Plate XII. On the use of the symbol L for ‘year’ (the origin of which is uncertain), see p. xi. For numismatic details see Carl Carlson, “Rarities 3: The zodiac series”, *SAN* (Journal of the Society for Ancient Numismatics), iv (1972–73), 46–48, 53, and “The zodiac series revisited”, *SAN*, v (1973–74), 49–50 (however, the astrological interpretations mentioned in these two articles are not reliable).
61. Magical gems bearing starred images of the Dioskoroï include MG 290, 300 and 303, with the latter being the best candidate for a straightforward astrological marker. On Dattari 2969, Demeter stands upright, dangling two spears of grain from her left hand. In her right, she balances a torch, which rests upon the ground. Demeter gems include DD 409, 410, MG 37, and MM 45 (all lacking stars). MM 43 has on one side an enthroned Demeter and on the other a Gorgon with three stars.
62. Franz Cumont, *L'Égypte des astrologues* (Brussels, 1937), 113–31, especially pp. 113–14 and 124–5. On the astrological writers' lack of understanding of the Greek cities, see p. 72. Alexander Jones, “The place of astronomy in Roman Egypt”, *Apeiron*, xxvii (1994), 25–51, provides compelling additions to Cumont's argument, using archaeological and papyrological evidence.
63. On the Dendera zodiac, which is now in the Louvre, see S. Cauville, *Le zodiaque d'Osiris* (Leuven, 1997), a popular treatment based on the same author's *Dendera: Les chapelles osiriennes* (5 vols, Cairo, 1997). Besides the temple zodiacs, we should also mention the zodiacs from the tomb of Petosiris, in the Dachla oasis, dated to between A.D. 54 and 84. A certain Petosiris was, of course, the traditional founder of astrology. That astrological consultations might take place at the tomb of his namesake seems plausible. On the zodiacs from Egyptian temples, tombs and coffin lids, see Neugebauer and Parker, *Egyptian astronomical texts* (ref. 29), iii, 203–12, and

- Marshall Clagett, *Ancient Egyptian science*, ii: *Calendars, clocks, and astronomy* (*Memoirs of the American Philosophical Society*, ccxiv (1995)), 126–7 and 471–88. On the tomb of Petosiris, see O. Neugebauer, R. A. Parker, and D. Pingree, “The zodiac ceilings of Petosiris and Petubastis”, in J. Osing *et al.* (eds), *Denkmäler der Oase Dachla aus dem Nachlass von Ahmed Fakhry* (Mainz am Rhein, 1982), 66–101 and Tables 36–44. For the iconography of these zodiacs, see Françoise Gury, “L’iconographie zodiacale des tablettes de Grand”, in Abry, *Tablettes astrologiques de Grand* (ref. 17), 113–39.
64. Donata Baccani, “Appunti per oroscopi negli ostraca di Medinet Madi”, *Analecta papyrologica*, i (1989), 67–77, and “Appunti per oroscopi negli ostraca di Medinet Madi (II)”, *Analecta papyrologica*, vii (1995), 63–72. The ostraca quoted are Baccani’s nos 2 and 10.
 65. Paolo Gallo, *Ostraca Demotici e ieratici dall’archivio bilingue di Narmouthis*, ii (nos. 34–99) (Pisa, 1997), no. 84 (p. 89 and Table XXVIII). Also, a Demotic papyrus in Vienna carries three horoscope work-orders of similar type: Friedhelm Hoffmann, “Astronomische und astrologische Kleinigkeiten I: Pap. Wien D6005”, *Enchoria*, xxii (1995), 22–26, Table 2.
 66. Guido Bastianini and Claudio Gallazzi, “Dati per un oroscopo. O. Tebt. NS inv. 89/1”, *Tyche*, v (1990), 5–7 and Plate 2.
 67. Vitruvius, *On architecture* IX, 8.8–15. For a photograph of the Salzburg disk see James Evans, *The history and practice of ancient astronomy* (New York, 1998), 156. On the disk from Grand see: Marcel Nordon, “Sur un objet en bronze découvert à Grand, en Lorraine, en 1886”, *Bulletin de l’Association Nationale des Collectionneurs et Amateurs d’Horlogerie Ancienne*, no. 57 (1990), 27–42; Otto Neugebauer, *A history of ancient mathematical astronomy* (Berlin, 1975), 870; and, for a drawing, Henry C. King, *Gearred to the stars: The evolution of planetariums, orreries and astronomical clocks* (Toronto, 1978), 12.
