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Autor: Tolsa, Cristian

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Ptolemy's Savior God, "Saving the Phenomena" and Plato's *Timaeus*

Cristian Tolsa, Kingston

Abstract: Claudius Ptolemy's *Canobic inscription* has received scholarly attention for its astronomical models and their relationship with those of the *Almagest*, but the motivations for its dedication to the "savior god" have yet to be addressed. This article provides reasons to believe that Ptolemy alluded thereby to the astronomical program of "saving the phenomena" – the explanation of the apparently irregular motions of the planets through combinations of uniform, circular motions. In addition, it is argued that Plato's *Timaeus* shows deep affinities with the inscription, including an invocation of a savior god by the main character of the dialogue (48d–e).

The so-called *Canobic inscription* is an astronomical work contained in the manuscript tradition of the *Almagest*, purporting to be a literal transcript of an inscription erected by Claudius Ptolemy.¹ It contains a tabulated list of parameters of planetary motion, arranged by kind, such as eccentricity of the planets' deferent (5), radii of the epicycles (6), mean daily motion (7), position at noon of Toth 1 in the first year of Augustus (8), as well as other astronomical and numerological data – more on this below. According to the recorded text, the artifact was set up in the tenth year of Antoninus (A.D. 146 or 147) in Canopus – a suburb of Alexandria² – and was dedicated to a "savior god".³ Now that past doubts over

* I wish to thank Wolfgang Hübner and the editor of this journal, Christoph Riedweg, for their interesting suggestions which have contributed to improving this paper.

1 Edited in A. Jones, "Ptolemy's *Canobic Inscription* and Heliodorus' Observation Reports", *SCIAMVS* 6 (2005) 53–98. I will follow the section numbers in this edition throughout this article.

2 Olympiodorus, in the only ancient reference to the inscription, reports a tradition that Ptolemy actually lived in the so-called Wings of Canopus, where the inscription was located (*Comm. Phaed.* 10.4). Two arguments make this doubtful: first, these wings seem to have been entrance patios of Egyptian temples (cf. Strab. 17.1.28; Aristid. *Panath.* 97.7 schol. vet. Dindorf). While the Wings of Canopus are attested to have been inhabited by a monk in the sixth century (Leontius, *Vit. Ioan. El.* 408.7), this could only have been possible after the abandonment of the pagan temples in Canopus at the end of the fourth century. Secondly, Olympiodorus portrays Ptolemy – possibly because the site was inhabited by monks – as having lived there in isolation for 40 years, a symbolic number of years frequently appearing in the legends about Egyptian hermits so widespread around that time. On the other hand, as Jones (above, n. 1) 64 notes, due to proximity it is impossible to tell from the observations whether Ptolemy made them in Alexandria or in nearby Canopus. The exact place where the inscription was set up has been discussed in some depth by I. Bullialdus, *Claudii Ptolemaei Tractatus de iudicandi facultate et animi principatu* (Paris 1663) 207–211, who hypothesized, wholly unsupportedly, that Ptolemy was a priest of Sarapis; however, I see no reasons for doubting that the inscription was dedicated in a temple in Canopus, *pace* Jones 62–64.

3 Jones (above, n. 1) 53.

authenticity have been dispelled,⁴ and that most of the mathematical detail has been cleared, it is time to study this work from other perspectives.

The topic I wish to treat here is precisely its dedication. The main cult in Canopus was of an oracular healing god, the Sarapis of Canopus. This fits well the fact that Ptolemy calls his dedicatee a "savior god": Sarapis was frequently invoked in this capacity in dedications of individuals surviving or asking for protection from diseases, the dangers of a voyage, fires, floods, or any other difficult enterprise.⁵ For this reason introductions to this work, intending to unmask the identity of the deity, have plausibly concluded that Ptolemy dedicated his inscription to this god.⁶

Far from attempting a new identification of the honoured god, I will defend the thesis that Ptolemy's silence over the name of the deity was significant, and that it served to highlight other aspects of the dedication, such as the divine epithet ("savior") and the place of the dedication (Canopus).

To begin with, we may observe that there was no proper patron god routinely honoured by mathematicians. Let us briefly examine the ancient Greek tradition of mathematical dedications for the purpose of justifying this statement. The famous story that Pythagoras sacrificed an ox after discovering a theorem⁷ had its real counterparts in real inscribed pieces of mathematics. One archaeological object representing this tradition, the so-called Keskinotos astronomical inscription – displaying, like Ptolemy's *Canobic inscription*, planetary models – has actually come down to us,⁸ but many other probably similar artifacts are attested in the literary sources.⁹ The fact that mathematical discoveries could easily be

4 Details in the inscription were found to have been alluded to by Ptolemy in the *Almagest*: cf. N. T. Hamilton, N. M. Swerdlow, and G. J. Toomer, "The Canobic Inscription: Ptolemy's Earliest Work", in J. L. Berggren et al. (eds.), *From Ancient Omens to Statistical Mechanics* (Copenhagen 1987) 55–75.

5 *IG* 12.1.742 (Rhodes) σωθεις ἐγ μεγάλου κινδύνου, *IGUR* 1.193 (Rome) κινδύνων πολλακίς διασωθεις, *SEG* 63.1168 (Lepcis Magna) ἐκ μεγάλης νόσου διασωθεις, *IG* 12.2.114 (Mytilene) σωθίς ἐκ νόσου, *I.Porto* (Portus) 3 ὑπὲρ εὐπλοίας παντὸς τοῦ στόλου, Aristid. *Or.* 45.56 ἡμῖν τε δὴ πρώην περιφανῶς γενόμενος, ὅτ' ἐπιρρεούσης τῆς θαλάττης ...

6 Bullialdus (above, n. 2) 205–206; Jones (above, n. 1) 94.

7 Plut. *Mor.* 1093D, DL 8.12, Ath. 418f, Procl. *In El.* 426.6; these attestations suggest a common source of two epigram lines with an account of the sacrifice.

8 Edited and commented in A. Jones, "The Keskinotos Astronomical Inscription: Text and Interpretations", *SCIAMVS* 7 (2006) 3–41.

