

# Coins in the World and the World (= Cosmos) in Coins: A Cosmographic Approach

## عملات العالم وعالم العملات: المنهج الكوني

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### ملخص:

عالم العملات هو عالم افتراضي شيق للغاية. تُستخدم العملات المعدنية منذ آلاف السنين لأغراض متعلقة بالمعاملات المالية. على الرغم من ذلك، فإن الكثير من هذه العملات عبارة عن أعمال صغيرة من الفن ذات الدلالات المختلفة التي تكون في أحيان كثيرة ثقافية وأحيان أخرى طقوسية. ومن خلال صورها ورسوماتها، كانت العملات تستخدم لأغراض سياسية، ودينية، ومالية. ومع ذلك، فإن الرسوم والصور التي تحملها بعض هذه العملات تحمل توجهاً كونياً، وتقدم لنا صورة للعالم القديم الخاص بصناعتها. يتم من خلال هذا العمل دراسة بعض العملات المعدنية التابعة للمجموعة الخاصة بمتحف العملات بأثينا والتي تحمل بعض الرسوم والرموز الكونية (نجوماً، أبراجاً، مجموعات فلكية من النجوم، كواكب، وما شابه ذلك). كما يتم فحص ومناقشة دلالات هذه التمثيلات الكونية المرئية التي تصنع من العملات المرتبطة بها عوالم افتراضية صغيرة داخل عالماً؛ الكون.

The world of coins is a very interesting virtual universe. Coins have been used in the last three Millennia for purposes related to financial transactions. However, many of them are small works of art that imply a different – more cultural and sometimes also cultic– significance. By their representations and motifs they were used for political, religious and financial reasons. Still, the motifs, and pictures on some of them have a mere cosmovisional approach and present us with the ancient *imago mundi* of their creators. We study a few coins belonging to the Collection of the Numismatic Museum in Athens, that bear certain cosmographic motifs and symbols (stars, constellations, zodiacal asterisms, planets, and the like). We are examining and discussing the semantics of these very cosmovisional representations, that make of the related coins small virtual worlds inside our Universe, the Cosmos ...

### Introduction

The scope of this paper is to present a brief study of a set of coins with cosmographic motifs, dating from the latest phase of the ancient Egyptian history. These very coins are kept at the premises of the Numismatic Museum of Athens (NMA) and are part of the donation of the late collector Iōannēs Dēmētriou. The Numismatic Museum of Athens is unique in Hellas, being one of the most significant of its kind all over the world and has accumulated over 500,000 objects: coins, lead seals, weights, medals and gems, dated from the 14<sup>th</sup> century BCE up to the present. The Museum is housed in the *Iliou Melathron* (actually meaning *Trojan Mansion*), the residence of the famous German Archaeologist Heinrich Schliemann (Fig. 1a, 1b).<sup>1</sup>

The rich Hellenic expatriate and connoisseur, Iōannēs Dēmētriou, who had formed a large and interesting collection for himself through purchases



(Fig. 1a) The Iliou Melathron housing the NMA in Athens.



(Fig. 1b) A hoard from the treasures of the Museum.

in Alexandria, donated it to the *National Museum* in the 1880's and early 1890's. Many of the objects of his personal collection were dispersed into the antiquities' market, whereof they were all subsequently bought by him, who eventually donated them –together with other items– to the National Archaeological Museum (actually to the Hellenic Government in 1884; Iōannēs Svorōnos, the Numismatics' expert, got receipt of the coins' donation in 1892). It was from this initial collection that the coins of that specific collection of the NMA originated. We should point out the fact that the very set of coins examined here has been chosen not only because of their unique cosmographic and astronomical representations, but also due to the fact that they come from Egypt and have been offered to

