ZIGGURATS, COLORS, AND PLANETS: RAWLINSON REVISITED

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The Walls of Ecbatana

Since at least the mid-nineteenth century, scholars have pondered the meaning of the colors, which, according to Herodotus (*Hist.* 1.98), adorned the seven concentric battlements of the royal city of Ecbatana in Media built by King Deioces in the late-eighth century BC:

> The building was so contrived that each circle of walls is higher than the next by the battlements only. The fact that the place chosen was itself a hill helps the design, but it was also much strengthened by contrivance. The circles of the walls were, in all, seven, and within the final circle are the royal palace and the treasuries . . . The battlements of the first circle are white, the second black, the third scarlet, the fourth blue, the fifth orange. Thus the battlements of those five circles are painted with colors; but of the last two circles, the one had its battlements coated with silver, the other with gold. (trans. Grene 1987: 80–81)[1]

Hence the color sequence was:

white – black – dark red – blue – light red – silver – gold

Sir Henry Rawlinson (1810–1895), traditionally the founding father of Assyriology, seems to have been the first to suspect an astronomical significance in these colors, proposing that each represented one of the seven traditional planets. His primary source for these associations was the twelfth-century Azerbaijani poet Nizami:[2]

> This [Herodotus' account] is manifestly a fable of Sabaean origin, the seven colours mentioned by Herodotus being precisely those employed by the Orientals to denote the seven great heavenly bodies, or the seven climates in which they revolve. Thus Nizámí, in his poem of the Heft Peïker, describes a seven-bodied palace, built by Bahrám Gúr, nearly in the same terms as Herodotus. The palace dedicated to Saturn, he says, was black—that of Jupiter

1. In Greek, the respective colors are: *leukós*, "white," *mélās*, "black," *phoiníkeos*, "dark red," *kýanos*, "blue," *sandarákinos*, "light red," *katargyrōménos*, "covered with silver, silvered" and *katakechrysōménos*, "gilded." For *phoiníkeos*, *LSJ* s.v. "φοινίκεος") give "*purple-red*, *crimson*, and (generally) *red*," as well as "dark red," from *phoinix* with the same meanings (p. 1948). Rawlinson (1858: 242) and Grene (above) legitimately translate it as "scarlet." As for *sandarákinos*, Liddell and Scott (1996: 1582 s.v. "σανδράκη") give "of orange colour." The adjective is derived from *sandarákē*, "*red sulphide of arsenic*, *realgar*" or "*an orange pigment* made therefrom"; cf. Latin *sandaraca*, "a red coloring matter" (Lewis and Short 1879: 1626). We have opted here for a simple distinction between *phoiníkeos* as dark red and *sandarákinos* as light red.

2. In Nizami's romance *Haft Paikar* ("The Seven Beauties"), the hero Bahram meets seven maidens on seven successive days. Each has a different color of eyes, garments, and sometimes hair, and occupies a pavilion with a corresponding color. The colors are linked to the planets governing the days of the week. For translation and commentary, see Wilson (1924).

orange, or more strictly sandal-wood colour (Sandalí)—of Mars, scarlet—of the sun, golden—of Venus, white—of Mercury, azure—and of the moon, green—a hue which is applied by the orientals to silver. (Rawlinson 1841: 127–28)

He developed his views in 1854 when excavating parts of the great ziggurat temple of Nabû at Birs Nimrūd (ancient Borsippa). According to a cylinder he discovered, the ziggurat had been renovated by Nebuchadrezzar II (604–562 BC). The cylinder states that the ziggurat was called é.ur$_4$.(me).imin.an.ki, "house which gathers the seven (me's) of heaven and underworld" (George 1993: 157 s.v. #1193). Rawlinson took these mes to be "the planets of the seven spheres" (1861: 17–18).[3] In keeping with this, he set out to identify seven stages in the ruins of the structure and satisfied himself that each had been decorated with a different color. He reconstructed these, in ascending order, as:

black – rich red brown – bright red – gold – yellow – blue – silver

Then, using the "Sabaean" associations he had derived from Nizami, Rawlinson recognized in this sequence "the well known [planetary] order of Saturn, Jupiter, Mars, Sol, Venus, Mercury, and the Moon . . .":

Saturn	Jupiter	Mars	Sun	Venus	Mercury	Moon
black	rich red brown	bright red	gold	yellow	blue	silver

For Rawlinson this was proof that the Babylonians were not only interested in the order of the planets, but that they had arrived at the most accurate system possible within the limits of a geocentric perspective.[4] The design of both Birs Nimrūd and Ecbatana apparently presupposed knowledge of this planetary sequence. Rawlinson felt that "hints" from a tradition about the variegated ziggurat of Borsippa could have fed into the story of the walls of Ecbatana (1861: 18 n. 1). However, as the reconstructed sequence at Borsippa did not match that given by Herodotus for Ecbatana, he was forced to conclude that the reported color order was irrevocably muddled.[5]

The Borsippa Ziggurat

But what did Rawlinson actually find at Birs Nimrūd? Starting with the lowest level of the ziggurat he reported the following:

1. The well-preserved lowest tier was "thickly coated with bitumen," providing the black color associated with Saturn (Rawlinson 1861: 18).
2. Burnt bricks of high quality, "a rich, red brown." Despite his admission that "it is not very certain what color we are to attribute to Jupiter," the logic of his wider assumption led Rawlinson to associate this stage with that planet (1861: 19).
3. Brighter red bricks, which to Rawlinson indicated Mars (1861: 9, 19–20), universally recognized in the ancient world as "the red planet."

3. The meaning of the word me is among the most debated of the Sumerian lexicon. Terms such as "power" or "decree" are currently preferred; for a discussion see Averbeck (2000: 418 n. 2).

4. The outer planets (Saturn, Jupiter, and Mars) are given in their correct order, starting with the most distant from the Earth, and are correctly separated from the inner planets Venus and Mercury. The Moon is in its correct position as the nearest body to the Earth.

5. His brother George experimented with a weekday sequence of planets for Ecbatana but similarly had to conclude that Herodotus had "accidentally reversed the places of black and white, and of scarlet and orange" (1858: 242).

4. Pinkish bricks, which Rawlinson thought were originally clad in gold, representing the Sun, but subsequently plundered; he found the fourth stage severely damaged, as if by pickaxe (Rawlinson 1861: 20).
5. Yellow bricks. Without specifying his sources (evidently Islamic), Rawlinson (1861: 21) opined that "Venus was figured in the temple of Borsippa as a light yellow."
6. Gray. Using a highly elaborate argument (see below), Rawlinson (1861: 22) argued that this level had originally been encased in a coating of burnt blue slag. He asserted that "The sphere of Mercury . . . is everywhere represented as blue."
7. Gray, weather-beaten bricks. Rawlinson (1861: 23–24) explained the absence of a silver coating, corresponding to the Moon, again by plundering.

Planetary associations aside, Rawlinson's own words reveal the highly prejudiced nature of his decisions regarding the "original" colors by which the stages were distinguished. Rawlinson admitted particular problems regarding the great pinnacle of brickwork at the top of the ruin, thought to represent the sixth and seventh levels, plus a presumed chapel on the summit:

> It may be objected that the whole extent of the standing pile exhibits, at present, one uniform appearance of dark, weather-beaten brickwork, and that there is no trace of its having been divided into two stages, or having supported a superstructure. (1861: 22, 23)

Rawlinson's explanation for the absence of the expected color (blue) from the sixth stage (the base of the "pile") was even more ingenious than that for stages #4 and #7. Here he appealed to "the large detached masses of vitrified matter, now cumbering the upper platform" (1861: 22). Described by him as "blue slag," more of it was "strewn about the surface of the mound, and in some instances . . . rolled down into the plain" (1861: 7). In Rawlinson's opinion, it "most unmistakably split off from the lower portion of the pile" and hence originally formed the exterior casing of the sixth stage (1861: 22, 7). The reasoning involved the idea that this stage of the ziggurat had been deliberately fired: "all this portion of the building had been artificially vitrified at the time of its construction," the intense fire converting its exterior into "one uniform mass" of blue slag which had subsequently split off "under the action of the elements" (1861: 6, 7).

The weakness of these arguments is self-evident. The idea that the fire was due to a deliberate process, *intended* to convert the sixth stage into "slag," is extraordinary. Such a method is without parallel in the architectural history of ancient Mesopotamia.[6] As observed by Julius Oppert (1863: 202), who examined the structure shortly before Rawlinson, the intensity of the fire had been enough to warp some layers of brickwork to the extent that they were no longer horizontal. The burning must thus surely have been unintentional on the part of the builders.