9 Two whitened tablets (λευκώματα) with the title "astronomy of Eudoxus" are recorded in the inventories of the temple of Good Fortune in Delos (*ID* 1426, 1444, 1443); Aelianus reports that the astronomer Oenopides of Chios dedicated a bronze tablet displaying an astronomical cycle, also entitled "astronomy" (10.7 ἀστρολογία), at Olympia, and that Meton set up stelae with a model of the sun and an astronomical cycle; Callippus is recorded in the so-called Parian marble as having "set out an astronomy" (*IG* 12.5.444 ἀστρολογίαν ἐξέθηκεν). The famous planetarium of Archimedes, which Marcellus placed in the temple of Virtue in Rome after his sack of Syracuse (Cic. *Resp.* 1.21), could be included in this list as well. Among non-astronomical mathematical dedications, Plut. *Vit. Aem.* 15.8–10 mentions an inscription of Xenagoras recording the height of Mount Olympus; Eratosthenes erected a column displaying both an

recorded in the small space available in the epigraphical medium, due to the briefness of mathematical language itself, surely contributed to the success of this format; furthermore, the traditional association of the celestial phenomena with the gods probably made astronomical inscriptions more frequent than others; Ptolemy himself put forward the argument that the planets had a close affinity with the divinity in his preface to the *Almagest* (I 6.24–25). Judging from the preserved accounts, it turns out that most commonly the concerned divinities are not specified or are referred to in generic form, and no god mentioned receives more than one such dedication. It thus seems that, in contrast with physicians – who often dedicated instruments to Asclepius and Hygieia¹⁰ – mathematicians did not have specific gods associated with their activity.

J. Evans has attempted to relate the cult of Sarapis to the practice of astrology; however, Ptolemy's inscription is not specifically astrological, and the link with astrology is far from being exclusive to Sarapis, as astrological items have also been found in sacred spaces dedicated to Harmouthis and Soknebtynis, and indeed other gods such as Mithras, Apollo, and Hermes, have more clearly been related to astrology in antiquity.¹¹ The specific place where Ptolemy dedicated the inscription – as indicated in the inscription (17 ἀνετέθη ἐν Κανώβῳ) – is more plausibly related to its astronomical content. The mythical Canopus, who was the pilot of Menelaus' fleet and the foundational hero of the town, had his catasterism in the star of the same name (Plut. *De Is. et Os.* 359E). As a witness to the astronomical aura of the place, it is probably significant that the sanctuary was the setting of the so-called Canopus decree of 238 B.C., issued by the Egyptian kings Ptolemy III Euergetes and Berenice, which intended that the Egyptian calendar keep track of the seasons, fixing the beginning of the year to the rising of Sirius (Sothis) by the insertion of an intercalary day every four years.¹²

Ptolemy's indefiniteness with respect to the divinity's name could reflect the circumstance that the deity in Canopus came to be strongly identified with the place

object and a short proof of his solution of the duplication of the cube, which he dedicated to King Ptolemy (Eutoc. *In SC* 88–96). Finally, Porph. *Vit. Pyth.* 3 credits Pythagoras' son Arimnestus as having offered a bronze tablet to Hera in Samos containing “seven knowledges” (ἑπτὰ σοφία). Porphyry names Duris of Samos as his source, a historian of doubtful reputation already in antiquity, but, similarly to Pythagoras' sacrifice, Arimnestus' dedication was a legendary precedent for the real mathematicians' dedications: cf. D. Creese, *The Monochord in Ancient Greek Harmonic Science* (Cambridge 2010) 99.

10 See I. Israelowich, *Patients and Healers in the High Roman Empire* (Baltimore 2015) 46. Cf. e.g. *CIL* 6.20.

11 J. Evans, “The Astrologer's Apparatus: A Picture of Professional Practice in Graeco-Roman Egypt”, *JHA* 35 (2004) 1–44, at 27–44, esp. 26 for Harmouthis, 27 for Soknebtynis and 36 for Mithras, Apollo and Hermes.

12 The decree was nevertheless ultimately ineffective, as we gather from the shifted dates of Egyptian festivals in Augustan age: cf. G. Hölbl, *A History of the Ptolemaic Empire* (London 2001) 205–211; R. Parker, *The Calendars of Ancient Egypt* (Chicago 1950); W. Barta, “Die Entwicklung des ägyptischen Kalenderwesens”, *ZAS* 110 (1983) 16–26; P. G. P. Meyboom, *The Nile Mosaic of Palestrina: Early Evidence of Egyptian Religion in Italy* (Leiden 1995) 326–327 nn. 174–176.

itself. The cult in Canopus was special enough to allow for Sarapis to have been honoured with a second temple in the Corinthian acropolis, dedicated to the Sarapis of Canopus.¹³ Surely because of this uniqueness Rufinus called the god in Canopus directly by the name "Canopus" in his account of the destruction of the temples of Sarapis in Alexandria.¹⁴ The so-called Osiris *hydreios* or Osiris-Canopus alluded to by Rufinus – a type of cultic statue with a body in the form of a bellied water-jar, decorated with diverse motifs, and a human head covered by an elaborated crown – has been, for all the scholarly controversy about their origin and function, associated with the cult of Canopus thanks to the study of bone tesserae.¹⁵

On the other hand, a certain fact is that Canopus was widely regarded as a place to visit for healing. Most memorable is Strabo's description of the cures attracting famous pilgrims, who incubated in the sanctuary even on behalf of others.¹⁶ We seem to be facing similar situation to the one identified by Th. S. F. Jim in her study of the goddess called Soteira in Aristophanes' *Frogs* (378); Jim concluded that with many Greek deities possessing a savior capacity their precise identity faded against what would have been more important to the devotee, namely the very saving power; this effect can be often seen in the manner in which the god or goddess is called, like when, as in Aristophanes' play or in Ptolemy's inscription, the invocation just comprised the divine epithet "savior".¹⁷ Therefore, now the important question would be the kind of salvation that Ptolemy had in mind when setting up his inscription.