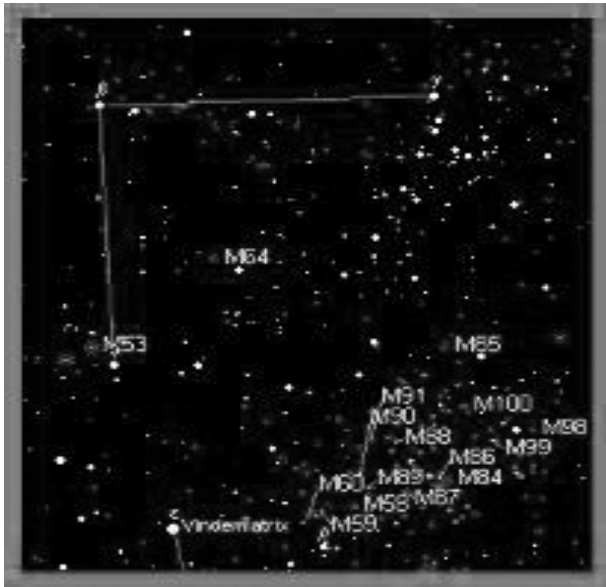
the Hellenic State by a person who loved Egypt and its antique culture and treasures.

### 1- Coins in the World and the World (= Cosmos) in Coins: A Cosmographic Approach

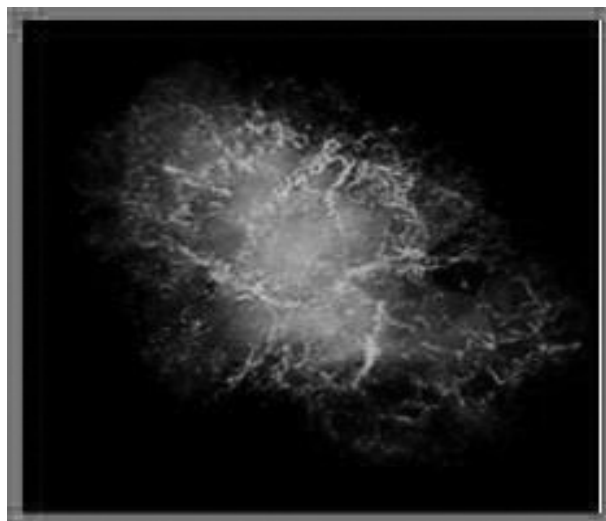
Coins are very interesting for historians and archaeologists alike since they are important parts of the past evidence. They consist of the primary/contemporary sources of their respective eras, and are not necessarily unbiased. Coinage had always a financial character but not only that. Coins were always the virtual vehicles for political, religious, social and cosmovisional ideas. They have also been used in many instances as funerary gifts to the deceased. Since our study is very specialized, since the author is not a numismatologist and since the international bibliography is rich indeed in related books and articles, we are not going to discuss these matters further. Let us only note that our contribution in this volume of *Abgadiyāt* is kindly offered to the celebration of 2009 as the International Year for Astronomy (IAY 2009).

The late ancient (e.g.: Hellenic or Roman) Cosmovision was several times depicted on coins. Thus, some impressive celestial phenomena (e.g.: conjunctions of planets, solar and lunar eclipses, comets, meteorites, novæ & supernovæ) were equally often represented on commemorative coinage (and on other objects of sculpture alike) (Figs. 2a, 2b, 3a). Hence, coins could well be considered as carriers of some of the most significant cosmographic and astronomical ideas of Antiquity. The present study proves this fact unequivocally!

Why have coins been used as virtual vehicles for cosmovisional ideas? Other than the fact that coins circulate a lot between people and they can propagate an idea or a notion very easily, coins are usually circular, a fact that hints to the circular cross sections of



(Fig. 2a) The constellation Coma Berenices, the only one of the 88 constellations of the IAU that refers to a historical person. It was conceived at c. after 244 BCE, during the reign of Ptolemaios III Euergetēs I, because of his wife’s love and piety! Berenikē (daughter of Magas of Kyrēnē) promised to offer her rich blond hair to Aphroditē (at her temple at Zephyrion), would her husband return victorious from his campaign at Syria. This happened indeed, but after some time her tresses disappeared! Then the astronomer royal, Konōn of Samos, implied that they were taken for safety to the sky by the goddess of love, who appreciated it a lot: Οἱ θεοὶ τὸν πλόκαμον τοῦτον ἐν ἄστροις ἔθηκαν!.