Extensive merging of the ostensible brick colors in the interior clearly caused Rawlinson (1861: 8, 21) considerable difficulty. For example:

> The pink and yellow layers are so intermingled, where the zones, as exposed in the trenches, appear to join, and generally, indeed, wherever the bricks can be examined around the slope of the mound, that it is impossible to say exactly where one division ends, or the other begins.

Likewise, Rawlinson's distinction between the red brickwork of layers 2 and 3 (see above) was hardly compelling.

6. Rawlinson may have been influenced by an idea widespread in the late-eighteenth century, according to which the so-called vitrified forts of Scotland had been deliberately fired, a proposition laid to rest in Wilson (1851: 413–18).

Indeed, so ruinous was the condition of the ziggurat that it seems extremely doubtful that Rawlinson was able to examine any exterior surface (as opposed to interior brickwork) as it was intended by its builders, apart from the bitumen coating on the first tier (Koldewey 1911: 57; see also Allinger-Csollich 1998: 103) and the blue-glazed bricks that were not found *in situ*. Because of this, Robert Koldewey (who carried out the first properly scientific excavations at Babylon in 1902) concluded from his visit to Birs Nimrūd that the alleged color distinction between the stages was nothing but fantasy (1911: 58). Most recently, the Austrian excavators working at Borsippa between 1980 and 1996 (Allinger-Csollich 1998) have not discerned any significant difference in the colors of the core brickwork. Aside from the black and the blue exterior decoration, it seems clear that the color differences perceived by Rawlinson in the interior were due to the accident of using different batches of bricks, varying in color either because of the clay source used and/or the degree of firing.

To conclude, it appears that wishful thinking misled Henry Rawlinson in his interpretation of Birs Nimrūd, reading Nizami's colors into the ruins. The only colors supported by archaeological evidence are the black and blue of the exterior decoration. That the latter was clearly not produced by firing a whole stage of the ziggurat follows from Nebuchadrezzar's cylinder, which, though fragmentary, states with respect to the ziggurat at Babylon: "with glazed bricks of pure blue color I raised it to its summit" (trans. Beaulieu 2000: 310).[7] The same text, among others, also confirms that the Babylonians decorated temples with precious metals: "I applied shining gold (glaze) instead of plaster. Ezida I built anew and with silver, gold, choice gems, copper, *musukkanu*-wood (and) cedar-wood, I completed its work." Additional examples could be supplied.

The Rise and Fall of Astral Interpretations

Despite the manifest flaws in Henry Rawlinson's understanding of Birs Nimrūd, it was accepted quite uncritically by many leading orientalists of the late-nineteenth to early-twentieth centuries.[8] A paradigm had been set for the interpretation of ziggurats. Henry Rawlinson's notion that the Babylonians possessed advanced knowledge of the planets was promulgated by his brother George Rawlinson (1879: 571–79) and spawned a plethora of "astral" interpretations of Mesopotamian myth and religion. By the early 1900s, these were flourishing in a—largely German—movement referred to as Pan-Babylonianism (Schmidt 1972: 97–102; Parpola 2004). Its central tenet was that the Babylonians were extremely accomplished astronomers, who had invented the zodiac as early as 3000 BC and possessed not only sophisticated mathematical learning and an accurate calendar, but knowledge of such matters as the phases of Venus and even the precession of the equinoxes.

Notable early critics of Rawlinson included Jensen, who objected that the alleged Borsippa correspondences could not be meaningfully applied to the sequence of decorative colors found on the Khorsabad ziggurat (1890: 143; see below); and Jastrow, who outrightly rejected any association of these colors with planets (1898: 618). Scepticism appeared to be warranted when, only a few years afterwards, Koldewey's inspection of the ruins of Birs Nimrūd repudiated Rawlinson's claim that different colors could be discerned in the brickwork of the various stages.

By the mid-twentieth century, mention of Rawlinson's planetary color scheme for Borsippa was fading from the literature, and along with it the very idea that there was a link between seven-staged ziggurats and the planets. More broadly, Pan-Babylonianism turned out to be a remarkably short-lived trend in scientific history. By the early-twentieth century, it was failing to sustain broadsides from a number of critics, including, most notably, the brilliant Jesuit scholar Franz Xavier Kugler (1907). Its

7. Whether this passage implies that blue-glazed bricks decorated the actual summit of this building is unclear.
8. E.g., Budge (1884: 13–14); Sayce (1887: 115); Jeremias (1911: 17).

excesses of interpretation were rightly exposed, but the resulting embarrassment meant that scholarship drew in its horns generally with respect to astral interpretations of Mesopotamian religion. It has yet to fully recover from the backlash (see Parpola 2004).[9]

The Ziggurats of Khorsabad and Ur

The issue might have been entirely laid to rest, were it not for the fact that Herodotus's sequence of colors appears to have been largely confirmed by archaeological work at the sites of Khorsabad and Ur.

Sargon II (721–705 BC) founded Khorsabad (Dūr Šarrukīn) in Assyria.[10] A French team that explored its ziggurat in the mid-nineteenth century uncovered four surviving levels. The excavators, Victor Place and Felix Thomas, discovered that these stages were still partly covered with colored stucco—the lowest stage white, the second black, the third reddish purple, the fourth blue (1870: 79). Among the ruins, they reported numerous fragments of enamelled bricks colored vermilion, silver-gray, and gold. They took this as proof that there had been three further stages to the ziggurat, decorated with these colors.[11] It did not go unremarked that the whole array matches the very colors listed by Herodotus (Babelon 1906: 74–75), allowing that vermilion (a vivid red or orange-red) is equivalent to Herodotus's *sandarákinos* (or light red—see n. 1 above).[12] The precise order in which the hypothetical upper stages would have appeared remains conjectural, but it seems reasonable to suppose that they continued Herodotus's sequence, first because of the good match provided by the colors of the four surviving levels, and second because the placement of the most expensive decoration—silver and gold on top—makes good sense in purely practical terms, making it extremely plausible that the vermilion stucco belonged to the fifth tier.

Place and Thomas's observations were largely confirmed by the twentieth-century excavations of Khorsabad. Henri Frankfort, one of the excavators, gave the colors of the extant stages as follows:

> There were actually three stages, and part of the fourth was preserved. . . . Each of them was eighteen feet high and decorated with recesses; each was painted a different colour: the lowest white, the next black, the third red, and the fourth white. (1970: 78–79)

As for the last, Frankfort allowed that this was: "Perhaps bleached blue, for the succession of colours of the three lowest stages correspond with Herodotus's report on the tower of Babylon [*sic*], where the fourth stage was blue."[13] Frankfort was evidently working from his own observations, for had he relied on Place and Thomas solely he would have simply given blue for the fourth color.

9. Perhaps the nadir of astral interpretation was Jacobsen's understanding that the deity Inanna originated as the "numen of the date storehouse" (1976: 135), with her well-documented astral aspects (relating to the planet Venus, the star Sirius, and cometary imagery) being of secondary importance. More recent research has shown that the association of Inanna with a celestial body, probably Venus, is apparent not only from the early-second millennium BC (Heimpel 1982: 10–11) but from the very earliest Sumerian (Archaic) texts of the late-fourth millennium BC (Szarzyńska 1993: 9–10).

10. Interestingly, Deioces of Media, the traditional founder of Ecbatana, may well have been a contemporary of Sargon II. For the various dates ascribed to Deioces see Scurlock (1990); Henige (2004).

11. "Chacun des sept étages de l'Observatoire était peint d'une couleur particulière. La peinture des quatre premiers étages se voyait encore sur la ruine; celle des trois autres a été restituée, avec les étages eux-mêmes, et suivant les données que nous avons déjà fait connaître. Les sept couleurs, blanche, noire, rouge, bleue, vermillon, argent et or, sont de larges teintes plates, hautes chacune de 6 mètres . . ." (Place and Thomas 1870: 79).

12. Place and Thomas must have had reasons to opt for such a technical word, rather than "orange" or "rouge," especially given that Thomas was an artist. Vermilion represents the brighter end of the red spectrum, gravitating towards the orange. The analogy with Herodotus's *sandarákinos* is therefore close.

13. Herodotus, of course, did not report colored stages for the ziggurat of Babylon. Frankfort's uncharacteristically sloppy remark here is compounded by another in the same volume, where blue has even changed position (1970: 52): "Babylon, where Herodotus observed that each of the seven stages had a different colour, the uppermost being blue." A similar mistake was made by Woolley (1954: 219).