13 Paus. 2.4.6: δύο Σαράπιδος, ἐν Κανώβῳ καλουμένου τὸ ἕτερον. Cf. Meyboom (above, n. 12) 330–331 n. 184.

14 Rufin. *Hist. Eccl.* 11.26.

15 E. Alföldi-Rosenbaum, "Alexandriaca: Studies in Roman Game Counters III", *Chiron* 6 (1976) 205–239, at 218. A series of bone tesserae with the inscription "Canopus" carry the image of Osiris Canopus on the obverse. Even if these statues have also been found elsewhere, one can no longer maintain that they were not characteristic of Canopus. These jars were very different from the so-called "Canopi" (visceral jars); they were rather like water jars crowned with the head of gods: Meyboom (above, n. 12) 300 n. 89. Cf. E. Panofsky, "Canopus Deus: The Iconography of a Non-Existent God", *Gazette des Beaux-Arts* 57 (1961) 193–216; F. Kayser, "Oreilles et couronnes: À propos des cultes de Canope", *BIFAO* 91 (1991) 207–217; J. Winand, "Divinités-Canopes sur les monnaies impériales d'Alexandrie", in C. Berger et al., *Hommages à Jacques Leclant* vol. 3 *Études Isiaques* (Cairo 1994) 493–503.

16 Strab. 17.1.17: πολλῇ ἀγιστεία τιμώμενον καὶ θεραπείας ἐκφέρων, ὥστε καὶ τοὺς ἐλλογιμωτάτους ἄνδρας πιστεύειν καὶ ἐγκοιμᾶσθαι αὐτοὺς ὑπὲρ ἑαυτῶν ἢ ἑτέρους.

17 Th. S. F. Jim, "Can Soteira be Named? The Problem of the Bare Transdivine Epithet", *ZPE* 195 (2015) 63–74, at 74. The chorus of the comedy calls upon the goddess Soteira – maybe Athena Soteira – probably because the safety of Athens was at stake in 405 B.C. Another example relevant in the present context might be Lucian's report of Sostratus' dedication in the Pharos lighthouse: Σώστρατος Δεξιφάνου Κνίδιος θεοῖς σωτήρσιν ὑπὲρ τῶν πλωϊζομένων (*Hist. conscr.* 62.13). The divinity on top of the building was probably Zeus Soter (Posidippus 115), so the identity of the architect's addressee is obscure, maybe with the purpose of including King Ptolemy I Soter, who commissioned the lighthouse; even if it's Lucian who altered the original text, this would show that the precise identity of the divinity was not so important as its function.

1. To “save the phenomena”

The idea of saving could be metaphorically applied to an intellectual enterprise. For example, Socrates alludes to the episode of Arion’s rescue by the dolphin in the *Republic* when he urges “to be saved from the argument, hoping for either a dolphin grabbing us from beneath or some other salvation *in extremis*.”¹⁸ The astrologer Vettius Valens informs that Critodemus – similarly to others, according to Valens – began his astrological work with the following statement:¹⁹

Now, having traversed the seas and travelled great deserts, I have been deemed worthy by the gods to reach a safe harbor and a secure abode.

It becomes clear that Valens interprets the voyage in a metaphorical way when he criticizes these writers for not being coherent with this statement, since according to him they wrote their works in a confusing manner, “not travelling a straight road”;²⁰ he concludes by making a similar claim for himself, associating more clearly the attainment of a “safe harbour” with the kind of precision that was required in his astrological activity, a “secure foreknowledge”.²¹

We should expect that, similarly to Valens, Ptolemy associated the salvation he asked from the god with his concerned field of expertise, that is, with the astronomical genre of the inscription. As we have seen, the astronomical connotations of the Canopus cult could have made this savior god especially appropriate. Here it will be helpful to read the words after the address. What appears to be the title of the work is syntactically tied to the address and the dedicant’s name in the first line: “To the savior god Claudius Ptolemy [dedicates] the first principles and hypotheses of astronomy” (2 θεῷ σωτήρι Κλαύδιος Πτολεμαῖος ἀρχὰς καὶ ὑποθέσεις μαθημάτων). This title seems to attribute a different epistemological status to different sections of the inscription.²² It turns out that

18 Pl. *Rep.* 453d9–11: πειρατέον σῶζεσθαι ἐκ τοῦ λόγου, ἥτοι δελφῖνά τινα ἐλπίζοντας ἡμᾶς ὑπολαβεῖν ἂν ἢ τινα ἄλλην ἄπορον σωτηρίαν: cf. E. Zinn, “Ἀπορος σωτηρία. Horaz im Rettungsboot (carm. III 29,62)”, in J. Kroymann (ed.), *Eranion. Festschrift für Hildebrecht Hommel* (Tübingen 1961) 185–205.

19 Val. 329.20–22: ἤδη ποτὲ πελαγοδρομήσας καὶ πολλὴν ἔρημον διοδεύσας ἠξιώθην ἀπὸ θεῶν λιμένος ἀκινδύνου τυχεῖν καὶ μονῆς ἀσφαλεστάτης.

20 Val. 329.24–330.5: οὗτοι μὲν οὖν καλλονῇ λόγων ἐνεχθέντες καὶ τερατολογία οὐ κατὰ τὰ ἐπαγγέλματα τὰ ἔργα ἐπέδειξαν οὐδὲ τὰς συντάξεις πλήρεις καὶ ἐπιλελυμένας, ἀλλὰ λειπομένας ἐν πολλοῖς τισιν ἀεὶ τῶν ἐντυχανόντων· ἐν πᾶσι δὲ τὸ σκολιὸν καὶ ἐφθονημένον καὶ ἀναδύομενον καὶ ἐπιπλεκόμενον· καὶ μηδεμιᾶ ὁδῷ διευθύνοντες ἀλλὰ προσεισφέροντες αἴρεσιν αἰρέσει καὶ ἀναπομίμους βίβλους πλάνης μᾶλλον ἢ ἀληθείας τεκμήρια.

21 Val. 330.14–17: πελαγοδρομήσας οὖν καὶ πολλὴν γῆν διοδεύσας κλιμάτων τε καὶ ἔθνῶν κατόπτης γενόμενος πολυχρονία πείρα καὶ πόνοις συνεμφυρεῖς ἠξιώθην ὑπὸ θεοῦ καὶ τῆς προνοίας βεβαίου καὶ ἀσφαλοῦς λιμένος τυχεῖν.