(Fig. 2b) A characteristic supernova remnant in the constellation of Taurus: known as M1. It is an expanding gas shell, after the SN explosion of the massive star that was there, recorded by Chinese Astronomers in 1054 CE.

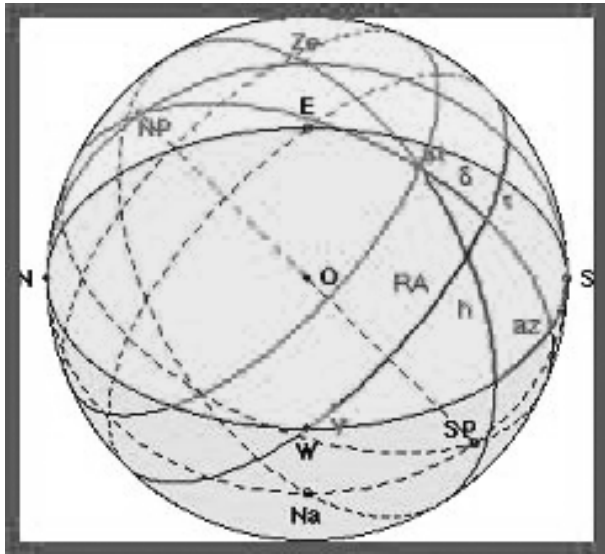
some celestial bodies (stars & planets), as well as to the projection of the circular shape of the shadow of the Earth on the surface of the Moon during lunar eclipses, and the circular shape of the Moon’s shadow on the surface of the Earth during solar eclipses. A comparative allegory on this fact can be seen *infra* (Fig. 3a, 3b ).<sup>2</sup> Obviously, a spherical object with a circular cross section, used as a virtual vehicle in order to express certain astronomical and cosmographic ideas, hints to the spherical shape of the celestial sphere, the conception of which was crucial for Practical Astronomy and the observations of the firmament.

## 2- The Studied Coins of the Numismatic Museum of Athens

Here we study 10 characteristic coins, belonging to the I. Dēmētriou Collection, dating from the Ptolemaic Era down to the Roman Era. Whenever possible we also compare them to similar pieces. All of them bear cosmographic and/or astronomical



(Fig. 3a) Aspect of the magical sphere of Athens (EM 2260) kept at the Epigraphic Museum. It is a unique object rich in cosmographic, astronomical and astrological representations, made of marble (Helleno–Roman Period).



(Fig. 3b) The celestial sphere (a simple representation of which is shown here) and its use were always very important, in order to understand and describe the celestial phenomena.

depictions and/or hints. None of them has been studied until now archaeoastronomically and most of them (№ 2–10) have never been fully studied. Let it be noted that coins with purely astronomical or cosmographic depictions are not very common among the collections of the NMA. Apart from the reasons given in the Introduction (see *supra*), the very set of coins examined here has been chosen from among a few similar coins because of their better preservation and the extremely rich astronomical representations on them. These depictions in the case of coins № 2-9 are so explicitly astronomical that no doubt is left for their purpose and meaning. In the case of coin № 1 we meet a cosmographic and metaphysical allegory undoubtedly influenced by the ancient pharaonic religion,<sup>3</sup> not an astronomical depiction *per se*.

**1. Cat. № S 1134 (~ № F 209): An Exquisite Golden *Oktadrachmon* (Fig. 4)<sup>4</sup>**

- \* Dating: Ptolemaios III Euergetēs I or Ptolemaios IV Philopatōr (244-221 BCE or 221-205 BCE).
- \* Material: Gold /  $D_{max} = 2.5$  cm / Preservation: Fine.



(Fig. 4a) Obverse of the coin Cat. № S 1134 (~ № F 209).



(Fig. 4b) Reverse of the same coin.