Evidence of colored stages has also been retrieved from the ziggurat at Ur. In its original form, as constructed by Ur-Namma and his son Šulgi (ca. 2100–2050 BC) of the Third Dynasty of Ur, the tower consisted of four stages. According to its excavator, Sir Leonard Woolley, the Neo-Babylonian king Nabonidus (555–539 BC) expanded the building into seven stages, leaving only the first level of the original intact (1925: 219; 1939: 135–43).

In his initial report, Woolley summed up his findings:

> The shrine, as we have seen, was bright blue, shining in the sun. The top was red: it was built of large lightly fired bright red bricks and was covered with plaster of the same colour. Below this the whole ziggurat, walls and steps alike, was black, the brickwork covered with a thin coat of bitumen applied with a brush. Below this again was the white-washed columned wall of the court. (1925: 14)

Here Woolley connected the blue bricks with a shrine forming the fourth stage but in his final report (1939: 141) the blue is assigned to the shrine at the hypothetical seventh stage of the ziggurat. The matter is inconclusive because the bricks were not found *in situ*. In an accompanying note, Gadd invited comparison with the colors found at Khorsabad, confirming *en passant* the validity of Place's reconstruction (in Woolley 1925: 14 n. 1 and 1939: 142 n. 1).

Ecbatana: A Fresh Approach

Although Rawlinson's analysis cannot in any way be used as a yardstick by which to assess the value of Herodotus's Ecbatana account, the archaeological evidence from Khorsabad and Ur warrants a reinvestigation of a possible connection between ziggurat colors and planets—especially as the planet-color associations argued by Rawlinson have left an indelible mark on the literature, notably in disciplines other than Assyriology and despite the decline of Pan-Babylonianism (see, e.g., Golzio 1983: 56–57). The matter is somewhat tangled, but one that we trust is worth the unravelling. In the following pages, the respective presuppositions of Rawlinson's argument will be reexamined in this order:

in architecture:
- whether it is legitimate to compare the legendary "battlements" (*promacheōnés*) of the royal citadel complex of Ecbatana to the stages of a ziggurat;
- whether some ziggurats consisted of seven stages;
- whether Babylonian architects, at least at some point, worked with a prescribed color system in the decoration of ziggurats;

in astronomy:
- whether Babylonian astronomers had a concept of seven planets, grouping the Sun and Moon together with the five "proper" ones;
- whether they assigned a specific symbolical color to each of the planets;

and hence:
- whether the respective stages of certain Babylonian ziggurats represented planets.

To begin with the first, the common assumption since Rawlinson's time has been that the tradition of the seven-colored battlements of Ecbatana may have arisen from conflation with the tiers of a ziggurat (see, e.g., How and Wells 1912: 104; Singor 1992: 408). From an archaeological perspective, the battlements story has always seemed unlikely. Moreover, there was a long tradition of ziggurat building in the Iranian world, of which a striking example is that at Choga Zanbil (thirteenth century BC) in Elam (Potts 1999: 223–26). The tradition continued through Neo-Assyrian times (e.g., the ziggurat at Susa described and depicted by Aššurbanipal; Parrot 1949: 47–48), while the tomb of the sixth-century

Persian king Cyrus (allegedly a descendant of Deioces) is like a miniature seven-tiered ziggurat, with the temple-shaped tomb placed on a series of six plinths (Parrot 1949: 50–51). In this light, it is legitimate to compare the seven colors given by Herodotus for the battlements of Ecbatana to the seven-colored stages of ziggurats.

The Seven-Tiered Ziggurats

Turning to the second question, Gadd (in Woolley 1925: 14 n. 1 and 1939: 142 n. 1) countered Rawlinson's planetary theory with the objection that ziggurats often had less than seven stages, commonly three or four. Indeed they did, but this does not preclude the possibility that ziggurats with seven stages may at some point have exemplified an idealized prototype. No intact examples of ziggurats have been found, and, as we have seen, their poor condition typically does not permit confidence about the original number of stages. Nonetheless, in some excavated examples of the first millennium BC, it has been surmised that seven was the original number of tiers. At Borsippa, for example, Allinger-Csollich counted five stages in the ruins of Nebuchadrezzar's restoration, but allowed for the possibility of two additional top stages that left no archaeological remains (1998: 103). At Ur, Woolley discovered three or four stages (depending on whether the white court is included in the count), but, on the basis of architectural projections, he suggested that Nabonidus's intention had been to transform the existing structure into one of seven stages.[14] At Khorsabad only four stages were discerned, but Frankfort thought it reasonable that there had been three further stages, as the height of the structure would then have matched the base "and this was, according to Strabo, the case in Babylon" (1970: 79).[15]

Reconstructions aside, what do iconography and texts tell us about the number of stages? Parrot's survey includes numerous illustrations, for example, a three-tiered structure on an Old Babylonian cylinder seal, four- to five-tiered towers on Assyrian cylinder seals, and the five-tiered ziggurat of Susa on a relief sculpture depicting Assurbanipal's Elamite campaign (1949: 37–50). In addition, a considerable body of literary and pictorial evidence documents the concept of a ziggurat with seven stages:

1. The so-called Esagila tablet from Uruk (AO 6555), first noticed by George Smith in 1876, dates to 229 BC (Parrot 1949: 22–24.; Wiseman 1991: 71) and is now also known from a partial duplicate in the British Museum (BM 40813); they are thought to be copies of an original no later than the early-seventh century BC (George 2005/2006: 75, 78; Allinger-Csollich 1998: 290–94). This sets out the dimensions of the temple tower Etemenanki (é.temen.an.ki) of the Esagila complex in Babylon, which was completed by Nebuchadrezzar II. Seven stages are described, with their respective dimensions (AO 6555 ll. 36–42). The height of the structure is equal to the base, a fact supporting Strabo's statement and Frankfort's deduction regarding the original height of the ziggurat at Khorsabad. George (2005/2006: 77, 86) regards it as "an ideal of how the tower was meant to look," not "a physical survey of a built structure."
2. A broken Neo-Babylonian stele (MS 2063) in the Schøyen Collection depicts a king, apparently Nebuchadrezzar II, "standing before a seven-storey ziqqurrat drawn in outline and labelled [é].tem[en].an.ki [z]i-qú-ra-at bābili (ká.dingir.ra)^{ki} 'E-temen-anki, ziqqurrat of Babylon.' The tower is as high as it is wide." (George 2005/2006: 79).

14. Woolley's considerations (1939: 137–41) included the distinct changes made by Nabonidus's builders to the lower levels, calculations from the amount of debris covering the ruins, suggesting that it originally stood to a considerable height, the layout of the flights of stairs and their angles, plus an idealized plan providing the best symmetry possible.

15. See Strabo, *Geog.*, 16.1.5, where the "tomb of Belus" (*Bēlou táphos*) is described as a quadrangular structure a stadion both in length and height.

3. Around 430 BC, Herodotus (*Hist.* 1.181.3) reported eight stages for the temple of "Zeus Belus" in Babylon, which can only have been the Etemenanki. Comparison with #1 and #2 shows that Herodotus's count was inaccurate, but it is easy to think of plausible explanations for the apparent discrepancy (George 2005/2006: 76 n. 2; Drews 1973: 180 n. 118).
4. A Late Babylonian tablet from Babylon (BM 38217; Wiseman 1972; 1991: 71; Allinger-Csollich 1998: 316–19) depicts the six lowest stages of a ziggurat. Wiseman showed that the top of the tablet, broken off, most likely showed a seventh level whose dimensions formed a cube.
5. An unprovenanced fragmentary Babylonian tablet in Berlin (VAT 8322 + 12886), of uncertain date, gives a drawing of six concentric squares. Jakob-Rost (1984) read the inscription on the upper margin of the tablet as the "ziggurat of Marduk," suggesting that the assumed temple on top of the structure counted as the seventh stage and wondering if the plan could have represented the ziggurat of Borsippa or an earlier form of the one at Babylon. More recently, George (2005/2006: 76) has disputed this reading, though allowing that the diagram is "in any case, clearly schematic" and may have represented at least an idealized ziggurat.
6. As seen, the name of the ziggurat at Borsippa (é.ur$_4$.(me).imin.an.ki) may imply a sevenfold structure.
7. A fragmentary tablet from Nippur now kept in Jena (HS 200a; Oelsner 1984, 1989) gives the floorplan of a building in the form of seven concentric squares with proportionally decreasing dimensions. The inscription does not identify the edifice, but Suter (1997: 5–6) convincingly argues that it can hardly have been intended for anything other than a ziggurat. While Oelsner thought the palaeography may suggest the Old Babylonian or Kassite period, Suter (1997: 6) has proposed an Ur III date.
8. The ziggurat of Ištar at Uruk was called (é).gi$_6$.pàr.imin.(na/bi), "house of seven *giparu*'s" (George 1993: 93 s.v. #384), *giparu* meaning the residence of the high priestess (Weadock 1975). A passage in the Temple Hymns (16.201–202) arguably refers to this structure when it characterizes Eanna as é.ub.imin, "house with seven corners" (ETCSL 4.80.1) or "of seven niches" (George 1993: 154 s.v. #1154). In practice, it is hard to conceive how else a building with seven "corners," "niches," or "angles" (Hübner and Reizammer 1985: 1092–93 s.v. "ub I," "ub II," "ub III," "ub IV') could have been realized architecturally other than in the form of seven stages, unless it were a heptagon (as translated in Edzard 1997: 143).
9. A byname given by Gudea, ruler of Lagaš (ca. 2100 BC), to the é.PA of Ningirsu, either at Girsu or at Lagaš, was é.ub.imin, "house of seven niches" (George 1993: 94 s.v. #393; 154 s.v. #1154, #1155) or "of seven corners" (Sjöberg and Bergmann 1969: 91–92), the same name as that given to the Eanna at Uruk (see #8). It has long been thought that the é.PA was a ziggurat (Barton 1923, but see Falkenstein 1996: 132–34).

