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Structuring astral science: a Demotic astrological manual from Graeco-Roman Egypt (Berlin, Egyptian Museum, P.Berlin 8345)

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Abstract: Papyrus Berlin 8345, which comes from the Roman-period Fayum (Egypt), contains a Demotic astrological treatise aimed at foretelling an individual's future based on the positions of the seven celestial bodies known in antiquity (Sun, Moon, Saturn, Jupiter, Mars, Venus, and Mercury) in the twelve places or compartments of the zodiac known as the dodecatropos. This paper briefly outlines the contents of the text and considers the conventions of textual division demonstrated in the papyrus. Since Demotic lacks modern punctuation, the scribe employed a host of other techniques to highlight and differentiate the various parts of the text. The manual was intended as a reference work, and the copyist therefore attempted to facilitate comfortable navigation through its different sections.

Keywords: papyrus, astral science, astrology, divination, Demotic, Graeco-Roman Egypt.

Introduction

P.Berlin 8345 is a papyrus roll which today preserves five fragmentary columns of an astrologer's handbook, written from right to left in Demotic Egyptian of the Fayumic dialect.[1] The larger part of the papyrus, the first four columns, is kept today in the Berlin papyrus collection,[2] while a fragment of the fifth column is preserved in Heidelberg.[3] It was once part of an astrologer's toolkit with which to foretell an individual's future, and contains what can be labelled a systematic catalogue of predictions based on various constellations that were deemed to be astrologically relevant.

The text can be dated on palaeographical grounds to the Roman period, probably to the first century AD, although the second century cannot be excluded.[4] As was usual for Demotic texts from Roman Egypt, it was written with a reed pen, a so-called *calamus* (Quack 2015: 444–45). The scribe used both red and black ink, a typical feature of manuscripts containing religious or para-literary texts. It was written on a fresh roll of papyrus, along the fibres of the *recto*.[5] Egyptian scribes tended to choose to lay out the text along the fibres of a papyrus if they had the choice, since it was easier than writing across them on the *verso*. On a reused roll,[6] however, the scribe might write either on the empty *verso* or else try to erase existing text so that he could write on the *recto*.

Archaeological and social context

The papyrus comes from Soknopaiou Nesos (Σοκνοπαίου Νῆσος, 'The Island of Soknopaios') also known as Dime (*T3-mỉy.t*, 'The Island'). The settlement is located on the north-western outskirts of the Fayum Oasis and is known today for the rich finds of both Greek and Egyptian—primarily Demotic—papyri dating to the Graeco-Roman period (Minnen 1998: 145–55). Most of these texts can be connected, directly or indirectly, to a temple dedicated to the crocodile god Soknopaios (*Sbk-nb-pay*, 'Souchos-Lord-of-the-Island') that stood in the centre of the village. It seems that a large proportion of the population worked as priests in the temple, meaning that they served a cultic function for at least part of the year. During the rest of the year, they engaged in a variety of more mundane trades, such as pursuing crafts, breeding donkeys and camels, and practising professional divination. The latter activity is particularly attested by P.Berlin 8345, though Egyptian astrological manuals from other localities can also often be connected to temple priesthoods, thus suggesting the importance of priests in maintaining this tradition.[7]

Egypt in Roman era was a bilingual society: while most of the population spoke Egyptian, most administrative work was conducted in Greek. Knowledge of written Egyptian was, by and large, confined to the priesthood, though the language of the manual does not necessarily indicate the language of an oral consultation.

Whether the manuscript was produced by the practitioner who used the text, or by a professional scribe who dealt in such texts, is not known.[8] The text was in all likelihood copied from another manuscript rather than composed anew, and the authorship of such texts was usually attributed to legendary sages. P.Carlsberg 420, one of the few astrological manuscripts in which the last column (and thus also a colophon) is preserved mentions that the text was copied exactly as it had been found.[9] This does not mean that all texts were copied exactly from a putative 'master copy', as a scribe might vary the content by adding material from other manuscripts, or by excluding formulaic expressions or particular sections.

The place of the text in an astrological consultation

Before embarking on a closer examination of P.Berlin 8345, it is worth providing a brief overview of how such a text would have been used to determine a person's fate, based on the celestial constellations active at the moment of his or her birth. First, the 'native', that is, the person for whom the procedure was conducted, needed to inform the astrologer when he or she had been born. This information could be written down and kept on an ostracon or a small

scrap of papyrus, as an *aide memoire* for when the horoscope was compiled (Hoffmann 1995; Menchetti and Pintaudi 2007). Whether the precise hour of birth could be established is questionable, but for the purposes of the consultation that hour—imagined or real—was key.

It is probable that the client would then be asked to come back at a later time, so that the astrologer could conclude his calculations and arrange the horoscope before revealing the native's future. The astrologer would likely turn to his astrological utensils: reference texts, and perhaps also a so-called *pinax* (Evans 2004: 4–24)—a board that represents the skies, usually by depicting the circle of the zodiac. The position of the celestial bodies and other astrologically relevant points could be visualized against the twelve signs of the zodiac with the help of markers, such as gemstones.