- \* Obverse: Bust of Ptolemaios III, crowned with a solar diadem.
- \* Reverse: *Cornucopia* full of fruits crowned too with a solar aura.
- \* Cosmographic Significance: The king as ruler –identified to the solar god and to the Sun– influences the growth of plants.<sup>5</sup> The semantics of this depiction alludes to the supersubstantial union of the solar god with the god of the hereafter and resurrection (- Osiris  $\equiv$  Rē<sup>6</sup>). In the *Litany of the Sun* we find the following text:<sup>6</sup>





the translation of which would be: *It is Osiris resting in Rē! It is Rē' appeased in Osiris!* We must note that the nocturnal union of these two principal deities was happening during the 6<sup>th</sup> hour of the Egyptian night, the darkest time, a time of death and fear. However, this very union was equivalent to a virtual resurrection of the osirified deceased, a fact which would subsequently lead to the dawn of the next day and the solar resurrection/reappearance. The Sun as a patron deity of the pharaoh, through his mediation by the ritual of the offering of Ma'at, would bestow his light and blessing upon the plants and trees, multiplying Nepri and giving the desired abundance of fruits and crops. In the case of this coin, we have a typical example of cosmographic allegories, well and concisely expressed with both natural and metaphysical symbols.

## 2. Cat. № F 1055: Copper Coin (Fig. 5)<sup>7</sup>

- \* Dating: Traianus (98-117 CE).
- \* Material : Copper /  $D_{\max} = 3.5$  cm / Preservation: Mediocre–Good.
- \* Obverse: Bust of Traianus with laurel diadem and *agis*.
- \* Reverse: The constellated Dioskouroi holding the *parazonium* (Kastōr & Polydeukēs), with 2 stars over their heads (cf. the ancient Egyptian decan *sb3wy*) and a crescent Moon between.
- \* Cosmographic Significance: The constellation Gemini. A possible eclipse in Gemini, perhaps connected to an important date of the Roman emperor. A possible conjunction of  $\alpha$ - or  $\beta$ -Gem/ $\zeta$ ? Actually this is the most astronomically significant depiction of all the coins studied here, which gave rise to three archaeoastronomical simulations (see Figs 14-16). The most important is the first, which is discussed below: the partial lunar eclipse in Gemini that happened in 112

CE, during the time of Traianus, on the day of the Winter Solstice which could also have a historical significance for that emperor.



(Fig. 5a) Obverse of the coin Cat. № F 1055.



(Fig. 5b) Reverse of the same coin.

## 3. Cat. № F 1661: Copper Coin (Fig. 6)<sup>8</sup>

- \* Dating: Antoninus Pius (138–161 CE).
- \* Material: Copper /  $D_{\max} = 3.5$  cm / Preservation: Mediocre–Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Head of Serapis (~Sun / Sol / Rē' ≈ Osiris), encircled by the 7 planets known in Antiquity, also encircled by the 12 zodiacal signs (~ constellations).

\* Cosmographic Significance: Serapis as the Sun<sup>9</sup> (through his virtual identification to Osiris–Re<sup>5</sup> (cf. also our comments for coin № 1, *supra*), with revolving planets (Ecliptic). Hints for a Heliocentric Cosmvision (?) and reference to the zodiacal asterisms as guardians of the Ecliptic. This small coin provides us with a good example of the Cosmvision of the ancient Helleno–Roman Period. The seven known planets (Mercury, Venus, Mars, Jupiter, Saturn, as well as the Sun and the Moon) were generally considered to revolve around the Earth, especially after the epicycles' theory of Klaudios Ptolemaios. However, the depiction on this coin



(Fig. 6a) Obverse of the coin Cat. № F 1661.



(Fig. 6b) Reverse of the same coin.

hints to a heliocentric approach, since Serapis is virtually identical to the Sun. Thus the 7<sup>th</sup> planet is the Earth. Aristarchos of Samos (310–230 BCE) was the actual father of the Heliocentric Theory (traces of which we can find in the even more ancient Orphic Hymns), which was stolen by Copernicus.<sup>10</sup> The radius of the zodiacal circle on the reverse of this coin is larger than that of the radius of the 7 planets, which correctly hints to their very projected apparent movement on the plane of the Ecliptic.