The cumulative effect of this evidence is difficult to brush aside. It would appear that, possibly as early as the late-third millennium BC, the ziggurat in *optima forma* consisted of seven tiers. Even if, in some cases, the original intention had been to build ziggurats of seven stages, this may not always have been possible for architectural and economic reasons, in the same way that European cathedrals have not always been brought to completion (see George 2005–2006: 86). As a further analogy, hundreds of medieval churches were carefully aligned to the cardinal points, but the fact that just as many were not does not disprove the former. Similarly, solar alignments were built into the layout of Stonehenge, but while this may suggest that one of its functions was a Sun temple, this hardly applies by default to every circle of standing stones in prehistoric Britain. It only demonstrates differences in the priorities of the builders. Different Mesopotamian cities were "owned" by distinct gods, and there may have been complex theological and as yet unfathomed reasons for building towers with differing numbers of stages.

Ziggurats and Colors

The next step is to reevaluate the possible association of the tiers of the ziggurat to colors. To what extent might a uniform pattern of colors have been at work in the design and decoration of ziggurats, particularly those erected or refurbished in the first millennium BC? At Khorsabad, Place and Thomas (allowed by Frankfort) found the sequence white – black – red – blue. This matches exactly that at Ur, if one includes the white courtyard as Woolley did: "The four colours in their order, white, black, red, and blue" (1925: 14). The same sequence may also have underlain the arrangement at Borsippa, where, despite other uncertainties, we know that the base was black and that blue-glazed bricks once decorated a higher stage (see above).

Though limited, the evidence raises the possibility that a consensus color scheme was employed in the decoration of ziggurats during the first millennium BC—at least with respect to the relative order of the colors white, black, red, and blue. This is, of course, the very sequence given by Herodotus for the four outermost "battlements" of Ecbatana, reviving the question of whether his account may, after all, have reflected a blueprint from the Neo-Babylonian period. With regard to the remaining colors in the Ecbatana sequence (light red, silver, and gold), one should not be too skeptical given that Place and Thomas reported the discovery of glazed tiles around the Khorsabad ruin sporting these very colors. Further, the restriction of silver and gold decoration to the topmost stages is credible enough, for purely practical considerations. As it happens, silver and gold are mentioned in characters drawn at the center of the seven-staged ziggurat plan on the Jena tablet (Suter 1997: 5). Instead of Suter's hunch that these signify some sort of treasure preserved in the building, they could have been the intended colors of the top two levels of the ziggurat, if only to a token degree.

The alleged color sequence discerned by Rawlinson at Borsippa flatly contradicted that given by Herodotus, with the result that he was tempted to "correct" the tradition regarding Ecbatana. A hundred and fifty years of further archaeological research have produced a very telling result. We have seen that Rawlinson's color scheme at Borsippa was largely imaginary. By contrast, the Ecbatana tradition has been partly confirmed by the evidence from other sites (Khorsabad and Ur). A reexamination of the possible meaning of this color sequence (hereafter "the Ecbatana/ziggurat sequence"), especially where it has been confirmed by excavation, is thus long overdue.

Aside from the placement of precious metals on the topmost levels and the protective function of the bitumen at the base, it is hard to imagine any practical reason for the positioning of the other (better-attested) colors, namely, white, red, and blue. All the more since they appear to have occurred in a fixed sequence. One understandably turns, therefore, to the likelihood that their arrangement had some religious or cosmological significance. But did this concern a sequence of planets, as Rawlinson had assumed?

Intermezzo: Rawlinson's Sources

As Graeco-Roman astronomers have long been known to have linked the respective planets to specific colors (see conveniently Boll 1916: 20)—primarily based on their appearance—Rawlinson's assumption, in his day, that the Babylonians matched colors to planets, is in general perfectly reasonable. Yet to what extent can his sources be said to be representative of Babylonian astronomy?

Rawlinson's statement that "Herodotus' story [regarding Ecbatana] was a fable of Sabaean origin" (1841: 127) implies anachronistically that the Sabaeans, a gnostic sect of northern Syria, predated Herodotus. In addition, and by his own admission, Rawlinson relied almost exclusively on the twelfth-century AD poet Nizami for an alleged Sabaean tradition, and even this source he did not follow consistently. Specifically, Rawlinson elected to assign the colors yellow and silver to Venus and the Moon (1861: 21), instead of Nizami's white and green (Wilson 1924).

There is a more fundamental problem with Rawlinson's reliance on Nizami. Rawlinson may not have been unjustified in his belief that the Sabaeans of Harran had inherited a measure of ancient Mesopotamian planet lore; their eclectic religion comprised a mixture of hermeticism, Jewish gnosticism, Neo-Platonism, and indigenous Assyrian beliefs (Green 1992). But was Nizami a reliable mouthpiece of Sabaean traditions? It seems unlikely. Nizami's *Haft Paikar* was not a work on astrology, but a romance and, although contemporary with the Sabaeans, Nizami's background was Azerbaijani. A far more reliable, though later, witness to the Sabaeans would be the Arab geographer al-Dimašqī († 1327 AD), who gave a detailed description of the pagan temples of Harran, including the statues, colors, and metals associated with each of the seven planet gods venerated there (*Nuḫbat al-Dahr*, 1.10.1–8; 2.4.1, trans. Mehren 1874: 41–47; 71; see also Chwolsohn 1856: 381–96).[16] His writings, together with those of the tenth-century AD scholar al-Nihāwandī (apud Ibn al-Ǧawzī, in Hjärpe 1972: 69–88), reveal the following sequence of correspondences between planets, colors, and metals:

Saturn	Jupiter	Mars	Sun	Venus	Mercury	Moon
black	green	red	gold	blue / white	brown	silver / white
lead	tin	iron	gold	copper	mercury	silver

Thus, Rawlinson's alleged "Sabaean" colors compare very poorly with those known from more representative sources. There are only four matches (Sun, Moon, Saturn, Mars), but there is complete disagreement on Jupiter (Rawlinson: red; Harran: green), Venus (Rawlinson: yellow; Harran: blue/white), and Mercury (Rawlinson: blue; Harran: brown). It transpires that Rawlinson's much-vaunted "Sabaean" system was not Sabaean at all. Rawlinson's cavalier approach to the archaeology of Birs Nimrūd was thus compounded by use of inappropriate source material.

In addition, when reconstructing the colors at Borsippa, Rawlinson invoked "the well known [planetary] order of Saturn, Jupiter, Mars, Sol, Venus, Mercury, and the Moon. . . ." But well known to whom? This was in fact the "Ptolemaic" sequence prevailing in late Hellenistic and Roman times, which was often referred to as the "Chaldaean" order of planets (Evans 1998: 348–49; Neugebauer 1975: 691). The placement of the Sun in the center of the sequence reflects a quasi-heliocentric system, which the consensus of scholarship would not date any earlier than the second century BC, certainly not in a Babylonian context. The Rawlinsons never addressed this chronological difficulty, believing that the Babylonians

> . . . had notions not far from the truth with respect to the relative distance from the earth of the sun, moon, and planets . . . probably based upon a knowledge, more or less exact, of the periodic times which the several bodies occupy in their (real or apparent) revolutions. From the difference in the times the Babylonians assumed a corresponding difference in the size of the orbits, and consequently a greater or less distance from the common centre. (Rawlinson 1879: 577)

Yet the only evidence offered for such claims, bordering on circularity, was that "the arrangement of the great temple at Borsippa . . . is a sufficient proof. . . ." The Pan-Babylonianists, who followed the Rawlinsons' leads in many respects, are generally guilty of having back-projected Hellenistic concepts into earlier times (Parpola 2004: 239).