Common practice seems to have been to turn first to a sign-entry almanac (e.g., Neugebauer and Parker 1969: 225–40). Such texts contain lists that indicate the date on which a particular planet will enter a new zodiac sign, providing the astrologer with a rough estimate of the position of the planets on the ecliptic at the moment of the native's birth. By simple rules of thumb, the astrologer would also be able to roughly pinpoint the position of the two luminaries, the Moon and the Sun. The longitude of the latter is easily correlated to each month, and while a separate table may have been used for the former, a simple rule for its position at the beginning of any month might have sufficed, at least if rough values were acceptable. The Ascendant—the sign rising in the eastern horizon at the moment of the native's birth—would have been approximated in a similar way, though tools existed for more precise predictions (e.g., Jones 2007).

This information, the horoscope,[10] would probably have been written down on a piece of papyrus or on an ostracon, in either Greek or Demotic. Known horoscopes typically record the native's time of birth (and occasionally name), the position of the five planets known in antiquity (usually arranged in the following order: Saturn, Jupiter, Mars, Venus, and Mercury), the two luminaries, and the Ascendant. The planets were related to the ecliptic—set in relation to the zodiac signs—and by knowing which sign was in the Ascendant the diviner could transpose these positions onto a chart, such as the twelve places of the dodecatropos (Bouché-Leclerq 1899: 257–75; Neugebauer and Hoesen 1959: 7–8; Heilen 2015: 2.689–702).

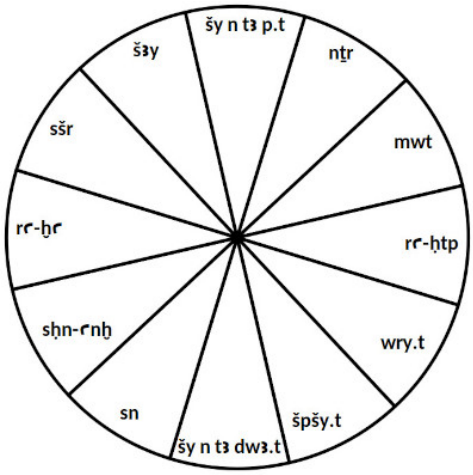

Figure 2: Diagram showing the twelve places of the dodecatropos.

The term dodecatropos refers to twelve compartments or places of the sky distributed at an equal distance across the ecliptic, each measuring 30° and thus together comprising 360° (Fig. 2). These were fixed with reference to the Ascendant and calculated anticlockwise. To simplify a little, a new zodiac sign takes this position at roughly each second hour of a 24-hour day, meaning that if Aries was in the Ascendant, Taurus would be in the second place on the dodecatropos, and so on. Each place determined certain qualities of the native's future (Barton 1994: 98). In Tbl. 1 are the names of the twelve places from P.Berlin 8345. Other texts can have slightly different designations for some of these places, usually representing qualities affected by each of the twelve (see, e.g., Winkler 2018: 305).

Table 1: The twelve places in P.Berlin 8345

No.	The twelve places	Translation
1*	*rᶜ-ḫᶜ*	Ascendant
2	*sḫn-ᶜnḫ*	Provisions of Life
3	*sn*	Brother
4*	*šy (n tȝ) dwȝ.t*	Lake of the Netherworld
5	*špšy.t*	Fortune
6	*wḥy.t (wry.t)*	Misfortune
7*	*rᶜ-ḥtp*	Descendant
8	*mwt*	Death
9	*nṯr*	God
10*	*šy (n tȝ) p.t*	Lake of the Sky
11	*šȝy*	*Daimon* /Fate
12	*sšr*	Evil *Daimon*

Items marked with an asterisk (*) indicate cardinal points.

After recording the positions, the astrologer would turn to his divinatory handbook—an astrological manual such as P.Berlin 8345—to look up the relevant entries before delivering the forecast to the client. The resulting predictions would typically have been delivered orally, and would therefore have been memorized.[11] The composition and structure of the astrological manual were designed to facilitate the memorization process, so it makes use of wordplay and punning—a technique well-known from similar texts in antiquity (Winkler 2016: 267–69). The formal structure of the text is discussed in greater detail below.

The structure of the systematic catalogue

P.Berlin 8345 is fragmentary and only partially preserved, so the manuscript must be compared to other astrological texts in order to understand its structure and layout. Moreover, all preserved manuscripts of this kind from Egypt are incomplete, so to better appreciate P.Berlin 8345, we must compare it to other fragmentary papyri.

The preserved part of P.Berlin 8345 consists of five incomplete columns, each of which would originally have contained roughly 23 lines of text, containing astrological predictions. The extant text represents the systematic catalogue—a collection of (ideally) all permutations possible within a given astrological system and their outcomes for the native—here relating each planet to the dodecatropos.

The preserved part of the manuscript is summarized in Tbl. 2. The columns are numbered according to the preserved fragment; it is almost certain that there were columns preceding 'col. i' in the original manuscript.