#### 4. Cat. № F 1662: Copper Coin (Fig. 7)<sup>11</sup>

- \* Dating: Antoninus Pius (138–161 CE).
- \* Material: Copper /  $D_{\max} = 3.5$  cm / Preservation: Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Over a depiction of the constellation Cancer a crescent, topped by the bust of the Moon (Luna?) and a star in front of it.
- \* Cosmographic Significance: The Moon at Cancer (possibly connected to an important date of the reign). Apparent passing of the Moon from the Ecliptic (it passes also from Cancer). A possible conjunction of  $\alpha$ -Cnc/ $\mathbb{C}$ ? Perhaps the star depicted would be  $\alpha$ -Cancri, but we don't think that this



(Fig. 7a) Obverse of the coin Cat. № F 1662.



(Fig. 7b) Reverse of the same coin.

depiction has any particular archaeoastronomical significance, since such conjunctions of the Moon with bright stars of the ecliptic (zodiacal) constellations are rather common.

### 5. Cat. № F 1663: Copper Coin (Fig. 8)<sup>12</sup>

- \* Dating: Antoninus Pius (138–161 CE).
- \* Material: Copper /  $D_{\max} = 3.5$  cm / Preservation: Mediocre–Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Over an image of the constellation Leo the bust of the Sun and a star in front of it.
- \* Cosmographic Significance: The Sun at Leo, Could this be Sirius, alluding to the *kynika kaumata*. Leo (~ the running lion) as a solar asterism: could it have a possible importance for the Roman emperor? Or perhaps that star would be Regulus ( $\alpha$ -Leonis)? During July and early August both Sirius (=  $\alpha$ -Canis Majoris) and the Sun are together over the horizon! Thus, it was believed in Antiquity that Sirius' heat was added to that of the Sun, hence the very hot weather. Consequently, the designation *kynika kaumata* (= *caniculæ ardores*) was devised ... Or maybe this coin was minted to commemorate the presence of Venus and Mars and their conjunction in



(Fig. 8a) Obverse of the coin Cat. № F 1663.



(Fig. 8b) Reverse of the same coin.

### 6. Cat. ~ № F 1664: Copper Coin (Fig. 9)<sup>13</sup>

- \* Dating: Antoninus Pius (138–161 CE).
- \* Material: Copper /  $D_{\max} = 3.6$  cm / Preservation: Mediocre–Poor.
- \* Obverse: Bust of Antoninus Pius with laurel diadem.
- \* Reverse: Over a depiction of the constellation Scorpius, is the bust of Arēs (Mars) looking towards the right and a star in front of it.
- \* Cosmographic Significance: The planet Mars in Scorpius (a rather negative and fearful insect/

constellation). Antarēs ( $\alpha$ -Scorpii) as a red giant is comparable to Mars as a red planet (Arēs/Mars as the [war] red planet); or maybe a possible conjunction of  $\alpha$ -Sco/ $\sigma^7$ ? In any case, we do not think that this depiction has any particular astronomical significance, since such conjunctions of planets (like Mars) with several bright stars of the ecliptic (zodiacal) constellations are rather common. However, coins like this are good proofs of the fact that these objects could be used as excellent vehicles in order to propagate various cosmographic and astronomical ideas during Antiquity in an easy, symbolic and understandable way that was also connected to religion and metaphysics.



(Fig. 9a) Obverse of the coin Cat. № F 1664.



(Fig. 9b) Reverse of the same coin.