Counting Seven Planets

Despite the weakness of Rawlinson's case, his core idea of linking a seven-tiered ziggurat with the notion of seven planets is still worthy of examination. While it is often overlooked, it is clear that Baby-

16. Long before Rawlinson, al-Dimašqī (1.10.11) curiously attributed the Sabaean belief system to the "Chaldaeans."

lonian astronomers did conceptualize a grouping of seven planets (Horowitz 1998: 153; Reiner 1995: 4). Although their astronomical texts tend to exclude the Sun and the Moon from lists of planets, a number, ranging from the MUL.APIN to the Seleucid era, group all seven bodies together.

MUL.APIN (ca. 1000 BC, but see Geller 1990) states that the Sun, Jupiter, Venus, Mars, Mercury and Saturn, respectively, all travel "the (same) path the Moon travels," concluding with the words: "Together six gods who have the same positions, (and) who touch the stars of the sky and keep changing their positions" (II i 1–8, trans. Hunger and Pingree 1989: 70–71).[17] Thus as Horowitz (1998: 172) observes, "all seven ancient planets were to be found along a single band of the sky." The so-called Great Star List (Neo-Assyrian; ll. 242–244, trans. Koch-Westenholz 1995: 200–201) enumerates: "The moon and the sun Jupiter Venus / 'Wild Sheep': Saturn Mercury / Mars" and concludes with the summary statement "Seven planets."[18] The seven bodies are also listed together on two mid-seventh-century tablets from Nineveh, both of which list Moon – Sun – Jupiter – Venus – Saturn – Mercury – Mars (K. 2067, 19–21, in Weidner 1915: 19–20; K. 4386 = An-ta-gál, G. 303–309, ed. Cavigneaux et al. 1985: 229).[19] The date of these attestations, unlike those in Seleucid texts (e.g., AO 6460 obv. 22–24, trans. Sachs 1969: 338; Rochberg-Halton 1988, 324–25, 328), precludes Greek influence.

Matching Planets and Colors

In testing a possible link between ziggurat colors and planets, an obvious advantage today is that specific associations between planets and colors can now be inferred directly from excavated texts unavailable in Rawlinson's time. While Neo-Babylonian omen texts generally feature the planets in a variety of colors, depending on atmospheric and other conditions (e.g., for Venus; Reiner and Pingree 1998: 19), at least one text (K 2346 54) gives what appears to be a "standard" list of planetary colors:

> The white star is Jupiter, the Red Star is Mars, the Green star is Venus, the Black star is Saturn, variant: Mercury. (Reiner and Pingree 1998: 249; Brown 2000: 143)[20]

For three of these planets, the respective colors given are readily confirmed in other sources (Reiner and Pingree 1998: 248–49; Eilers 1976: 79–80, 93). A common Babylonian name for Jupiter was ^{mul}babbar, "white star,"[21] Mars, conspicuous for its redness, was known as ^{mul}SA$_5$, "red star," and Saturn, widely associated with black in the ancient world, is described in Babylonian texts as ^{mul}gíg, "dark star" or ^{mul}MI (see Gössmann 1950: 28).[22] The color associations of Venus and Mercury require further discussion.

As Sumerian and Akkadian made no distinction between green and blue (Landsberger 1967: esp. 139), the notion of a "green" Venus is arguably confirmed by the intimate association of the goddess of Venus, Inanna-Ištar, with lapis lazuli, a blue mineral that was valued in the cults of the gods generally,

17. The names used for these bodies are Sin, Šamaš, Šulpaea, Dilibat, Ṣalbatanu, Šiḫṭu *ša* Ninurta, and Kajamānu.

18. The respective terms are ^{d}30 u, ^{d}utu, ^{d}šul.pa.è, mul dil.bat, mul udu.idim, mul sag.uš, ^{d}udu.idim.gu$_4$.ud, and mul Ṣal-bat-a-nu, in all "7 mul udu.idim.meš."

19. The names used in An-ta-gál are ^{d}A.KU = ^{d}sin (30), $^{d\ kaš\text{-}še\text{-}bi}$GUD.LUGAL = ^{d}UTU, ^{d}*da-pi-nu* = ^{d}šul-pa-è-a, $^{d\ zib}$ZIG = ^{d}dil-bat, ^{d}lu-lim = ^{d}UDU.IDIM.SAG.UŠ, ^{d}*bi-ib-bu* = ^{d}UDU.IDIM.GU$_4$.UD, and ^{d}si-mu-ud = ^{d}*Ṣal-bat-a-nu*.

20. The Sumerian terms are MUL BABBAR, "white star," MUL SA$_5$ "red star," MUL SIG$_7$, "green star" and MUL MI, "black star" or "dark star."

21. Plato (*Republic*, 617a) alludes to Jupiter as the "whitest" (*leukótatos*) of the seven planets and to Venus as *deúteron . . . leukótēti*, the "second whitest." Despite that, white has been assumed by many (from Rawlinson to Parpola) to correspond to Venus, even though there seems to be no Babylonian source ascribing this color to Venus, with the exception of one difficult omen text in which it is described as "white and black"; Reiner and Pingree propose that this simply refers to the planet being bright or obscured (1998: 19).

22. Similarly in India, Saturn was known as Kāla, "the black one" (Eilers 1976: 93). Maimonides (*Commentary on the Mišnā, 'Abodah Zarah*, 3.1, in Chwolsohn 1856: 485), too, described Saturn as black. See Ptolemy, *Tetrabiblos* 2.9; Nigidius Figulus, apud Lucan, *Pharsalia* 1.651–657; Celsus, apud Origen, *Contra Celsum*, 6.22.

but among the planetary deities especially so with Ištar. Many references can be found to support this. For example, in Inanna's Descent to the Netherworld, when the goddess prepares for her descent she grasps a measuring rod and line of lapis lazuli and dons a necklace of two lapis lazuli beads (ll. 107, 113). When appealing to the gods Enlil, Nanna, and Enki to save her life, she repeatedly refers to herself as the stone: "Don't let your precious lapis lazuli be split there with the mason's stone." (ll. 45, see also 54, 62, 187, 201, 214; trans. ETCSL 1.4.1) In the so-called Uruk text, Inanna is given the epithet "her of the lapis lazuli (gems)"; a date-gatherer presents her with lapis lazuli from the "gem-revealing heap" underneath a date-palm (Jacobsen 1976: 34–35). Most importantly, a Kassite-period list of magical correspondences from Nippur, of which a partial Neo-Assyrian copy survives, directly links lapis lazuli (*uqnû*) with the planet Venus (^{d}dili.bat).[23] Indeed, a blue/green color for the planet, whatever its rationale,[24] is attested in at least one classical source[25] and ethnographic sources from some other cultures with no demonstrable link to Mesopotamia.[26]

Mercury is associated with a red hue, in at least one Babylonian omen text: "If Venus wears a red crown—Mercury stands in front of her" (K. 148.13; Reiner and Pingree 1998: 58–59; Brown 2000: 60).[27]

Finally, the association of gold and silver with the Sun and Moon is universal and requires no further comment.

To sum up, the following planet-color associations may be viewed as standard for Neo-Babylonian times: Jupiter (white), Mars (red), Venus (green/blue), Saturn (black), Mercury (red), Sun (gold), Moon (silver).

The Ziggurat Planet Order?

While the backlash against the Pan-Babylonianists has receded, allowing astral interpretations of Mesopotamian religion and myth to be discussed afresh, this time with more restraint (e.g., Heimpel 1986), discussion of a connection between the ziggurats and planetary astronomy has remained in the doldrums. It required the boldness of an eminent Assyriologist to raise the matter in recent years. Stressing the archaeological evidence, Parpola has revived the idea of a planetary meaning for the colors of the Khorsabad ziggurat and Ecbatana battlements:

> Remains of colouring on the ziggurat of the Assyrian capital city Dur-Šarruken show that each of its stages was painted in a different colour, the sequence of colours corresponding to the colouring of the seven concentric walls of Ecbatana in Herodotus I 98 (white, black, purple, blue, orange, gold, silver) and probably symbolizing the seven planetary spheres (Venus, Saturn, Mars, Mercury, Jupiter, Sun, and Moon). (1997: XCII; 2000: 199)

23. Livingstone (1986: 175–87, esp. 176–77). The collation (involving five manuscripts) given by Livingstone supersedes the incomplete version published by Langdon (1919: 330–43).