Table 2: The contents of P.Berlin 8345

Location	Contents
col. i 1	Heading introducing the influences of Venus (*nꜣ sḫny n Pꜣ-nṯr-t(w)ꜣ*)
col. i 2–8	Forecasts relating to Venus in the Ascendant
col. i 9–13	Forecasts relating to Venus in the House of Provisions of Life
col. i 14–18	Forecasts relating to Venus in the House of the Brother
col. i 19–[23]	[Forecasts relating to Venus in the Lake of the Netherworld] *
col. ii 1–4	Forecasts relating to Venus in the House of Misfortune
col. ii 5–9	Forecasts relating to Venus in the Descendant
col. ii 10–14	Forecasts relating to Venus in the House of Death
col. ii 15–19	Forecasts relating to Venus in the House of God
[col. ii 20–22] **	[Forecasts relating to Venus in the Lake of the Sky]
col. iii 1–6	Forecasts relating to Venus in the House of *Daimon*
col. iii 7–10	Forecasts relating to Venus in the House of Evil *Daimon*
col. iii 11	Heading introducing the influences of Mercury (*nꜣ sḫny n Swgꜣ*)
col. iii 12–18	Forecasts relating to Mercury in the Ascendant
[col. iii 19–23] **	[Forecasts relating to Mercury in the House of Provisions of Life]
col. iv 1–5	Forecasts relating to Mercury in the House of the Brother
col. iv 6–9	Forecasts relating to Mercury in the Lake of the Netherworld
col. iv 10–13	Forecasts relating to Mercury in the House of Fortune
col. iv 14–18	Forecasts relating to Mercury in the House of Misfortune
col. iv 19–23	Forecasts relating to Mercury in the Descendant

* The fifth place of the dodecatropos, the House of Fortune, should have followed the forecasts of the planet in the Lake of the Netherworld.
** Reconstructed number of lines.

The following two sections are not visible in Fig. because the corresponding fragment is preserved in the Heidelberg collection:

col. v 1–4	Forecasts relating to Mercury in [the House of Death]
col. v 5–6	Forecasts relating to [Mercury in the House of God]

The astrological text in P.Berlin 8345 reads as a systematic catalogue that can be reconstructed as having been initially subdivided into sections relating to planets, arranged according to the standard planetary order. Each section would be based on the position of a planet or other celestial body in the dodecatropos, so that each treated the prognostications that would follow from the presence of the planet in each of the twelve compartments, with each corresponding to one place in the dodecatropos. It can be observed, however, that the scribe who compiled P.Berlin 8345 seems to have omitted one, as the predictions related to Venus in the House of Fortune are missing (cf. col. iv 10–13).

The planets were usually arranged to have the three 'superior' planets followed by the two 'inferior' ones: Saturn, Jupiter, and Mars, followed by Venus and Mercury (Neugebauer and Parker 1969: 175). It is thus likely that sections relating to the three superior planets are also missing. Predictions relating to Venus are found from the first line in col. i to line nine in col. iii, while the second half of col. iii—from line ten and throughout col. iv—contains forecasts relating to Mercury. The two luminaries were probably also part of the manual, and could have been in separate sections at the beginning of the systematic catalogue. If each planetary section occupied roughly the same space, then less than 20 per cent of the systematic catalogue remains, and the following order of sections might be expected:

1. Sun
2. Moon
3. Saturn
4. Jupiter
5. Mars
6. Venus
7. Mercury

This order is found in a few other texts, notably the Demotic astrological handbook found in P.Carlsberg 81, P.Carlsberg 89, and PSI inv. D 34,[12] which represent three fragmentary copies of one such handbook from Tebtunis. If P.Berlin 8345 followed this arrangement, it would mean that the column now held in Heidelberg would also have been the last column of the complete systematic catalogue.

But another possibility exists, namely that the sections were organized according to the geocentric distance of each celestial body. Such an arrangement would produce the following order:

1. Saturn
2. Jupiter
3. Mars
4. Sun
5. Venus
6. Mercury

7. Moon

This possibility is indicated by, for instance, P.Cairo III 50143, another astrological text from Tebtunis.[13]

The state of P.Berlin 8345 means that both options seem equally possible, but the number of lines occupied by each section provides a clue. To judge from what remains of the papyrus, each section would have occupied roughly 2.5 columns. The Venus section begins on line one in the first column, while that on Mercury begins on line 12 in the third column. If the text is structured as most horoscopes were, and supposing that each chapter had a similar length, Venus would be the sixth planet in the original order and forecasts relating to it should then have begun in the middle of the twelfth column, not at the beginning of one.

Yet if Venus were instead the fifth planet, its section would begin at the top of a hypothetical eleventh column. The section on Venus does begin at the top of a column, so it seems probable that P.Berlin 8345 was structured according to geocentric distance. This is not conclusive, though, because several other astrological manuals begin with an introduction (Winkler 2009: 373), which requires space and would alter where the beginnings of following sections were situated.

Other sections of the text: introduction and instructions

The introduction to an astrological treatise can theoretically comprise a single line (Quack 2002: 90–91) or contain a longer narrative (Quack 2019). The purpose of such an introduction was ostensibly to present the document to the reader, by stating what kind of text it was, who 'authored' it, where it was written, and how it had been passed down, often as a fantastical episode where the text was revealed to a king. Such literary devices are not unique to the astrological corpus, as almost any theoretical, instructional, or scientific treatise from Egypt would have contained such an element. Such opening lines provided the text with credibility; divine revelation cannot be disputed. It is probable that P.Berlin 8345 originally contained such an introduction, though whether it would have occupied only the first few lines or a longer passage cannot be known. Regardless, the length of this element would have affected where the systematic catalogue proper started.

Many astrological manuals also had an instructional section, containing an outline of the general principles of astrology, including lists of various celestial bodies, a description of the general effects that various constellations produced, and procedures such as how to calculate the lifetime of a native (Winkler 2016: 249). It is hard to predict what a missing instructional section contained, but there was probably general correspondence between how advanced a given astrological manual was and the level of detail the instructions contained. The astrological system employed by P.Berlin 8345 appears to be fairly rudimentary, so perhaps only a few general instructions were included in the text.