### 7. Cat. № F 1665: Copper Coin (Fig. 10)<sup>14</sup>

- \* Dating: Antoninus Pius (138–161 CE).
- \* Material: Copper /  $D_{\max} = 3.3$  cm / Preservation: Good.
- \* Obverse: Bust of Antoninus Pius with laurel diadem.
- \* Reverse: Over an image of the constellation Sagittarius, crowned with a star is the bust of Zeus (Jupiter).
- \* Cosmographic Significance: The bright planet Jupiter in Sagittarius. A possible historically significant conjunction of  $\alpha$ -Sgr/ $\lambda$ ? In any case, we do not think that this depiction has any particular astronomical significance, since such conjunctions of planets (e.g. Jupiter) with several bright stars of the ecliptic (zodiacal) constellations are rather common. The sky at Sagittarius appears to be very ‘rich’ in stars, nebulae and stellar clusters, since we are looking towards the galactic center! At moonless nights, the ancient people would be able to perceive the rich structure of the Milky Way. We present another simulation of a conjunction of Jupiter and Venus in Sagittarius during 158 CE, while Mars would also be projected at the same constellation on the sky (Fig. 19). However, we



(Fig. 10a) Obverse of the coin Cat. № F 1665.



cannot be sure of the importance that such a non-close conjunction might have had in the minds of ancient people and if it would be eligible to be considered as archaeoastronomically significant during its own era.



(Fig. 10b) Reverse of the same coin.

### 8. Cat. № F 1666: Copper Coin (Fig. 11)<sup>15</sup>

- \* Dating: Antoninus Pius (138-161 CE).
- \* Material: Copper /  $D_{\max} = 3.2$  cm / Preservation: Mediocre–Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Over the depiction of the constellation Pisces, the bust of Zeus/Serapis (or perhaps Aiōn and his time–semantics?) with a sceptre together with a star. The two *pisces* face opposite directions.
- \* Cosmographic Significance: The planet Jupiter in Pisces. A possible historically significant conjunction of  $\alpha$ -Psc/♃? In any case, we do not think that this depiction is of any particular astronomical significance, since such conjunctions of planets (like Jupiter) with several bright stars of the ecliptic (zodiacal) constellations are rather common.



(Fig. 11a) Obverse of the coin Cat. № F 1666.



(Fig. 11b) Reverse of the same coin.

### 9. Cat. ~ № F 1667: Copper Coin (Fig. 12)<sup>16</sup>

- \* Dating: Antoninus Pius (138-161CE).
- \* Material: Copper /  $D_{\max} = 3.5$  cm / Preservation: Mediocre–Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Over an image of the constellation Taurus, the bust of Aphroditē (Venus), looking towards the left too, with a star.
- \* Cosmographic Significance: The planet Venus in Taurus. A possible historically significant conjunction of  $\alpha$ -Tau/♀? Would that star be Aldebaran? Or maybe it is just a mere depiction of Venus, perhaps near Pleiades or

Hyades? Additionally we have found another interesting conjunction of Jupiter and Mars in Taurus, while Venus was also present at 138 CE (Fig. 17). However, one cannot be sure of the very archaeoastronomical significance of this celestial phenomenon, which was a non–close conjunction.



(Fig. 12a) Obverse of the coin Cat. № F 1667.



(Fig. 12b) Reverse of the same coin.

**10. Cat. № F 1668: Copper Coin (Fig. 13)<sup>17</sup>**

- \* Dating: Antoninus Pius (138-161 CE).
- \* Material: Copper /  $D_{max} = 3.4$  cm / Preservation: Mediocre–Good.
- \* Obverse: Head of Antoninus Pius with laurel diadem.
- \* Reverse: Over an image of the constellation Aries

(the ram runs towards the right), the bust of Athēna / Pallas (Minerva), together with a star.

- \* Cosmographic Significance: Of course, it is not the asteroid Pallas that is meant here, a celestial minor planet discovered in the recent era! Aries was the 1<sup>st</sup> zodiacal asterism and some possible semantics of its cosmographic meaning was the fact that the Spring Equinox (equinoctial point  $\gamma$ , where the Ecliptic is crossing the celestial Equator) was found in this constellation. Maybe the star depicted on this very coin is none other than  $\alpha$ –Arietis. In any case this zodiacal constellation is not so particularly impressive neither big as it is projected on the sky, thus we



(fig. 13a) Obverse of the coin Cat. № F 1668.



(Fig. 13b) Reverse of the same coin.

believe that the depiction on this coin is rather of a general cosmographic character than of any particular archaeoastronomical significance.