24. Venus easily shifts to the blue to the unaided eye. Livingstone (1986: 182) remarked: "Similarity in appearance may underlie connection of lapis lazuli with Venus."

25. Pseudo-Callisthenes, *Life of Alexander*, 1.8 (Armenian and Syriac versions).

26. For example, one of the names assigned to Venus as evening star by the Mescalero Apache of New Mexico is *sụụs bik? edalatl? izhe?*, "star blue/green under it"; apparently, this "gives emphasis to the characteristic glow of color Apaches perceive to be a part of Venus." (Farrer 1986: 60). The Mexican *Annals of Cuauhtitlan* (*Codex Chimalpopoca*, 3.56–4.2) report that the god Quetzalcoatl "was placed in his mother's belly when she swallowed a piece of jade" (trans. Bierhorst 1992: 28). The same god was thought to have metamorphosed into Venus's aspect as morning star, in the guise of a quetzal bird. (*Codex Chimalpopoca*, 7.27–46.) The quetzal bird (*Pharomachrus mocino*) has red feathers on the chest, but green wings and tail feathers.

27. In this text, the various colors of Venus's "crown" are ascribed to the influence of occultating planets. The cuneiform for "red" is SA_5. This is the same term as that used for Mars and in several texts of the same period also Jupiter (although the latter is never called "the red planet"), so in this text at least there is no distinction between "dark red" and "light red." The connection of Mercury with red may relate to Plato's (*Republic* 617a) qualification of Mercury as *xanthóteros*, the comparative of *xanthós*, "*yellow*, of various shades, freq. with a tinge of red, *brown*, *auburn* . . ." (*LSJ* 1187 s.v. "ξανθός"; cf. the brown of the Sabaeans, above). Vettius Valens associated Mercury with *ōchrós* (Boll 1916: 20), "*pale*, *wan*, of complexion . . . esp. *pale-yellow*, *sallow* . . ." (*LSJ* 2042 s.v. "ὠχρός").

Unfortunately, the detail of this proposal is subject to the objection raised by Jensen to Rawlinson's theory in 1890 (above): the deduced sequence of planets is unrecognizable either in astronomical terms or in the planetary orders familiar from Assyro-Babylonian texts. But this is because Jensen (and Parpola, too) relied on the manifestly unreliable planet-color correspondences offered by Rawlinson. Would a more intelligible order emerge if the planet-color associations given in cuneiform sources were applied to the Ecbatana/ziggurat sequence? The experimental result would be as follows:

white	black	dark red	blue	light red	silver	gold
Jupiter	Saturn	Mars	Venus	Mercury	Moon	Sun

A significant improvement on Rawlinson, this analysis relies on eighth- to seventh-century BC cuneiform sources contemporary with the construction of the first-millennium ziggurats. Intriguingly, the sequence reconstructed above produces a meaningful result in astronomical terms, as its constituents neatly fall into three groups: lowest are the outer planets (Jupiter, Saturn, and Mars); then come the inner planets (Venus and Mercury); and uppermost are the two major luminaries (Moon and Sun). The position of the latter is perhaps supported by the single or double pair of horns reported to surmount some ziggurats.[28] These possibly represent the crescent of the moon god Sîn, typically envisioned as a bull,[29] or the sun god Šamaš, who could also be referred to as a bull.[30]

With respect to the five traditional planets, their order is astronomically "correct" from a geocentric perspective, except for the reversal of the two outermost planets, Saturn and Jupiter. Yet it can hardly be coincidence that this order including the inversion is identical to that given in the first/second century AD by pseudo-Eratosthenes (*Catasterismi*, 43) and in the late-first century by Hyginus (*Poetica Astronomica*, 2.42).[31] In switching the positions of Saturn and Jupiter, as compared to the standard systems in vogue in Greece from the fourth century BC onwards, this order is aberrant and possibly archaic.

The astronomical ceilings known from Egyptian tombs from the mid- to late-second millennium BC reveal a sequence—like that reconstructed from the Ecbatana/ziggurat color order—which similarly distinguishes the outer from the inner planets and features the same reversal of Saturn and Jupiter, leaving Mars as the lowest of the outer planets:

> The usual order in which the planets appear on the monuments prior to the Graeco-Roman period is Jupiter, Saturn, Mars, Mercury and Venus, with the first three, the outer planets, separated from the last two, the inner planets, by . . . triangle decans . . . (Neugebauer and Parker 1969: 175, also 3; see also Clagett 1995: 124)

The Egyptian New Kingdom evidence thus refutes the possible objection that Babylonian astronomers of the eighth and seventh centuries BC could not yet have conceived a planetary order reflecting fairly accurate knowledge. The question of possible exchange of knowledge between Mesopotamia and Egypt on these matters will require further study.

28. "Bovine horns are depicted at the tops of ziggurats and other buildings throughout the ancient Near East . . ." (Horowitz 1998: 124) The *locus classicus* is Enūma Eliš VI.66, where with respect to the ziggurat built by Marduk, it states: "To the base of Esharra its horns look down" (Speiser 1969: 69; Horowitz 1998: 123). See also the reference in Assurbanipal's "annals," eighth campaign: "I destroyed the ziggurat of Susa, which was made of blue bricks. I cut off its horns made of shining cast copper . . ." (Horowitz 1998: 124). A relief of Assurbanipal depicts the same ziggurat, formed of five tiers with two pairs of horns on top (Parrot 1949: 47–48).

29. E.g., Sîn's epithet "the red wild bull" (Eilers 1976: 32).

30. E.g., Lugalbanda and Enmerkar (ll. 223–24), where Lugalbanda addresses the Sun as "Bright bull, emerging from heaven's base" (Heimpel 1986: 143). In the Gilgamesh Epic (IV, Ha_1 10–13; trans. George 1999: 37) Enkidu interprets the "wild bull" of a dream as Šamaš.

31. Some manuscripts of Hyginus also swap the names *Phaenon* and *Phaethon*, so that the usual Hellenistic assignment of Phaethon to Jupiter and of Phaenon to Saturn is restored, but Phaethon/Jupiter occupies the highest orbit (Le Boeuffle 1983: 178 n. 7).

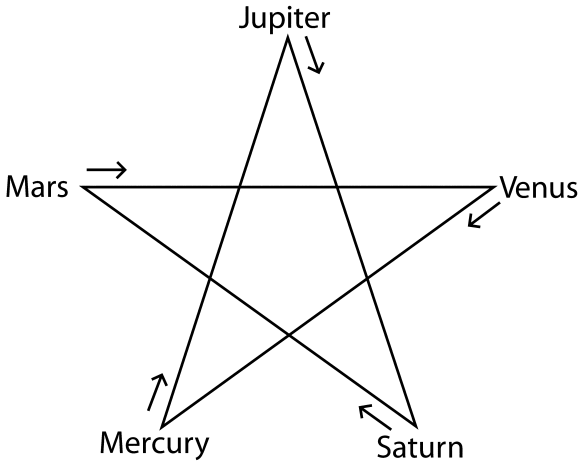

Fig. 1. Planetary Pentagram.

The Neo-Babylonian Planet Order

A more serious objection to the hypothetical planet order reconstructed on the basis of ziggurat decoration would be that it conflicts with the standard sequence of the five "proper" planets known from Neo-Babylonian astronomical texts (Brown 2000: 143; Rochberg-Halton 1988: 323, 327–28; Neugebauer 1975: 690):[32]

Jupiter – Venus – Saturn – Mercury – Mars

The conflict here may only be apparent, however. As it happens, the Ecbatana ziggurat order can be correlated with the standard Neo-Babylonian sequence by means of a pentagram,[33] by plotting either on the corners and reading along the diagonal lines (fig. 1).[34] Such a result is not a mere curiosity. It is well known that, in imperial Roman times, the sequence of the weekdays (by their tutelary deities) was derived from the quasi-heliocentric ("Chaldaean") planet order then in vogue (Cassius Dio 37.18–19; Boll 1911: 372–75; Neugebauer 1957: 169; 1975: 691) by taking leaps of two. While the precise origins of this weekday system—still adhered to—remain shrouded in fog (Zerubavel 1985: 8–9; Sarton 1959:

32. The same sequence survived in Greek *horia* astrology (Rochberg-Halton 1988: 323). Variant orders are seen in *MUL.APIN* (II i 1–6: Sun – Jupiter – Venus – Mars – Mercury – Saturn, with the Moon) and during the Seleucid period (Jupiter – Venus – Mercury – Saturn – Mars; e.g., *TCL* VI.41, 23–24, trans. Sachs 1969, 338; see Neugebauer 1975: 690; Rochberg-Halton 1988: 323; Brown 2000: 143).