Where these instructions might have been placed is unclear. Comparisons with other similar manuscripts do not suggest a pattern. Some astrological handbooks—such as the one preserved in P.Carlsberg 81, P.Carlsberg 89, and PSI inv. D 34—dedicated separate sections to the instructions and the systematic catalogue. Even the placement varied across texts, as a large instructional section seems to be positioned after the systematic catalogue in P.Carlsberg 81

(etc.),[14] while others—such as P.Carlsberg 420 + P.CtYBR 1132vo— kept them on separate sheets of papyrus.[15] Either is possible for P.Berlin 8345. Rudimentary instructions could have followed the introduction, so that the text would have ended with the last planet in the systematic catalogue (either Mercury or the Moon), placed after the systematic catalogue on a sheet of papyrus that is now lost.

Accordingly, the manuscript of P.Berlin 8345 probably once contained the following three elements, of which only the second is preserved, albeit partially:

1. Introductory material
2. Systematic catalogue
3. Instructional section[16]

Subdivisions in the systematic catalogue

The prognostications in each section are, as noted, based on the positions of celestial bodies in one of the twelve compartments of the dodecatropos. Based on the surviving entries for Venus, P.Berlin 8345 runs through each in order, from the first, the Ascendant (col. i 2; col. iii 12), to the twelfth and last, the House of Evil *Daimon* (col. iii 7), albeit omitting Venus in the House of Misfortune for unknown reasons. This seems to have been an accessible way for the reader to navigate the text and find the appropriate section. If he had a planet positioned in, say, the Lake of the Sky, he would need only to look at the tenth entry after the heading to find the appropriate forecast.[17]

Every section of P.Berlin 8345 comprises more than one prognostication, that is, a chain of interlinked forecasts for each possible constellation. These vary in length, with the surviving examples relating to the Ascendant comprising seven lines each (col. i 2–8; col. iii 11–18), and those relating to the Descendant (col. ii 5–9; col. iv 19–23) occupying four to four-and-a-half lines. The latter is, by and large, the standard length of most of the entries, though the forecasts of Venus in the House of *Daimon* occupy six lines (col. iii 1–6). The length may not be incidental. It is possible that the compartments which were regarded as particularly influential received more attention.

Each prediction related to a constellation was expressed by a fairly standard formula consisting of two elements: the subject or the native: ‘The one who was born’ (*pꜣy-msꜥw*),[18] and a phrase mentioning the position of a planet within the dodecatropos, e.g., ‘when Venus was in the House of the Brother’.

The basic structure found in P.Berlin 8345 seems to have been the most common, but there were variants and abbreviated versions.[19] The scribe of P.Berlin 8345 could have written out an abbreviated formula but apparently chose not to. The full version does little to increase the readability of the text, so the motivation was perhaps stylistic rather than functional. There is a slight variation in the P.Berlin 8345 formula, either including or excluding the rare particle *mtwꜥf*. There seems to be no discernible reason that explains why it was occasionally used.

The predictions follow this formula. For instance, col iv 1–2 reads (note that the words written in red in the papyrus are marked by underlining):[20]

‘Again, the one who was born when Mercury was in the House of the Brother, as for this man, | great praise will come to him, more than his brethren…’ (*pꜣy-msꜥw r Swgꜣ mtwꜣf n ꜥ.wy (n) sn r pꜣ rmt n rnꜣf | r ḥs(.t) ꜥꜣ.t (r) ḫpr nꜣf (r)-ḫwꜣ nꜣyꜣf sn.w* …).

Or (col. ii 1–2):[21]

‘The one who is born when Venus was in the House of Misfortune, | much ill fame will occur for him …’ (*pꜣy-msꜥw r Pꜣ-ntr-t(w)ꜣ n ꜥ.wy (n) wry(.t)| r syṯ byn ꜥšꜣ (r) ḫpr nꜣf* …).

It should be noted that other astrological manuals may contain additional parameters in the introductory formula. Such additional parameters might specify whether a birth was diurnal or nocturnal, and where the planet stood in relation to one of its ‘dignities’ (a particularly important configuration). These elements do not seem to take a fixed position with respect to one another, but can be inserted in any order after a celestial body’s position in one of the twelve houses has been laid out.

Physical properties

Each of the five columns of P.Berlin 8345 is divided by a space, called an *intercolumnium*, each of which measures approximately 1.5cm, though the distance between the first and second columns is somewhat larger. The top margin typically measures 1.5 to 2cm, but due to its rather poor state of preservation the bottom edge of the papyrus it is more difficult to gauge. Judging by the fourth column, which is the best preserved, it seems that the writing ended approximately 3cm from the bottom of the papyrus, but it is probable that the space was occasionally up to one centimetre larger, in the same way that space at the top margin and between columns varies somewhat. The inscribed surface of each column measures between 11.5cm and 12cm in width and approximately 17.5cm in height. The preserved Berlin papyrus measures roughly 48cm across and roughly 21cm high. Where the full height of a column is preserved it comprises 23 lines, so it follows that each column would have had a similar number of lines, though this may have varied slightly across the scroll.