22 Jones (above, n. 1) 84 describes the distinction as “not entirely clear”, tentatively suggesting that the ἀρχαί are the epoch positions and the ὑποθέσεις the permanent parameters of the models. But this seems implausible, since Ptolemy never makes this distinction in his astronomical works.

astronomical hypotheses were closely connected with a fundamental tenet of ancient Greek astronomy that soon became encapsulated in the catchphrase "to save the phenomena". The astronomer's task consisted in saving the phenomena by the means of hypotheses, that is, in L. Zhmud's words, "to find a mathematically correct model that would reduce the *apparent* irregularities in planetary motion to the *true* circular motion".²³ This aim is, as is well known, explicitly shared by Ptolemy,²⁴ who uses the expression in many relevant instances for defining his own astronomical project,²⁵ even applying it to his work on harmonics.²⁶

That the astronomer should seek to save the phenomena has long been considered as first being proposed by Plato, due to a famous remark by Simplicius (*In Cael.* 488.18–24), but the expression itself seems to have been first used by the astronomers Eudoxus and Callippus.²⁷ Geminus' clear exposition of the concept is especially important to us, since the "first principles" (ἀρχαί) of Ptolemy's title also make an appearance:²⁸

Sometimes the astronomer tries to find out by hypothesis (καθ' ὑπόθεσιν), stating some ways by which, if established, the phenomena will be saved (σωθήσεται τὰ φαινόμενα). For example, why do sun, moon and planets seem to move irregularly? If we suppose their circuits to be eccentric, or the stars to revolve in epicycles, their apparent irregularity will be saved (σωθήσεται ἡ φαινόμενη ἀνωμαλία). [...] For it is not the job of the astronomer at all to know what is at rest by nature or what things are capable of motion; rather, introducing hypotheses, granting that some things stay still and others are in motion, he enquires which hypotheses celestial phenomena will accommodate. He must take the principles (ἀρχαί) from the natural philosopher (φυσικός), that the movements of the stars are simple, uniform and orderly.

We can find an account of such astronomical "first principles" (ἀρχαί) in Theon of Smyrna (199.13–203.14). Some of them agree with the ones listed by Geminus: Adrastus (whom Theon is following) posits the earth as the body which does not move, and argues that the planets, despite the appearances, have a real circular

23 L. Zhmud, *The Origins of the History of Science in Antiquity* (Berlin and New York 2006) 273.

24 *Alm.* I 208.18–21: πρόθεσιν μὲν καὶ σκοπὸν ἡγούμεθα δεῖν ὑπάρχειν τῷ μαθηματικῷ δεῖξαι τὰ φαινόμενα ἐν τῷ οὐρανῷ πάντα δι' ὁμαλῶν καὶ ἐγκυκλίων κινήσεων ἀποτελούμενα.

25 *Alm.* II 533.1–3: ἅπαξ ἕκαστα τῶν φαινόμενων κατὰ τὸ ἀκόλουθον τῶν ὑποθέσεων διασώζεται.

26 On the grounds that in his view they are similar sciences. *Ptol. Harm.* 1.2.1–7: διασῶσαι τὰς τῶν οὐρανίων κινήσεων ὑποθέσεις συμφώνους ταῖς τηρουμέναις παρόδοις. 1.15.5–6: διασῶσαι τὸ ταῖς τῶν ἐμμελειῶν ὑποθέσεις καὶ τοῖς φαινομένοις ἀκόλουθον.

27 See Zhmud (above, n. 23) 274.

28 *Simpl. In Phys.* 2.2, 292.13–29, translation by Kidd, slightly altered. ἄλλοτε δὲ καθ' ὑπόθεσιν εὐρίσκει τρόπους τινὰς ἀποδιδούς, ὧν ὑπαρχόντων σωθήσεται τὰ φαινόμενα. οἷον διὰ τί ἀνωμάλως ἥλιος καὶ σελήνη καὶ οἱ πλάνητες φαίνονται κινούμενοι; ὅτι εἰ ὑποθώμεθα ἐκκέντρους αὐτῶν τοὺς κύκλους ἢ κατ' ἐπίκυκλον πολούμενα τὰ ἄστρα, σωθήσεται ἡ φαινόμενη ἀνωμαλία αὐτῶν. [...] ὅλως γὰρ οὐκ ἔστιν ἀστρολόγου τὸ γνῶναι, τί ἡρεμαῖόν ἐστι τῇ φύσει καὶ ποῖα τὰ κινητά, ἀλλὰ ὑποθέσεις εἰσηγούμενος τῶν μὲν μενόντων, τῶν δὲ κινουμένων σκοπεῖ, τίσιν ὑποθέσεσιν ἀκολουθήσει τὰ κατὰ τὸν οὐρανὸν φαινόμενα. ληπτέον δὲ αὐτῷ ἀρχὰς παρὰ τοῦ φυσικοῦ, ἀπλᾶς εἶναι καὶ ὁμαλὰς καὶ τεταγμένας κινήσεις τῶν ἄστρον.

movement. Also included among these principles is the distinction between the circle along which the planets move (the ecliptic) and the one concerned with the daily motion of the cosmos (the equator).

The inclination of the ecliptic and the period of revolution of the cosmos are the first topics treated in Ptolemy's inscription (3 ἢ μεταξὺ τοῦ ἰσημερινοῦ κύκλου καὶ τοῦ ἡλιακοῦ διὰ τῶν πόλων αὐτῶν περιφέρεια ...), so it is likely that these are the first principles of the title, and that Ptolemy used the concept in a similar way as Geminus and Adrastus. Since immediately thereafter in the text of the inscription comes the subtitle "parameters of hypotheses" (4 λόγοι ὑποθέσεων) – and because astronomical hypotheses were basically related to the planets, which is what the text deals with from this point on – we are led to suppose that by the term ὑποθέσεις Ptolemy refers to the remaining portion of the inscription. The title of the *Canobic inscription* would then function like the title of Ptolemy's philosophical essay *On the criterion and the commanding faculty*, which indicates that the first part (1–12) deals with the criterion and the last part (13–16) with the commanding faculty.²⁹

2. The savior god in the *Timaeus*

This section explores the meaning of the invocation of a savior god in the main speech of Plato's *Timaeus*, and argues that Ptolemy consciously alluded to this invocation with his own one in the *Canobic inscription*. But before going into that, it will be convenient to review the deep affinities between Ptolemy's astronomical project as represented in the inscription and the *Timaeus*.

To modern interpreters, the most surprising part of the *Canobic inscription* is the correspondence between the heavenly spheres and the so-called fixed notes of the Greek musical system, at the end of the text (14–16). Such correspondence follows the very influential Pythagorean tradition that conjecturally related ratio-based harmony to very basic astronomical observations. Unfortunately, although the theory could have been developed as early as Philolaus, no ancient fragment detailing the system survives, and we are left with Aristotle's obscure remark that for the Pythagoreans the speeds of the heavenly bodies, "as measured from their distances, are in the same ratios as musical concordances".³⁰ The later tradition filled in the gaps and produced many different specific corre-

29 Cf. A. A. Long, "Ptolemy *On the Criterion*: An Epistemology for the Practicing Scientist", in J. Dillon and A. A. Long (eds.), *The Question of "Eclecticism": Studies in Later Greek Philosophy* (Berkeley 1988) 176–207.