33. As a symbol, the pentagram is known from the Uruk and Jemdet Nasr periods (Falkenstein 1936: 118–19 s.v. #453; Goff 1963: 77, 113). Intriguingly, the pentagram was the Sumerian sign for u b, first attested in the Uruk IV period and used for the "regions" or "corners" of the world (De Vogel 1966: 292). While, in relation to cardinal directions, these were most frequently counted as four, the names of some ziggurats testify to a notion of "seven corners" as well (see above). De Vogel concludes: "It is certain that the pentagram comes from Babylon. . . . The pentagram, perhaps originally a geometrical figure, acquired a cosmic significance as early as in the third millennium B.C. (the connotation of heavenly region or quarter, already in the Fara texts, say c. 2600), while somewhat later it was connected with the planets" (1966: 292, 296). A heptagram shown on an intriguing late Babylonian tablet from Nippur was evidently used as a mathematical device of some sort (Horowitz 2006). Waerzeggers and Siebes have suggested it depicts the seven strings of the harp, while stressing "that the present interpretation of CBS 1766 rests on a number of emendations to the edition by W. Horowitz that could not yet be confirmed by collations" (2007: 45). Yet, even if the tablet concerns musical tuning, it is worth asking if this precludes an astronomical connotation, as originally considered by Hilprecht (1903: 530).

34. This approach was explored by Tetens (in Jensen 1886: 267; 1890: 133), Winckler (1905: 192–93), and Boll (1911: 373–75).

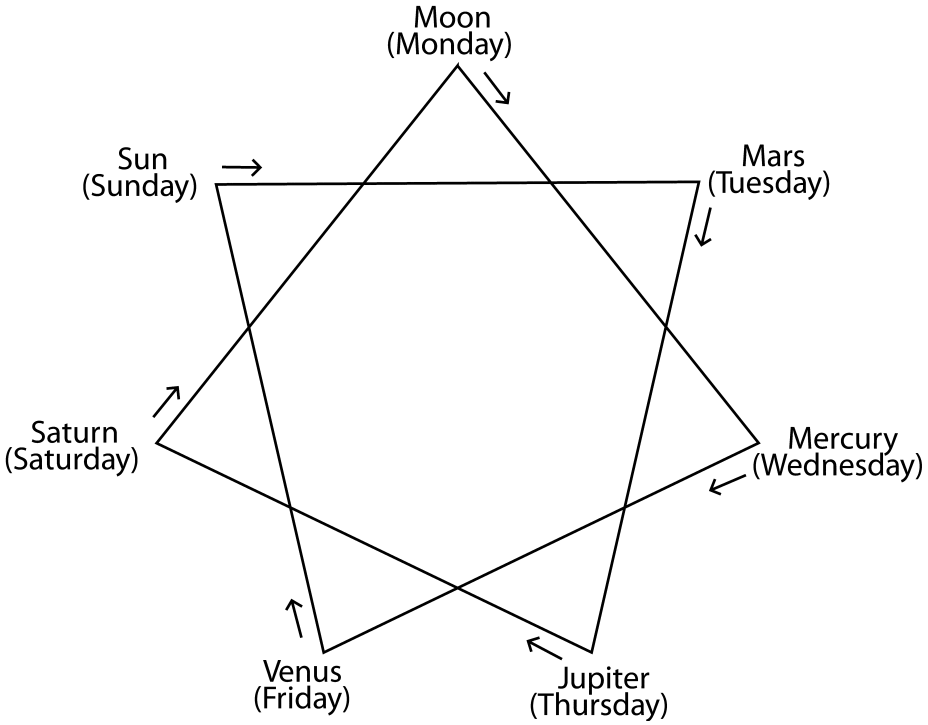

Fig. 2. Planetary Heptagram.

326–33; Gandz 1948–1949: 215–16; Colson 1926: esp. 6, 18, 22), there is no doubt that it originated as a mathematical adaptation of the so-called Chaldaean order.[35] Significantly, one way in which this adaptation could conveniently be visualized was the use of a heptagram (fig. 2) as a graphic device (Winckler 1905: 192; Jeremias 1911: 43; Sarton 1959: 332–33). Although none of the extant textual sources spells this out, Hellenistic astrologers are known to have positioned the planets at the respective corners of a hexagon, with Bel or Jupiter in the center—in Palmyra, Zaghuan (Tunisia), and possibly Baalbek, where "the hexagonal court becomes a symbol of the days of the week and the month. . . ." (Brown 1939; Palmyrene image in Wood 1753: pl. XIX A).

The quasi-heliocentric planetary system underlying the weekday order must, of course, have been known to the Babylonian astronomers of the Hellenistic (Seleucid) period, if only because a full-blown heliocentric (Aristarchean) model had been advocated by the Babylonian astronomer Seleucus in the second century BC (Sarton 1959: 295; Plutarch, *Platonic Questions*, 8.1 [1006C]). Yet neither this nor the earlier Platonic-Aristotelian geocentric order is attested in *any* extant cuneiform text. Instead, texts from this period continued to place Jupiter and Venus at the front of the sequence, as had been customary in the Neo-Babylonian period, while the relative positions of Mercury, Mars, and Saturn varied (Rochberg-Halton 1988: 325, 328). As Rochberg-Halton (1988: 323) notes, this positioning . . .

> has nothing to do with a spatial arrangement of the planets in the cosmos, in contrast to the following planetary arrangement in Greek astronomy and astrology: ♄♃♂☿♀. The Greek model represents the order of the planets in

35. Zerubavel (1985: 14) qualified "the astrological seven-day week" as "essentially a Hellenistic invention," which "most probably evolved sometime during the second century B.C. at the very heart of the Hellenistic world, namely Alexandria," almost concurrently with the Ptolemaic sequence itself.

depth according to their periods of sidereal rotation. No such "natural" explanation can be offered for the Babylonian sequence.

As Rochberg-Halton explains, the order typically followed in Seleucid literature is an astrological one, determined by the benefic and malefic aspects of the respective planets (1988: 323–25; see also Neugebauer 1957: 169). This is amply illustrated by a Seleucid text that gives the following order of planets, with accompanying glosses: Jupiter (favorable)—Venus (calm)—Mercury (heroic)—Mars (ambiguous)—Saturn (dark, disturbed). The reasons behind these astrological associations are beyond the scope of the present study—though it must be significant that Jupiter and Venus are the two brightest planets, Saturn the dimmest—except to note that their origins well predate the Seleucid period.[36]

The astrological planetary order was used in all literary genres, not just the astronomical.[37] That a scientific order is unattested in Seleucid cuneiform texts, when astronomers must have been thoroughly aware of developments in "Greek" astronomy, suggests that it was proscribed for magico-religious reasons. In plain terms, a "taboo" appears to have been operating. One is reminded here of the secrecy of Egyptian and "Chaldaean" astronomers stressed by Strabo (*Geog.* 17.1.29). According to him, Greek access to "barbarian" knowledge of the planets was a protracted process. At first the information was deliberately withheld, rather "concealed," by their savants, and only gradually revealed to those (like Eudoxus during his long sojourn in Egypt) who had the patience to "prevail upon them in time and by courting their favour," This report is consistent with the so-called *Geheimwissen* formula attached to some Babylonian astrological tablets, according to which "knowledge of the contents of the tablet is reserved for the initiated, lit. 'the one who knows,' and that showing it to an uninitiated person is a crime as bad as destroying the tablet itself. . . . In a sense, all astrology, including the series Enūma Anu Enlil, was certainly considered a part of the secrets of the great gods" (Koch-Westenholz 1995: 95). As the colophon of one tablet states, "Reading of (what has to do with) the great gods is the secret lore of Heaven and Earth. Reading the commentary is the secret lore of the scholars" (Ki 1904-10-9, 94: 26–30, in Koch-Westenholz 1995: 96).

These considerations require us to reexamine the problem of the standard Neo-Babylonian order of the planets, which, like the Seleucid, conspicuously evades any "natural" explanation in terms of astronomical distance. As both the Neo-Babylonian and the Seleucid "auspicious" orders begin with Jupiter and Venus, one must accept Rochberg-Halton's opinion that the same astrological thinking (that of benefic and malefic planets) underlay both schemes. Given this, as in the case of the Seleucids, one should be wary of denying Neo-Babylonian scholars any interest in a different, scientific order of the planets—though such may not have been "written" it may have been encoded in the color decoration of ziggurats.