 68. On the mummy portrait of Plate VI see the following: Klaus Parlasca, *Mumienporträts und verwandte Denkmäler* (Wiesbaden, 1966), 85–90; Barbara Borg, *Mumienporträts: Chronologie und kultureller Kontext* (Mainz am Rhein, 1996), 112; Barbara Borg, “Der zierlichste Anblick der Welt...”: Ägyptische Porträtmumien (Mainz am Rhein 1998), 70; Klaus Parlasca and Hellmut Seemann (eds), *Augenblicke: Mumienporträts und ägyptische Grabkunst aus römischer Zeit* (Munich, 1999), 39, 138–9; and Susan Walker (ed.), *Ancient faces: Mummy portraits from Roman Egypt* (New York, 2000), 59–60. For a discussion of the dating of mummy portraits, see Lorelei H. Corcoran, *Portrait mummies from Roman Egypt (I–IV centuries A.D.) with a catalog of portrait mummies in Egyptian museums* (Chicago, 1995).
 69. On the Egyptian roots of Sarapis see Stephen Quirke, *Ancient Egyptian religion* (London, 1992), 175–8, and Günter Hölbl, *A history of the Ptolemaic Empire* (London and New York, 2001), 99–100. On the Memphis Sarapieion, see Dorothy J. Thompson, *Memphis under the Ptolemies* (Princeton, 1988). On the introduction of the cult at Alexandria see P. M. Fraser, *Ptolemaic Alexandria* (Oxford, 1972), 246–59. For the iconography see Wilhelm Hornbostel, *Sarapis: Studien zur Überlieferungsgeschichte, den Erscheinungsformen und Wandlungen der Gestalt eines Gottes* (Leiden, 1973), and G. J. F. Kater-Sibbes, *Preliminary catalogue of Sarapis monuments* (Leiden, 1973). The story of the dream of Ptolemy I Soter, which led to the transportation of a cult statue of Sarapis to Alexandria, is told by Plutarch (*Isis and Osiris* 361F–362B) and by Tacitus (*Historiae* IV, 83–84).
 70. Hans Rupprecht Goette, “Kaiserzeitliche Bildnisse von Sarapis-Priestern”, *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo*, xlv (1989), 173–86.
 71. For Sarapis radiate, see Hornbostel, *Sarapis* (ref. 29), photographs 2, 140, 165, 270, 311, 312, as well as Gisela M. A. Richter, *The engraved gems of the Greeks, Etruscans and Romans*, Part II: *Engraved gems of the Romans* (London, 1971), nos 203, 204.
 72. For the statue of Sarapis holding a disk in his hand see Hornbostel, photographs 26 and 42a. For other artifacts with Sarapis and disk, see Kater-Sibbes, *op. cit.* (ref. 69), nos 33, 63, 79, and 988. For gems of Sarapis with star and lunar crescent, see Hornbostel, *Sarapis* (ref. 29), photographs 178, 180, 182, and 338. For a lamp of Sarapis flanked by stars see *ibid.*, photograph 252. For a lamp of Sarapis with star and crescent see *ibid.*, photograph 251.

73. For other examples of stars on coins, see James Evans, "The material culture of Greek astronomy", *Journal for the history of astronomy*, xxx (1999), 237–307, Figs 40 and 41.
74. See Clauss, *Roman cult of Mithras* (ref. 19), 44–50, 131–6.
75. A gold star diadem ornament similar to the one in the mummy portrait of Plate VI exists in the collection of the British Museum (EA 26328, 3.4cm across, 1st to 3rd century A.D.). Whether this particular ornament was really the badge of a Sarapis priest is doubtful, as it has eight rays. For a photograph see Walker, *Ancient faces* (ref. 68), 153, or Parlasca and Seemann, *Augenblicke* (ref. 68), 138.