30 ΑΓ. *De cael.* 290b21–23: ὑποθέμενοι δὲ ταῦτα καὶ τὰς ταχυτήτας ἐκ τῶν ἀποστάσεων ἔχειν τοὺς τῶν συμφωνιῶν λόγους, ἐναρμόνιον γίνεσθαι φασι τὴν φωνὴν φερομένων κύκλων τῶν ἄστρον. Cf. the discussion about the harmony of the spheres in Philolaus in C. Huffman, *Philolaus of Croton: Pythagorean and Presocratic* (Cambridge 1993) 279–283. Huffman argues that the second part of Philolaus F6 presupposes a theory of the harmony of the spheres.

spondences between the planets and the notes of a certain musical scale, with varying choices as regards the order of the spheres and the musical scale.³¹

Ptolemy, in particular, derived his musical-astronomical correspondence from Plato's *Timaeus* and its commentary tradition.³² In his account of the creation of the world-soul (35a–36d) Timaeus famously depicts the heavenly spheres as formed out of cuts from a musical scale, but without detailing a particular correspondence between notes and spheres. Ptolemy's choice of notes coincides with a report by Plutarch of a scale attached to the *Timaeus* by unnamed commentators (possibly Eudorus of Alexandria), who used data from the dialogue and their own imagination to complete Timaeus' description. These two passages are actually the only instances of this scale – formed by the so-called fixed notes of the perfect system – among all the scales used in such Pythagorean-style correspondences. Similarly, Ptolemy's figure of 729 Earth radii for the distance of the Sun (13), just before the musical section, as well as his curious justification of the number in terms of its prime factors – the fact that 729 is a square and a cubic number – are also present in Plutarch's text (Plut. *An. proc.* 1028B; 1028F–1029A).

It has already been mentioned that the notion of the astronomical program of "saving the phenomena" was attributed to Plato. Both the section on the myth of Er in the *Republic* and the main speech in the *Timaeus* contain allusions to complex astronomical lore, such as the retrogradations of the planets, that reveal a genuine concern for the empirical world in Plato's philosophy. In relation to this, it has been convincingly argued that the much-discussed advice by Socrates in the seventh book of the *Republic* to pursue astronomy "by means of problems, just like geometry", and "to set aside the things in the heavens",³³ should be understood as a call to the adjustment of the phenomena to simple geometrical representations – circular uniform movements – rather than to detaching astronomical study from perceptible reality.³⁴

There are, indeed, passages in the *Timaeus* where it would have been a short step to argue that Plato was setting out this program for astronomy, if one is not

31 See W. Burkert, *Lore and Science in Ancient Pythagoreanism* (Cambridge Mass. 1972) 352–353 for the various systems of tones of the spheres attested from antiquity, including Ptolemy's at 353 n. 17: as Burkert notes, neither Ptolemy nor Plutarch make any claims to antiquity for their system.

32 C. Tolsa, "Ptolemy and Plutarch's *On the Generation of the Soul in the Timaeus*: Three Parallels", *GRBS* 54 (2014) 444–461.

33 Pl. *Rep.* 530b6–9: προβλήμασιν ἄρα, ἦν δ' ἐγώ, χρώμενοι ὡσπερ γεωμετρίαν οὕτω καὶ ἀστρονομίαν μέτιμεν, τὰ δ' ἐν τῷ οὐρανῷ ἐάσομεν, εἰ μέλλομεν ὄντως ἀστρονομίας μεταλαμβάνοντες χρήσιμον τὸ φύσει φρόνιμον ἐν τῇ ψυχῇ ἐξ ἀχρήστου ποιήσειν.

34 W. Knorr, "Plato and Eudoxus on the Planetary Motions", *JHA* 21 (1990) 313–329, esp. 324–325; I. Bulmer-Thomas, "Plato's Astronomy", *CQ* n.s. 34 (1984) 107–112; *pace* Zhmud (above, n. 23) 273 who argues that the idea according to which a mathematical model had to be verified by empirical observations was not genuinely Platonic. Zhmud's argument is however mainly based on the fact that nothing like the phrase σώζειν τὰ φαινόμενα appears in Plato, which does not preclude that the idea actually did.

too careful distinguishing a cosmological account from a piece of scientific advice. Clearest of all are the words in 39b, where Timaeus declares that the god situated the sun as a light in the second orbit from the earth:³⁵

... so that there might be a conspicuous measure of their [the planets'] relative slowness and quickness; to bestow upon all those living things, appropriately endowed and taught by the revolution of the same and the uniform, a share in number.

The emphasis is placed upon the fact that the planets' motion is not the product of chance, much in line with the teleological stance of the whole discourse. But, more precisely, Timaeus' reference to the sun as a steadily moving body from which the planets' motions should be measured, and to the "revolution of the same" as the leading motion in the heavens could easily have been pushed into saying that Plato had been the first to put forward the astronomical program of "saving the phenomena". The circle of the same has been defined earlier in the text, in the construction of the world-soul, as one of the two circles which the demiurge has cut off from a musical scale, and Timaeus has made it clear that this is the circle defining the uniform circular daily motion of the cosmos (turning to the right); the other circle, the inner one, turning "diagonally to the left" – the ecliptic – he has called the "circle of the different", dividing it into seven unequal circles, the orbits of the seven planets (36c–d). Therefore, the fact that, in Plato's language, the planets are taught by the revolution of the same could mean that the expressions of their motions should be reduced to uniform circular motions.