Compared with other divinatory manuals from the same locality, this papyrus appears rather small; one might call it ‘pocket sized’. A dream interpretation manual now known as P.Berlin 8769, for instance, has been restored as containing up to 50 lines in each column (Prada 2012: 313), as has a divinatory handbook based on the movements of a gecko (P.Berlin 15682).[22] A treatise that concerns the rolling of a ‘die’ (P.Vindob.Dem.12006) comprises up to 48 lines, having a height of approximately 31cm. Another published astrological text from Soknopaiou Nesos, this one for casting nativities (P.Vindob.Dem.6614),[23] has a similar height to P.Berlin 8345, but the dimensions of the inscribed area differ.[24]

This does not mean that astrological manuals were generally smaller than other divinatory texts. P.Carlsberg 81, P.Carlsberg 89, and PSI inv. Dem. 34 are all from Tebtunis and were all written by different scribes, but still have similar measurements: the height of the roll in each case appears to be approximately 30cm, while the width of each column measures *ca.* 20cm, varying marginally across the three manuscripts. They are broadly the same size as other divinatory texts from Soknopaiou Nesos, a size adhering to the standard of a papyrus roll of a literary character in Roman Egypt (Ryholt 2006: 21).

Accordingly, the smaller size of P.Berlin 8345 was not genre-specific nor particular for divinatory texts in its locality. Its size may have made the manuscript more portable, and perhaps this was a reason why it was inscribed on a relatively small papyrus roll, though this is speculation. It is difficult to assess whether the size had bearing on how the manuscript was kept. There are no apparent traces of folding visible on the papyrus, which suggests that it was rolled when stored, but it remains unknown whether it was stored on a shelf, in a box, or in a jar. Cracks on the surface of the papyrus disclose that it was compressed and flattened after being rolled up, perhaps after having been discarded.

Graphically, P.Berlin 8345 conforms to many other contemporary documents from the Fayum,[25] but is among the simpler examples. It makes no use of guide lines, for instance, and there are no border lines to indicate either the height or width of the inscribed columns. When a papyrus roll consisted of several sheets pasted together, scribes often tried to space the columns so that the writing followed the edges. What is preserved of P.Berlin 8345 shows no trace of this practice: the papyrus preserved in Berlin appears to consist of a single sheet. It is, however, possible that the scribe used the edge between sheets that have not survived for *intercolumnia* (see Turner 1968: 3–5; Johnson 2011: 256–57).

Framing strategies used for other manuscripts include a thin vertical stroke between columns or above each column to indicate the borders of the inscribed area. Such simple demarcation lines perhaps had ornamental value while helping the scribe maintain an orderly structure (Prada 2012: 313). This did not stop some of the scribes beginning the text of each column above the line, however. Some texts have double lines framing the top, bottom, and sides of each column, which is a feature common in cultic manuscripts, often those carrying hieroglyphic texts (Ryholt 2017: 162), and again probably had an aesthetic value in addition to indicating the extent of a column. Occasionally only the *intercolumnia* were indicated with such an ornament.

Some texts used guide lines, which have again been understood as contributing to the aesthetics of a manuscript (Ryholt 2017: 161–62) in cases where they were clearly marked, but could also have served as a reading aid (Töpfer 2018: 41) or to facilitate the portioning of the text, at least when the ink was fainter in some parts of the text than others.

It is unlikely that P.Berlin 8345 followed the layout of its source text or texts. Notably, the three extant manuscripts of the astrological manual from Tebtunis all look slightly different, so there was no definitive pagination or distribution on the page that had to be followed:[26] the text was divided according to the space available, so a copy written in a smaller hand could fit more text in each column, more words per line, and more lines per page.[27] P.Berlin 8345 may have been copied from a manuscript that had a rather different appearance.

P.Berlin 8345 is not an ornate manuscript, in the sense that it lacks most of the decorative delineating elements found in similar papyri. Since variation seems to have been common among such manuscripts, embellishments may have had some value for establishing the ‘status’ of a text, in the sense that a more sumptuous manuscript might indicate a text or copy of importance.

Red, black, and blank

The scribe made use of both red and black ink, and the layout appears to have been carefully planned, since after the final words of a compartment the remainder of a line is left blank. The compartments are thus clearly divided from one another as each begins on a new line and ends with a visual marker: a blank space.

In one instance, however, in col. iv 13, the scribe lacked space for the last word of a forecast ('… and he will be happy until the end of his | lifetime'), and so instead of writing the last word at the beginning of line 14 he inserted it below the line to which it belongs, indented to the left. Moreover, the two last words in the following forecast have an unusually generous space separating them from earlier ones in the line. There seems to be no obvious reason for doing this. Scribes could bypass uneven sections or holes in the writing surface, but this is not the case here.

In the upper left corner of the first preserved column, where the forecasts relating to Venus begin, is a heading that introduces the section: 'The Influences of Venus'. This is signified by being placed in the space that served as the upper margin, thus ensuring that the heading stands out from the rest of the text. It was also written in red ink, a colour that catches the eye of the reader and makes it easier to navigate a text that was written mainly in black (Parkinson and Quirke 1995: 44–46).

Red ink was not a novelty when P.Berlin 8345 was written. Indeed, the oldest preserved writings on papyri (third millennium BC) made use of black and red colouration. Black ink was usually employed to write the main part of the text, while red was used for para-text or to emphasise certain features, such as important words or headings introducing chapters or sections. The introductory formula for each section of P.Berlin 8345 was also written in red, as were the introductory words for each compartment of the dodecatropos. This would undoubtedly aid in navigating the manual, and the technique was also employed by the scribes who wrote P.Carlsberg 81 and P.Carlsberg 420. But while those scribes used red to write out only the first few words of the introductory formula (*pꜣy-ms=w …*), and occasionally the name of a celestial body, the person who wrote P.Berlin 8345 went furtherby sometimes writing the whole first prognostication in red. This can be seen in col. iii 11–12, even though most of the forecast has been lost due to damage:[28]

'The one who was born when Mercury was in the Ascendant, he will become | […] it/him. He will know much' (*pꜣy-ms=w r Swgꜣ n rˁ-ḫˁ ỉw=f r ḫpr*| […]*=f ỉw=f r rḫ m-sš*).