76. For the gem of Fig. 7B see also Gundel, *Zodiakos*, no. 167, as well as Elfriede Brandt, *Antike Gemmen in deutschen Sammlungen*, i: *Staatliche Münzsammlung München*, Part 3, Gemmen und Gaspasten der römischen Kaiserzeit sowie Nachträge (Munich, 1972), no. 2664, p. 86 and Table 248. For the gem of Fig. 7C see Richter, *Engraved gems of the Romans* (ref. 71), no. 202. On the gem of Fig. 7D see also Gundel, *Zodiakos*, no. 144, pp. 126–7, 246.
77. Poole, *Catalogue of the coins of Alexandria* (ref. 59), p. lvi, conjectured that the astrological coins of year 8 of Antoninus celebrated the start of a new Sothic cycle (when Sirius makes its morning rising on the first day of the Egyptian year). Poole therefore interpreted the matched zodiacs of Fig. 8B as symbolizing the synchronicity of two kinds of year. But, if this is right, as Poole himself pointed out, it is hard to understand the reason for the delay, since the new Sothic cycle actually began five years earlier, in year 3 of Antoninus. Moreover, there was no iconographic tradition among the Greeks of representing two motions of different period by offset zodiac circles, such as we find in medieval and Renaissance representations of the theory of the trepidation of the equinoxes [see, for example, Evans, *History and practice* (ref. 67), Fig. 6.16, on p. 280]. Finally, the other coins of the same series all reflect standard astrological motifs.
78. Cairo Egyptian Museum CG 27567. See Günter Grimm, *Kunst der Ptolemäer- und Römerzeit im Ägyptischen Museum Kairo* (Mainz am Rhein, 1975), Plate 13, no. 12. This stele is also discussed in the following: M. Rostovtzeff, *The social and economic history of the Hellenistic world* (Oxford, 1941), ii, 900, Plate ci; Thompson, *Memphis under the Ptolemies* (ref. 69), Plate vii and pp. 87, 195, 197, 225, 265; and Susan Walker and Peter Higgs (eds), *Cleopatra of Egypt* (London, 2001), 104.
79. Earlier writers call this P. Parisinus 1, but it is now known at the Louvre as N 2325. For the text see F. Blass, *Eudoxi ars astronomica* (Kiel, 1887). There is a French translation in Paul Tannery, *Recherches sur l'histoire de l'astronomie ancienne* (Paris, 1893), 283–94.
80. For the chronology of the triple monarchy, see Hölbl, *Ptolemaic Empire* (ref. 69), 181 and 335–6.
81. This account of the provenance of the papyrus is due to Thompson, *Memphis under the Ptolemies* (ref. 69), 252–65. See also her remarkable reconstruction of the life and worries of Ptolemaios, son of Glaukias, at the Memphis Sarapieion from his letters, pp. 215–52.
82. Esna Zodiac A was located in the part of the temple constructed during the reigns of Ptolemy III–V. See Claggett, *Ancient Egyptian science* (ref. 63), ii, 126. Ptolemy III came into power in 246 B.C. and Ptolemy V was poisoned by his generals in 180. See the chronological table starting on p. 318 in Hölbl, *Ptolemaic Empire* (ref. 69).
83. On the transition from omens to real horoscopic astrology see David Pingree, *From astral omens to astrology: From Babylon to Bīkāner* (Rome, 1997).
84. For examples of the gem types see Hélène Guiraud, *Intailles et camées de l'époque romaine en Gaule* (supplement 48 to *Gallia*; Paris, 1988).
85. Plutarch, *On the obsolescence of oracles*, 407C, transl. by Babbitt (ref. 9), 331.
86. The *Alexander romance* mentions the illumination of the zodiac board in a small circle of light. Lamps decorated with images of Sarapis may be seen in many collections (for example, Louvre Inv. S1925, S 1926, S 5928, S 5929, CA 696, CA 2689, CA 5929, Tarse 111, and KLL 13–CA 5888). For examples of Sarapis lamps bearing astrological symbolism see Hornbostel, *op. cit.* (ref. 69) photo 251 (Sarapis flanked by star and lunar crescent) and 252 (Sarapis flanked by two stars). For a gold amulet casket of the second century A.D. decorated with images of Isis and Sarapis as serpents see Parlasca and Seemann, *Augenblicke* (ref. 68), p. 198, no. 105.