Ptolemy used phrases similar to "saving the phenomena" to refer to his own astronomical program, which he defines in the *Almagest* as that of showing that the motions in the heavens are ultimately reducible to uniform circular movement (*Alm.* I 208.15–30). As the main outcome of this project he presents the tables which form the core of the *Almagest*; one of their most obvious characteristics is that they are divided between those that describe mean motions (circular and uniform) and those that give the anomaly or correction; Ptolemy is absolutely explicit about the appropriateness of this design with regard to accomplishing his goal of reducing the motions of the planets to uniform circular motion.³⁶

Ptolemy's introduction to the planetary motions in the *Planetary hypotheses* – a work very similar in structure and contents to the *Canobic inscription* in its first book – reminds of the Timaeian world-view also in terminology. Ptolemy introduces the discussion on the motion of the whole (Plato's circle of the same) by stating that he starts with it because "it leads the rest and contains the others,

35 *Tim.* 39b2–5 (this and the following translations from the *Timaeus* are taken from Zeil): ἵνα δ' εἶη μέτρον ἐναργές τι πρὸς ἄλληλα βραδυτῆτι καὶ τάχει καὶ τὰ περὶ τὰς ὀκτὼ φορὰς πορεύοιτο, φῶς ὁ θεὸς ἀνήψεν ἐν τῇ πρὸς γῆν δευτέρᾳ τῶν περιόδων, ὃ δὴ νῦν κεκλήκαμεν ἥλιον.

36 Ptol. *Alm.* I 208.21–25: προσήκουσαν δὲ καὶ ἀκόλουθον τῇ τοιαύτῃ προθέσει μάλιστα κανονοποιίαν τὴν χωρίζουσιν μὲν τὰς κατὰ μέρος ὁμαλὰς κινήσεις ἀπὸ τῆς διὰ τὰς τῶν κύκλων ὑποθέσεις δοκούσης συμβαίνειν ἀνωμαλίας. Cf. N. Sidoli, "Mathematical Tables in Ptolemy's *Almagest*", *Historia Mathematica* 41 (2014) 13–37, at 17.

and it would serve as a model (παράδειγμα).³⁷ Precisely παράδειγμα is one of the catchwords which Plato uses in the *Timaeus* for signifying the imitation of a divine pattern that is so present in the discourse.³⁸ Bearing in mind Ptolemy's deep knowledge of the *Timaeus*, at least of the passages on the creation of the world-soul, it is plausible that in the inscription he intended his division between the ἀρχαί and the ὑποθέσεις to reflect the Timaeian distinction between the circle of the same and the circle of the different, even if resorting to a different terminology, as established in the later philosophical and astronomical traditions.³⁹

But the two circles of the world-soul play a still more important role within the *Timaeus*. They are namely used as a metaphor for referring to two epistemological levels, knowledge (the circle of the same) and true belief (the circle of the different).⁴⁰ That this is perceived by Timaeus as affecting the status of his own account can be seen in that, as G. E. R. Lloyd observed, Timaeus consistently differentiates two levels of certainty in philosophical accounts of the cosmos: on the one hand, the cosmologist should make judgements about the nature of the unchanging model (παράδειγμα) with absolute certainty "so far as is possible"; on the other, explanations of the world of "becoming", the image of the model, could only attain the status of likely accounts. Thus, the task of cosmologists like Timaeus, concerned with explaining the world of becoming, is to deliver the "most likely" (μάλιστα εἰκός, 44cd, 67d) account.⁴¹ Such impossibility of certainty (on the human side) is what Timaeus underlines when he calls upon the god at the beginning of his discourse:⁴²

37 *Plan. hyp.* 74.1: ἀρξόμεθα δὲ ἀπὸ τῆς τῶν ὄλων φορᾶς, ὅτι καὶ προηγείται πασῶν καὶ περιέχει τὰς ἄλλας καὶ γένοιτ' ἂν ἡμῖν παράδειγμα.

38 E.g. *Tim.* 39e7, 48e5.

39 In Plato's *Republic*, mainly in the discussion of the line simile, there is much talk about the ὑποθέσεις used in the mathematical sciences as compared to the ἀρχή which is sought in dialectic (510b–511e). However, a close reading of the text makes it clear that the concept of ὑποθέσεις used there does not have anything to do with planetary hypotheses, the final product of the astronomer's work as it was later established, but concerns the initial definitions with which arithmeticians and geometers worked to arrive at a result (510c). However, this does not mean that later theoreticians like Geminus and Adrastus were not influenced by Plato's use of these words in order to differentiate the philosopher's job from the astronomer's.

40 *Tim.* 37b6–c3: ὅταν μὲν περὶ τὸ αἰσθητὸν γίγνηται καὶ ὁ τοῦ θατέρου κύκλος ὀρθὸς ἰὼν εἰς πᾶσαν αὐτοῦ τὴν ψυχὴν διαγγείλη, δόξαι καὶ πίστεις γίνονται βέβαιοι καὶ ἀληθεῖς, ὅταν δὲ αὖ περὶ τὸ λογιστικὸν ἦ καὶ ὁ τοῦ ταυτοῦ κύκλος εὐτροχος ὢν αὐτὰ μηνύσῃ, νοῦς ἐπιστήμη τε ἐξ ἀνάγκης ἀποτελεῖται.

41 G. E. R. Lloyd, "Plato on Mathematics and Nature, Myth and Science", in G. E. R. Lloyd, *Methods and Problems in Greek Science. Selected Papers* (Cambridge 1991) 338–351, at 343–344.

42 *Tim.* 27c1–d1: τοῦτό γε δὴ πάντες ὅσοι καὶ κατὰ βραχὺ σωφροσύνης μετέχουσιν, ἐπὶ παντὸς ὀρμῆ καὶ σμικροῦ καὶ μεγάλου πράγματος θεὸν αἰεὶ που καλοῦσιν· ἡμᾶς δὲ τοὺς περὶ τοῦ παντὸς λόγους ποιεῖσθαι πη μέλλοντας, ἧ γέγονεν ἢ καὶ ἀγενές ἐστιν, εἰ μὴ παντάπασιν παραλλάττομεν, ἀνάγκη θεοῦς τε καὶ θεᾶς ἐπικαλουμένους εὐχεσθαι πάντα κατὰ νοῦν ἐκείνοις μὲν μάλιστα, ἐπομένως δὲ ἡμῖν εἰπεῖν.

Surely anyone with any sense at all will always call upon a god before setting out on any venture, whatever its importance. In our case, we are about to make speeches about the universe – whether it has an origin or even if it does not – and so if we're not to go completely astray (παραλλάττομεν) we have no choice but to call upon the gods and goddesses, and pray that they above all will approve of all we have to say, and that in consequence we will, too.