Occasionally the scribe continued to use red ink in the second prognostication, as in col. iii 1–3:

'[The one who was born] when Venus was in the House of Daimon, | he will be happy as to fate. He will become the owner | of many possessions' ([*pꜣy-ms=w*] *r Pꜣ-nṯr-t(w)ꜣ n ˁ.wy (n) šy* | *ỉw=f r ỉr nfr-r-šy ỉw=f (r) ỉr nb* | *ỉḫy ˁšꜣ* …).

Here the line break may have prompted the scribe to change ink, but in a few instances most of the second divination was written in red ink before the scribe turned to black, without having been motivated to do so by a line break, for example in col. i 2–3:

‘The one who was born when Venus was in the Ascendant, he will become a praised man | [and] he will be foremost in the house of hisancestors’ (*pꜣy-msꜥw r Pꜣ-nṯr-t(w)ꜣ n rᶜ-ḥᶜ ỉwꜥf (r) ỉr rmt ḥsy* | *[ỉw]ꜥf (r) ỉr ḥꜣṯ ḥn pꜣ ᶜ.wy (n) nꜣyꜥf ỉt.w*).

There are even cases where the scribe turned to black ink even before finishing the first forecast, such as in the passage at col. ii 1–2, where words are coloured unevenly. The extensive use of red ink was not meant to save time by using all of the colour once the *calamus* had been dipped, as the scribe re-inked the writing utensil on several occasions in the red sections of each prognostication.

The first stroke of any one sign was richly inked, and the colour thinned out as the scribe continued to write, usually requiring fresh ink after two or three strokes. The first two lines of col. ii illustrate the uneven colouring of each word. The scribe sometimes rewrote signs entirely, or in part, as in the last word on the first line (*wly.t*, ‘Misfortune’), where three short strokes are visible. The scribe then re-inked his reed pen, because the next sign is again full, and so it continues until he switched to black ink. The scribe occasionally re-inked the *calamus* in the middle of a word when writing with red ink, which might suggest he was not trained in portioning out his ink, leading to the uneven pattern of densely- and lightly-inked strokes. But it appears that the parts written in black are more evenly inked, showing that re-inking was deliberate and dependent on the colour of ink used. The fact that the scribe could disrupt writing to dip his reed pen and still keep a fairly even level of ink while writing in black shows skill.

Other tools were used to enhance the visibility of each section. Some of prognostications end in the middle of a line (e.g., col. i 8), but instead of beginning the next subsection on that very line, the scribe left a blank space,[29] and the next forecast was written on the line below. As a result, line breaks effectively indicate each subsection. This structure resembles some contemporary divinatory handbooks, such as P.Berlin 15682, whose forecasts are based on the locations of geckos. But it is different from manuscripts such as P.Carlsberg 81, where a section corresponding to a new constellation begins on the same line where the previous one ends.

The section containing forecasts relating to the planet Venus ends at the tenth line of the third preserved column, but rather than beginning the Mercury section in the following column, the scribe wrote the heading in the same one. And rather than leaving a space after the final forecast for Venus—that of the planet in the House of Evil *Daimon*—and seemingly against common practice, he wrote the caption introducing the forecasts of Mercury immediately afterwards, even pushing it from the right margin of the column to the left. The heading was then written half-line lower than the preceding words, creating an empty space. By pushing the introductory caption to the left, he (presumably unintentionally) made it slightly more difficult to find, at least for the reader accustomed to perusing the right side of each column to detect a new section. It is unclear why the scribe did this. He may have inserted captions after the forecasts were written down, or he may have realized that he left too little space between the two sections, and that the only available space would be on the left side of the column. Alternatively, this may have been the way that the scribe introduced new sections when they began in the middle of a column, or he may have decided to save space after noticing that he was nearing the end of the available papyrus. The early columns of the papyrus are lost, so these suggestions cannot be tested. However, some astrological handbooks, such as P.Carlsberg 89, left a couple of lines between sections, so it is possible that the scribe would have followed this practice in earlier columns.

Different scribes used different approaches when copying a text, and modified their approaches as required within a single manuscript. P.Carlsberg 81 is a prime example of this. The scribe used red ink to introduce new subsections, at least until the forecasts relating to Venus when he seems to have run out of red ink. To compensate, he made use of blank spaces and excluded the first element of the formula: 'He who was born' (*pꜣy-msꜥw*). The empty space would catch the reader's attention in a similar manner to text in red. It is also possible that the scribe intended to fill in the blank space later, restoring the missing element. Later in the text, however, he began again writing out the full introductory formula preceded by an empty space that was occasionally filled with a thin red stroke. This would probably have been done after the manuscript was finished, when the scribe again had access to red ink. P.Carlsberg 89 is perhaps of relevance here, as its scribe consistently excluded the first words of the 'He who was born' formula from his version of the text.