In conclusion, while direct evidence is lacking for the planetary significance of the Ecbatana/ziggurat color sequence as reconstructed here, three lines of evidence strongly support it: (a) that it is meaningful in astronomical terms, (b) that it is similar to the planet order attested in some Greek and Latin writings and sources from the Egyptian New Kingdom, and (c) that the device of the pentagram apparently links it to the known standard planetary order of Neo-Babylonian times. There may be thus be good reason to reappraise the persistent tradition of the Greeks that they learnt about the planets from the Babylonians and Egyptians.[38] This tradition conflicts with the current understanding that the Greeks "invented" the concept of a planetary order based on relative distance, while the Babylonian view of

36. As Rochberg-Halton (1988: 328) observed, "the bare traces [of the schema] . . . are already found in apodoses of Enūma Anu Enlil and its Old Babylonian forerunners." See Rochberg-Halton (1988: 326) for the example of Mars.

37. "Regardless of textual genre, therefore, the planets were enumerated by convention. In my view, that convention was originally shaped by the underlying astrological schema identifying planets as either benefic or malefic" (Rochberg-Halton 1988: 328).

38. See, e.g., Philip of Opus, *Epinomis* 986D–987D; Aristotle, *Cael.* 2.12 (292a8–9); Diodorus Siculus 2.30; Seneca, *Nat.* 7.3.1–2; Proclus, *In Platonis Timaeum Commentarius*, III.125.28–30.

the stars was a purely arithmetical one, with the stars and planets all existing together on one undifferentiated plane (Vernant 1983: 176–89; Rochberg-Halton 1988: 323; Lloyd 1991: 294–95; Pedersen 1993: 63; Evans 1998: 320).

From "Heavens" to "Planetary Heavens"

The case of the Neo-Babylonian ziggurats strongly suggests the concept of a sevenfold stratification of the cosmos. Does any independent evidence support such a concept? In the literature on ziggurats, a fact that has often been overlooked is that Babylonian texts attest to a stratified view of the heavens. While some texts describe the heavens as having three layers, respectively the Upper, Middle, and Lower Heavens (Horowitz 1998: 8–15), many others refer to "seven heavens" or "seven heavens and seven earths" (Horowitz 1998: 208–20, 244). The evidence largely comes from Sumerian incantations, known at least from the Old Babylonian period onwards. The motif is apparently reflected in later (Jewish and Arab) traditions concerning seven superimposed firmaments and underworlds.

It would seem that the term "seven heavens and seven earths" relates to the layers of the sky and their infernal counterparts, respectively. Like the layered sky, the underworld was conceived as having seven zones, each guarded by its gateway and gatekeeper, as known from Inanna's Descent to the Netherworld and Nergal and Ereškigal (contra Horowitz 1998: 358).

The concept of "seven heavens" and "seven earths" could well have found its architectural expression in the seven-tiered ziggurats. In the annual Akītu ritual, Marduk was symbolically imprisoned in Etemenanki, as explicitly stated in Marduk's Ordeal (VAT 9555+9538; ND 812(a), l. 13; Livingstone 1986: 236–37, also 212–13, l. 40): "[That which] they do [on] the ziggurat: Because the gods imprisoned him he disappeared and was held captive inside." He was released from captivity by Nabû (ll. 8–9), the tutelary deity of astronomy to whom the Borsippa ziggurat was dedicated. This, in combination with Strabo's reference (16.1.5) to the ziggurat of Babylon as the *Bēlou táphos*, the "tomb of Belus [Marduk]," indicated to many scholars, though not all, that Marduk's enacted imprisonment can be seen in terms of a ritual death scheme, suggesting that the ziggurat acted as a representation of the underworld (Pallis 1926: 102–10, 243; Frankfort 1948: 322–23; Livingstone 1986: 230–31; Naydler 2005: 56; more generally, Busink 1938: 48–49; but see Bidmead 2002: 87).[39]

That there was an infernal component to the symbolism of ziggurats may also be inferred from the use of the Sumerian word kur both for a mountain and for the underworld (e.g., Katz 2003: 110), as ziggurats were often conceived as forms of a cosmic mountain (Busink 1938: 48–49; Walton 1995: 159–62). Indeed, in Marduk's Ordeal (ll. 6, 7), the place where the messenger comes to find Marduk is described as the ḫur-sa-an or "mountain" (Pallis 1926: 221–22, 242).[40]

The question remains whether and when ziggurats, as a model of a sevenfold cosmos, may have become connected with the planets.[41] As seen, analysis of the ziggurat/Ecbatana sequence indicates that by Neo-Babylonian times the planets could have been associated with seven-tiered ziggurats. The

39. In keeping with this, Parpola opined that the seven stages of a ziggurat symbolized the seven gates of the underworld (2000: 199) and that "through its seven-staged colouring the ziggurat is associated both with the rainbow and the descent and ascent of Ištar" (1997: XCII). If Inanna's ziggurat at Uruk did indeed have seven stages, as suggested above (#8 in the list of seven-staged ziggurats), this raises the possibility that the narrative of the goddess's descent, in which she is gradually divested of garments and ornaments referred to as *me*, accompanied a ritual performed on this ziggurat.

40. Livingstone's translation "the place of the river ordeal" is less literal (1986: 237). Gelb et al. (1965: 253–54), s.v. "ḫuršānu A (*ḫursānu*)," give *ḫuršānu* as "mountain."

41. If the color scheme of ziggurats symbolized a planetary order, it remains as yet unclear why the outermost planets would have been associated with the bottom and not the top of the structure. At the very least, such an arrangement would conveniently have allowed the topmost stages, decorated with the most costly ornaments, to be dedicated to the two major luminaries.

respective stages of the ziggurat may not have been associated with individual planets from the start, but a tendency to do just that may well have developed in subsequent times, culminating in a first-millennium trend of ziggurats with seven "planetary" colors.

It would be simplistic to argue that first-millennium ziggurats were built mainly or even largely to represent the seven planets. Yet even if this was not the primary function of ziggurats, some may have acquired such symbolism over time, as a "bonus" coming on top of the more fundamental associations such as those with the cosmic mountain or the underworld.

Conclusions

We have come a long way from our starting point, which was to reassess the meaning of Herodotus's description of the colored "battlements" built by Deioces at Median Ecbatana about 700 BC. It was Herodotus's account that inspired Henry Rawlinson to investigate the possibility that the specified colors spelled out a sequence of planets and that this could provide a major clue to ancient astronomical knowledge. It was a potentially brilliant insight. Yet when he applied it to Borsippa, Rawlinson effectively demolished his own case by an over-imaginative interpretation of the archaeology and an inappropriate use of a color sequence from an allegedly "Sabaean" tradition, leading him to an absurd position where he had to throw into doubt the order given by Herodotus. Had more cuneiform sources been available to him, he may well have come to a different conclusion, that is, that a Neo-Babylonian color-planet order matching that of Ecbatana was applied to ziggurat architecture.

Our reinvestigation has led to three key insights, which are valid independently of each other, namely, that the Assyro-Babylonians did conceive of seven-tiered ziggurats; that the stages of some ziggurats were decorated in different colors; and that a particular symbolical color was assigned to each of the planets. These three threads may have converged into a single system during the first millennium BC.

Without any doubt, a very similar planet order to that reconstructed here for the Neo-Babylonian period existed much earlier in Egypt, in which the outer and inner planets were correctly distinguished. The implications for the development of Greek knowledge of the solar system are considerable, restoring confidence in the Greek claim that their knowledge of the planets derived from the ancient Near East. Such questions—in a post-Pan-Babylonianist phase of scholarship—need serious reexamination. The Babylonians and Egyptians seem to have shared a model of a stratified cosmos that involved a rudimentary concept of planetary distance and, at the very least, the distinction between inner and outer planets. This may have represented a large part of the knowledge gift for which Greek thinkers felt so indebted. The Greek contribution to these matters would not, then, have been the perception of the universe in geometric terms per se (planetary distance), but the introduction of *circular* geometry in terms of planetary orbits, to which the names of Pythagoras and Parmenides have traditionally been attached.[42] Once introduced, the idea of circular orbits (rather than simple stratification) led to the growth of planetary astronomy proper.

The resolution of a "minor" puzzle of archaeoastronomy, namely, Rawlinson's interpretation of the Ecbatana colors, may thus have wider ramifications for the history of astronomy than one might expect.

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42. Diogenes Laertius, *Life of Pythagoras*, 25–26, 48; *Life of Parmenides*, 21; see also Theo of Smyrna, *Mathematics*, 150.18; Van der Waerden (1979: 445, 453). For a discussion of the pioneers in the related concept of a spherical cosmos, see Kahn (1970).

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