### 3- Astronomical Simulations & Discussion

From our study it was evident that the examined coins provide us with several opportunities to re-construct some aspects of the ancient skies, when these very coins were minted. Indeed, the astronomical representations on them, as described above are tempting towards this goal! Thus, we performed the following archaeoastronomical simulations, based on the depictions of the coins under study. It should be emphasized that in order to do this we used –as usually– the software RED SHIFT 5.1, whose high precision as a professional astronomical tool has been already discussed elsewhere by this and other authors.<sup>18</sup> Before presenting these simulations we would like to emphasize the fact that all of them have been performed for the latitudes of both Alexandria and Rome (since most of the coins are Roman), but there was no significant difference in our results. Hence, as a good working hypothesis, we kept working at the Horizon of Alexandria. In our paper we present only the most important and archaeoastronomically significant simulations, among a big set of numerous plausible simulations, discussing their possible semantics and clarifying whenever necessary (LT = Local Time, for Egypt  $LT = UT + 2^H$ ).

1- A partial lunar eclipse in Gemini: Alexandria, 21-XII-112 CE, LT 03:28', 1<sup>D</sup> before the Winter Solstice, 2<sup>D</sup> after Coma Berenicids (Fig. 14). This instance actually seems the most significant from the archaeoastronomical point of view. A partial eclipse of the Moon, less than 24 hours before the Winter Solstice, happening also 2 days after the maximum in the Coma Berenicid meteors [let us not forget the importance of Coma Berenices for Egypt during the Ptolemaic and Roman Periods

(Fig. 2a)], visible equally easily in both Rome and Alexandria,<sup>19</sup> would be definitely a very important and special astronomical epiphany. Perhaps this has led to minting coin № 2, on the reverse of which Gemini and the Moon are so characteristically depicted. Would, then, this lunar eclipse in Gemini be possibly connected to an important date of the Roman Emperor Traianus? Another plausible scenario (although less probable because of its minor astronomical importance) would be a possible conjunction of  $\alpha$ - or  $\beta$ -Geminorum with the Moon, since all of these celestial bodies are depicted on the studied coin.

- 2- A conjunction of the Moon (☾) and Venus (♀) in Gemini: Alexandria, 29-IV-111 CE, LT 19:30' (Fig. 15). This celestial phenomenon (a close conjunction of the Moon and Venus) would be another plausible explanation of coin № 2; however, since Venus is not depicted on the reverse of the coin, most probably this was not the case.
- 3- A conjunction of the Moon (☾) and Venus (♀) in Gemini: Alexandria, 29-VII-113 CE, LT 01:20' (Fig. 16). This celestial phenomenon (a conjunction of the Moon and Venus) would be another plausible explanation of coin № 2; however, since Venus is not depicted on the reverse of the coin, most probably this was not the case (see the previous case 2, *supra*).
- 4- Venus (♀) and a conjunction of Jupiter (♃) and Mars (♂) in Taurus: Alexandria, 05-IV-138 CE, LT 17:00' (Fig. 17). Here we have a concentration of important planets in Taurus. However, one cannot be sure of the significance of this in the minds of ancient people. Maybe it had an astrological meaning. Jupiter and Mars appear in a not-so-close conjunction, while Venus is also present further away and rather (apparently)

close to Aldebaran and also close to Hyades. The Sun is already set and the group of planets follow the day–star into the West. Could this possibly explain the reverse depictions of coin № 9?

5- The Sun (☉) and a conjunction of Mars (♂) and Venus (♀) in Leo: Alexandria, 21-VII-144 CE, LT 15:37' (Fig. 18). This heavenly phenomenon that took place during July during that ancient era, in the period of *kynika kaumata*, could well explain the depiction on the reverse of coin № 5. Both the Sun (being at Leo) and Sirius are over the horizon and there is a close conjunction of Venus and Mars that could also be astrologically important in the minds of ancient people.<sup>20</sup>

6- Mars (♂) and a conjunction of Jupiter (♃) and Venus (♀) in Sagittarius: Alexandria, 09-II-158 CE, LT 05:58' (Fig. 19). Here we have another conjunction of Venus and Jupiter, this time in Sagittarius, and Mars is also projected further away in the same constellation. Of course, it was not a close conjunction and the whole heavenly phenomenon might be not so significant. Could this possibly explain the depiction on the reverse of coin № 7?