No such deviations can be seen in P.Berlin 8345, but its scribe kept the introductory formula to bare minimum, only describing the position of a celestial body in a given position. It was thus only possible to include or exclude the particle *mtwꜥf*.

Conclusion

P.Berlin 8345 is a divinatory handbook concerned with determining an individual's future based on the position of the seven celestial bodies known in antiquity. It would have been only one of several tools employed by the astrologer before he delivered to the native the outcome of the astrological deliberations on his (the native's) future.

Egyptian divinatory handbooks employed various devices to facilitate finding an appropriate reference, and the scribe of P.Berlin 8345 made use of a number of such techniques. Ink of red and black was employed: the majority of the text was inscribed with black ink; the openings of new sections and subsections were written in red, and beginning lines of each new section were also inscribed in this colour, and not the more commonly-used black ink.

Moreover, while it would have been sufficient to write only the initial words of a new section or a subsection in red, the scribe often chose to go beyond this and write the entire first prediction in red. A user could skim thus through it looking for the red sections, and find what was needed more easily than if the text had been written only in black ink.

Headings also stand out graphically. The caption of the section pertaining to Venus was separated from the rest of the text-filled space in a more eye-catching way than that concerning Mercury. The scribe also ensured that each section began on a new line, so that a reader would only need to look at the right-hand corner of each column to find the appropriate sections, without having to read the whole text.

The structure of the manual is visibly adapted to its intended purpose, emphasising its practical qualities. By carefully planning the layout of every textual unit, the scribe ensured that the handbook was as user-friendly as possible, by holding to millennia-old traditions of colour coding, augmented by planned units of text with clear divisions separating each entry.

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Endnotes

1) On papyrus as a writing material, see Zellmann-Rohrer in the present volume, and for Egyptian-language texts in general see Parkinson and Quirke (1995). 'Demotic' is a term used to designate both a cursive Egyptian script ultimately based on the hieroglyphic writing system and the penultimate stage of the language (followed by Coptic). It was in use between seventh

century BC and the fifth century AD, with a stark decline in usage after the second century AD. See Depauw (1997), for a comprehensive overview of the topic. For a monograph dedicated to the demise of pre-Coptic Egyptian scripts, see Love (2021).

2) The manuscript is now kept in the Ägyptisches Museum und Papyrussammlung in Berlin. A preliminary edition with a black-and-white photograph was published by Wilhelm Spiegelberg (1902: 28, pl. 97). The first full transcription and translation was furnished nearly 80 years later by George R. Hughes (1986), and more recently an updated translation was published by Joachim Quack (2008: 368–70).

3) Quack (2018: 98, n. 174). This piece still awaits publication. I am grateful to Joachim Quack for providing me with information on this fragment.

4) See, e.g., Stadler (2004: 25–30) for the dating of various hands from Soknopaiou Nesos.

5) 5) See Ryholt (2017: 155–61).

6) It could be argued that a fresh papyrus indicated a high-status text, perhaps a presentation copy, while a reused papyrus might indicate a 'use text' (Moyer 2011: 235). However, the nature of a text did not determine its suitability for regular use (Quack 2014); most kinds of text could be written on a reused papyrus. There was no strict rule as to what types of texts could be recorded on a reused papyrus, and while it is not uncommon to find discarded administrative documents, such as accounts, on reused papyrus there also are plenty of exceptions. Reused papyri were probably employed because they were cheaper to acquire than a fresh roll. In rare cases, both the *recto* and *verso* texts may have been in use at the same time—for instance when both held the same type of information—but since the text on the back of a scroll was usually more prone to damage—being exposed to more wear when the papyrus was rolled up, or when placed on a table or board to be read—it can be assumed that it was not of primary interest to the keeper of the roll.

7) See Winkler (2016: 269–78). Note, however, that divinatory manuals such as astrological handbooks were not part of a temple's theological library, where ritual handbooks and other texts necessary for the cult would have been stored, even if they were kept there (Ryholt 2005). It is better to regard P.Berlin 8345 as part of a practitioner's private toolkit for casting horoscopes.

8) See Wespi (2016: 183–85). Many of the known astrological manuscripts come from Tebtunis (Winkler 2009: 361–75)—another village in the Fayum—and the variation between them suggests that a fairly large number of scribes produced such manuscripts: one would expect a greater uniformity had they been copied and supplied by one or a few individuals only. One text even exists in three contemporary copies (Winkler 2016: 247) that were written by three different individuals. The letter now known as P.Carlsberg 21 (Zauzich 2000: 53–55), concerns the delayed return of two borrowed medical texts to their owner, so it's possible that the person who borrowed them did so in order to copy them for his own needs. Another letter, P.Carlsberg 22 (Zauzich 2000: 55–57), suggests that the sender would copy a scroll for the addressee.

9) See Ryholt (2017: 174). The papyrus, which is kept in the Carlsberg Collection in Copenhagen, is still unpublished.

10) See Heilen (2015: 213–326) for a comprehensive list of such texts in both Greek and Demotic. A few texts appeared too late to be included in or were omitted from Stephan Heilen's catalogue. These include P.Berlin 21347 (Heilen 2015: 644), BKT IX 102 and X 29, O.Petr.Mus. 68, P.Kramer 17; and P.Monts.Roca IV 64. See Winkler (2018); Abbas (2021); Quack (2018: 100–103); Winkler (2022).