Even if Timaeus piously remarks that any new enterprise should begin with an invocation of a god, he especially focuses on the nature of the contents he is going to discuss (the universe), and on the strong possibility of failing. Again, but more clearly praying not to get lost in his discourse, Timaeus makes a second appeal to the gods at what he defines as a new beginning, when he begins with the account of the so-called works of necessity. It is here where we find the invocation to the savior capacity of the god, as in our inscription:⁴³

Let us therefore at the outset of this discourse call upon the god to be our savior (σωτήρα) this time, too, to give us safe passage (διασώζειν ἡμᾶς) through a strange and unusual exposition, and lead us to a view of what is likely (τῶν εἰκότων).

Since the account will be about the imitation of the unchanging model, Timaeus can only expect a likely account, and asks the god for help in this risky enterprise. Ptolemy would imitate Timaeus in the dedication of his inscription, conscious about the impossibility of absolute certainty in the mathematical description of the planetary motions.

The likelihood that this is a conscious allusion is enhanced by the fact that Ptolemy paid close attention to the passage in which Timaeus utters this prayer; as has been shown elsewhere, Ptolemy used the *Timaeus* as a model for structuring the *Harmonics* in two parts (1.1–3.2 and 3.3–16) analogous to the parts of the speech before and after the prayer.⁴⁴ Having in mind that the *Canobic inscription* shares the approach of the *Harmonics* – which also concluded with the correspondence between the fixed notes and the heavenly spheres (3.16)⁴⁵ –, it is difficult not to believe that Ptolemy had Timaeus' savior god in mind when dedicating his inscription.

43 *Tim.* 48d4–e1: θεὸν δὴ καὶ νῦν ἐπ' ἀρχῇ τῶν λεγομένων σωτήρα ἐξ ἀτόπου καὶ ἀήθους διηγῆσεως πρὸς τὸ τῶν εἰκότων δόγμα διασώζειν ἡμᾶς ἐπικαλεσάμενοι.

44 C. Tolsa, "Philosophical Presentation in Ptolemy's *Harmonics*: The *Timaeus* as a Model for Organization", *GRBS* 55 (2015) 688–705. Ptolemy transitions in *Harm.* 3.3 to a second beginning, just like the *Timaeus* at 48d–e, investigating the topics treated at the beginning of the treatise from a new perspective. The parallel with the *Timaeus* is established through many verbal and structural allusions.

45 The chapter is lost, but the title and a fragment probably pertaining to it, with apparently the same correspondence as in the inscription, are extant: cf. A. Barker, *Greek Musical Writings*, vol. 2 (Cambridge 1989) 390 n. 89.

3. Two senses of divine salvation in the *Timaeus* and in the inscription

There is an alternative meaning of divine salvation appearing in the *Timaeus*. At the beginning of the *Critias*, which is actually set at the end of Timaeus' discourse, Timaeus again speaks to the god, now calling his own finished exposition "a long road" (106b μακρῶς ὁδοῦ) and asking for the salvation (σωτηρίαν) of those of his words which have been spoken properly (τῶν ῥηθέντων ὅσα μὲν ἐρρήθη μετρίως). This preoccupation for the material preservation of the words also appears at the beginning of the *Timaeus*, in Critias' discourse about Solon's stay in Egypt, in which he recounts the statesman's conversation with an Egyptian priest in Sais, on the Canobic branch of the Nile. The priest tells Solon the reason for the antiquity of Egyptian knowledge: "the Nile is our savior from all calamities, and saves us from this one as well" (22d ἡμῖν δὲ ὁ Νεῖλος εἷς τε τὰλλα σωτὴρ καὶ τότε ἐκ ταύτης τῆς ἀπορίας σφῆζει λυόμενος), referring to natural disasters affecting other parts of the world such as Greece, which eventually cause the fall of civilizations. Interestingly, the priest connects such calamities with the falling of heavenly bodies – by telling the myth of Phaethon (22c4–7) – and remarks that elevated places are therefore more liable to destruction; on the other hand, he says, in Egypt even the water comes up from below and not from the sky (22e2–4), a fact which preserves the land from any catastrophes. This is evidently a reference to the natural cycle of the Nile's flood – strongly associated with the calendar, that is, the yearly motion of the sun –, and the whole opposition between destruction coming from the sky and regular changes in the Nile can be seen as a parallel to the dual structure used by Timaeus in his speech.

Therefore, two notions of divine salvation coexist in the *Timaeus*: the metaphorical – saving the philosopher from uncertainty – and this second one referring to the physical preservation of accounts. The two of them are related, as expressed by Timaeus in the *Critias*, in that if the accounts are found (by the god) to be certain they should be preserved. It has been shown that in his inscription Ptolemy adhered to the first meaning; now, if we take a look at the context of Ptolemy's inscription, a case can be made for a parallel with the second meaning, as well. Firstly, the very fact that it was an inscription on the durable material of a stele can be interpreted as motivated by the desire of material preservation. Secondly, the cult of the Sarapis of Canopus has been shown to be specifically related to Osiris and to the Nile,⁴⁶ whose water symbolized the efflux of Osiris' body.⁴⁷ It is significant that the only surviving foundation plaque in Canopus is for a *temenos* of Osiris, dedicated by Ptolemy III Euergetes and Berenice in 244 B.C.;⁴⁸ in connection with this, P. G. P. Meyboom has suggested that since the monarchs' interest in Egyptian religion increased in this period, the aim in Canopus might have been to emphasize the Egyptian Osiris aspect of

46 See n. 15 above.

47 Plut. *De Is. et Os.* 363D.

48 *OGIS* 60.

Sarapis.⁴⁹ A couple of dedications in Canopus bear the inscription “To Sarapis, Isis, and the Nile”,⁵⁰ and a priest of the Nile is attested in another Canobic inscription.⁵¹ Besides, Sais and Canopus are the two only known sanctuaries featuring a public boat procession of Osiris in the Khoiak festival, which was symbolically associated to the inundation period – even if this officially shifted through the year due to the nature of the Egyptian calendar.⁵²

4. Conclusion

We have seen that Ptolemy used an allusion to Plato that conveyed the various motivations of his dedication. Plutarch makes use of another Platonic expression in a remarkably similar context and manner to Ptolemy. He dedicates his dialogue *On the Delphic E* to his friend Serapion, comparing his text to “first offerings” (384E ὡσπερ ἀπαρχάς).⁵³ The metaphorical use of this expression with the meaning of an intellectual dedication was a widespread topos, found in the Bible and Christian authors.⁵⁴ However, as M. Bonazzi shows, the coincident Delphic context makes it highly probable that Plutarch was alluding to the passage of Plato’s *Protagoras* where Socrates mentions the Delphic precepts of the ancient sages, “dedicated as a first offering of their knowledge to Apollo”, emphasizing and praising their briefness.⁵⁵

It should not be surprising that Ptolemy too adopted a rhetoric of dedication similar to the types used by Platonic philosophers. Ptolemy reveals in his works

49 Meyboom (above, n. 12) 140; *ibid.* 327 n. 176. Another sign is that the building was of Egyptian features, as attest the Egyptian-style pylon found on some tesserae showing the inscription “Canopus” (see n. 15 above).