11) There are a few known cases where the forecasts were written down, either on the horoscope or in a separate document. The prime example is the so-called Old Coptic Horoscope (Černý, Kahle, and Parker 1957; Neugebauer and Hoesen 1959: 28–38; see also Winkler 2016: 257, n. 50 for additional comments).

12) Winkler (2016: 247). Though this text is also fragmentary, the same order is expected if the sections were arranged according to how the planets were listed. The Sun and the Moon are always mentioned ahead of the five true planets, and thus Mercury would have been listed last.

13) See Neugebauer (1943: 124); Quack (2018: 97). Only a small fragment of this papyrus has been published (Ryholt 2017: 174), but even that is informative about structure of the text. The preserved part contains the beginning of the chapter treating predictions relating to Mercury, where the planet is referred to as: 'The sixth god is Mercury' (*p3 nṯr mḥ-6 Swg3 p3y*). If the ordinal number corresponds to a section in the systematic catalogue, then Mercury was the penultimate celestial body. This can best be explained if P.Cairo III 50143 followed an arrangement where geocentric distance was taken into consideration.

14) The second century AD astronomer Claudius Ptolemy claimed, in the first book of his *Tetrabiblos* (I.21), that a table of terms at the end came from an ancient astrological manuscript (e.g., Heilen 2010: 52). This claim of antiquity likely had a rhetorical function, but it shows the continuation of instructional sections near the end of learned Egyptian treatises.
15) Winkler (2016: 260–62). P.Carlsberg 420 contains the systematic catalogue, which ends with forecasts relating to Mercury and a scribal colophon (Winkler 2016: 260; Ryholt 2017: 174). The instructions were on a separate sheet, P.CtYBR 1132vo (Depuydt 1994: 1–9; Bohleke 1996: 11–46). They were perhaps not *per se* part of the actual manual, but rather a tool enabling readers to make use of the manual, so the separation may have been for practical reasons. This astrological text is more advanced than that of P.Berlin 8345 as it contains more parameters to establish a divination, so it may have been easier to explain them on a separate piece of papyrus. Separate instructions may also have been easier to refer to when writing a horoscope than instructions contained at the end of a papyrus roll.
16) Shorter instructions could also be inserted before sections of the systematic catalogue, as is also evident in the preserved text of P. Carlsberg 81, P.Carlsberg 89 and PSI inv. D 34, or in P.Cairo III 50143 (see Quack 2018: 97), probably as a convenient summary of the more complete instructions elsewhere.
17) Though arranging the dodecatropos in this way seems logical and easy to navigate, it was not the only solution adopted by astrologers. Another approach was to separate the four cardinal points (nos 1, 4, 7, and 10) from the other eight, and to arrange them not in numerical order but in pairs of opposition, that is, the Ascendant and the Descendant and the Lake of the Netherworld and the Lake of the Sky. The remaining eight places would then be laid out in the typical order (Winkler 2016: 249–52). Some Demotic horoscopes from the Theban region in Upper Egypt (e.g., O.Neugeb. 1–4), were similarly organized. There may be a relationship between how a manual was structured and how horoscopes were drafted as part of the working process.
18) See Chauveau (1992: 104); Winkler (2009: 370); Prada (2017: 279–80).
19) Non-essential information could be excluded by abbreviating, such as the statement that a person was born. This practice would have been known to any user skilled enough to use the manual (Winkler 2016: 253–54, n. 39).
20) The repetition of the word *sn*, 'brother', in the House of the Brother and 'more than his brethren' is an example of the simple punning and word-association techniques employed in the text to facilitate memorization.
21) This example also contains wordplay: *wry.t*, 'misfortune' in the House of Misfortune, and its dialect form of *wly.t* resonate with *wr*, which can be translated in a variety of ways including 'great' or 'much'. As such it functions as a synonym to ꜥ𓎛, 'much', in the following line. There is of course a connection between 'misfortune' and being tormented by a bad reputation (*syṯ byn*).
22) See Zauzich (2012); Stadler (2004; 2012: 165–77); Quack (2019: 331, n. 42).
23) It's first editor, Eve A. E. Reymond (1977: 143–57), misunderstood the nature of the text: see Smith (1985: 112–13); Hughes (1986: 69); Quack (2002: 90–91).
24) The papyrus measures approximately 19cm and has a maximum of 23 preserved lines covering *ca.* 17cm of the surface. The widths of its columns are greater than in the Berlin papyrus, measuring no less than 16cm. Its precise width is unknown, however, because neither edge is preserved. The measurements give each column an almost square appearance.
25) For a general overview of such features, see Tait (1986) and Ryholt (2017: 161–67).
26) A few contemporary texts were paginated, so the technique was known (see Ryholt 2017: 168–72), but it was clearly not used in this instance. Pagination seems not to have constituted a point of reference for finding appropriate sections.
27) Two fragments of PSI inv. D 34 that preserve its height have different number of lines: the scribe filled in 25 lines in one column and 26 in the other. The scribe of P.Carlsberg 81 seems to have been more consistent, as where its full height is preserved each column comprises 31 lines. P.Carlsberg 89 does not have its full height preserved, but the most substantial fragments indicate a column height of at least 30 lines.
28) Quack (2008: 369) suggests 'He will become very famous' as a translation for the last phrase.
29) See Rößler-Köhler (1984–1985) for such textual devices in Egyptian manuscripts from the Pharaonic period. The author discusses various empty spaces that were consciously left vacant by the scribe, and their function as textual markers.