50 *Delta* I 235.1, I 235.6.

51 *Delta* I 237.8.

52 Cf. n. 12 above.

53 The traditional translation of ἀπαρχαί is “first-fruits”, but the Greek term does not immediately imply the agricultural connotation obvious in English, so I have adopted the more neutral “first offerings” proposed for this reason by Th. S. F. Jim, “The Vocabulary of ἀπάρχεσθαι, ἀπαρχή and Related Terms in Archaic and Classical Greece”, *Kernos* 24 (2011) 39–58, at 40. For ἀπαρχαί in the Greek world, see Th. S. F. Jim, “The Vocabulary of ἀπάρχεσθαι”, *ZPE* 195 (2015) 63–74, at 54. For a classification of ancient Greek dedicatory practices, see R. Parker, “Greek Dedications”, in V. Lambrinoudakis and J. Ch. Balty (eds.), *Thesaurus Cultus et Rituum Antiquorum (ThesCra)*, vol. 2 (Los Angeles 2004) 268–281; and particularly on ἀπαρχαί, although not touching upon intellectual offerings, Th. S. F. Jim, *Sharing with the Gods: Aparchai and Dekatai in Ancient Greece* (Oxford 2014). Dealing specifically with intellectual offerings, there only seems to exist the outdated volume of W. H. D. Rouse, *Greek Votive Offerings* (Cambridge 1902) 64–65.

54 *Ex.* 23.19; *Paul Rom.* 8.23; *Aug. Conf.* 9.24; *Phil. Alex. Congr.* 98.

55 *Pl. Prot.* 343b1: ἀπαρχήν τῆς σοφίας ἀνέθεσαν τῷ Ἀπόλλωνι. Cf. M. Bonazzi, “L’offerta di Plutarco: Teologia e filosofia nel *De E apud Delphos* (capitoli 1–2)”, *Philologus* 152.2 (2008) 205–211, at 209. As Bonazzi remarks, Plutarch insists in using the expression later in the dialogue, which corroborates its importance in the dialogue: ἀπάρξασθαι τῷ θεῷ τῆς φίλης μαθηματικῆς (*De E* 387E5).

an impressive awareness of the Aristotelian and Platonic philosophical tradition, and he performs an effective integration of his own scientific research within a philosophical frame mainly based on the philosophy of these authors.⁵⁶

Bonazzi argues that through his offer, Plutarch recognizes the insurmountable superiority of the god, and that the last word in the dialogue, ἀσθένεια (394C7), underlines the weakness of the human nature with respect to the deity.⁵⁷ Ptolemy described the god as an entity completely separated from perceptible reality (I 1.5.18 καθάπαξ κεχωρισμένης τῶν αἰσθητῶν οὐσιῶν), high in the most elevated parts of the cosmos (ἄνω που περὶ τὰ μετεωρότατα τοῦ κόσμου),⁵⁸ very much in line with the middle Platonic idea of the divinity. Therefore his idea of dedication was probably not far from Plutarch's, even if the specific characteristics of astronomical knowledge – its approximate success – allowed for him to suggest, on a more positive note, that astronomy approaches its practitioners to the god.⁵⁹

Correspondence:

Cristian Tolsa
Queen's University
505 Watson Hall
49 Bader Lane
K7L 3N6 Kingston, ON
Canada
ctolsa@gmail.com

56 For Ptolemy's philosophical standpoint see F. Boll, "Studien über Claudius Ptolemäus", *Jahrbücher für Classische Philologie Suppl.* 21 (1894) 49–244; and, more recently, L. C. Taub, *Ptolemy's Universe: The Natural Philosophical and Ethical Foundations of Ptolemy's Astronomy* (Chicago 1993); J. Feke, "Ptolemy's Defense of Theoretical Philosophy", *Apeiron* 45 (2012) 61–90; Tolsa (above, n. 44).

57 Bonazzi (above, n. 55) 209.

58 Ptolemy identifies this entity with the Aristotelian prime mover: *Alm.* I 5.13–14: τὸ μὲν τῆς τῶν ὄλων πρώτης κινήσεως πρῶτον αἴτιον. Cf. *Plan. hyp.* Goldstein 5: "the planets, all of which lie below the (prime) mover ...".

59 Ptol. *Alm.* I 7.17–24 ἐραστὰς μὲν ποιούσα τοὺς παρακολουθοῦντας τοῦ θείου τούτου κάλλους, ἐνεθίζουσα δὲ καὶ ὡσπερ φυσιοῦσα πρὸς τὴν ὁμοίαν τῆς ψυχῆς κατάστασιν. For the sense of the divinity conveyed by astronomy in Ptolemy see the epigram ascribed to him in the manuscripts of the *Almagest* and in the *Palatine Anthology* (9.577): Οἶδ', ὅτι θνατὸς ἐγὼ καὶ ἐφάμερος· ἀλλ' ὅταν ἄστρον / ἰχνεύω πυκινὰς ἀμφιδρόμους ἔλικας, / οὐκέτ' ἐπιπαύω γαίης ποσίν, ἀλλὰ παρ' αὐτῷ / Ζηνὶ διοτρεφέος πίμπλαμαι ἀμβροσίης – text as in my recent edition in C. Tolsa, "The 'Ptolemy' Epigram: A Scholion on the Preface of the *Syntaxis*", *GRBS* 54 (2014) 687–697; however, as I argue *ibid.*, Ptolemy was not the author of the epigram, which was actually inserted as a scholion into the manuscript tradition. Cf. also the previous study of F. Boll, "Das Epigramm des Claudius Ptolemäus", *Socrates* 9 (1921) 2–12.