Hence, it is evident that our simulations hint to the fact that maybe the astronomical and cosmographic depictions on the set of the examined coins were the result of inspiration after these very astronomical phenomena (eclipses, conjunctions, & c.) occurred. However, we must point out emphatically that no matter how these celestial phenomena occurred, no matter how correct our simulations are, the fact that these heavenly phenomena stimulated the minting of the coins under study cannot be proven! Maybe they did –at least in the case of some coins (e.g.: № 2, 5, 7, 9)– but regrettably this cannot be explicitly stated until further clear and unquestionable archaeological and/or epigraphic evidence is uncovered. Hence several important archaeoastronomical questions rise from our experimental study.

*Questions to RP historians:* Are there any important dates –for the reigns of both Traianus & Antoninus Pius– that could be correlated to some celestial phenomena as the ones examined here (e.g.: Sun and Moon at zodiacal constellations, the lunar eclipses and phases, planetary conjunctions, star–planetary alignments, & c.)?

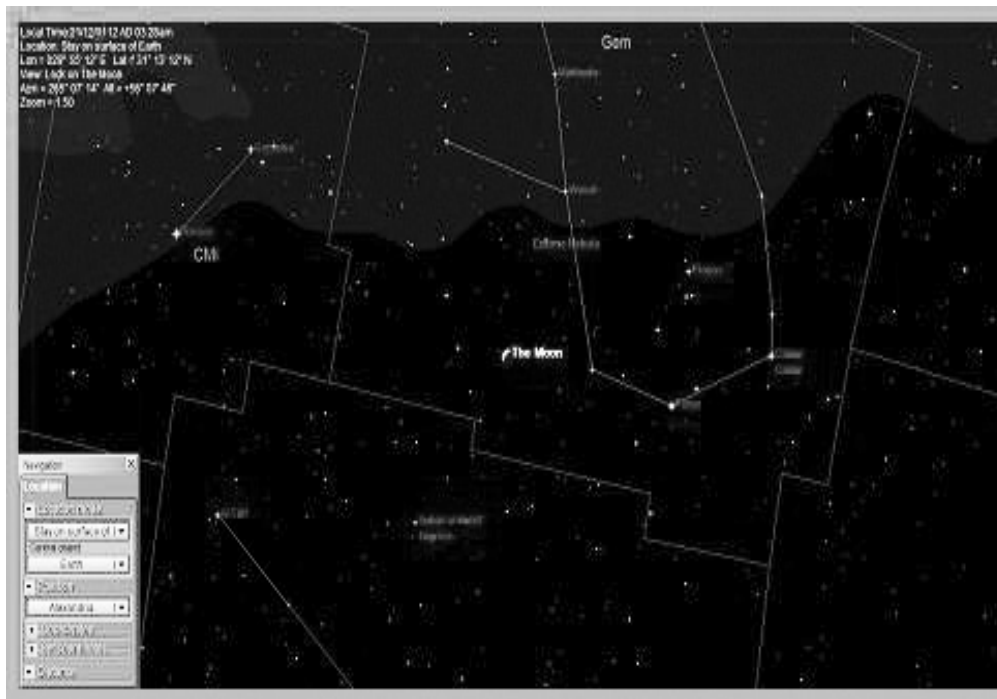
*Questions to Numismatologists:* Would it be possible that both the aforementioned Roman emperors have issued the specific coins studied here, in order to commemorate the concomitant dates, relating them to those striking cosmic events? Or were they merely astrological depictions of a more or less cultic significance (an answer that seems quite plausible in this instance, having in mind the late Egyptian lore on astrology, magic and the like)<sup>21</sup>?

## Conclusion

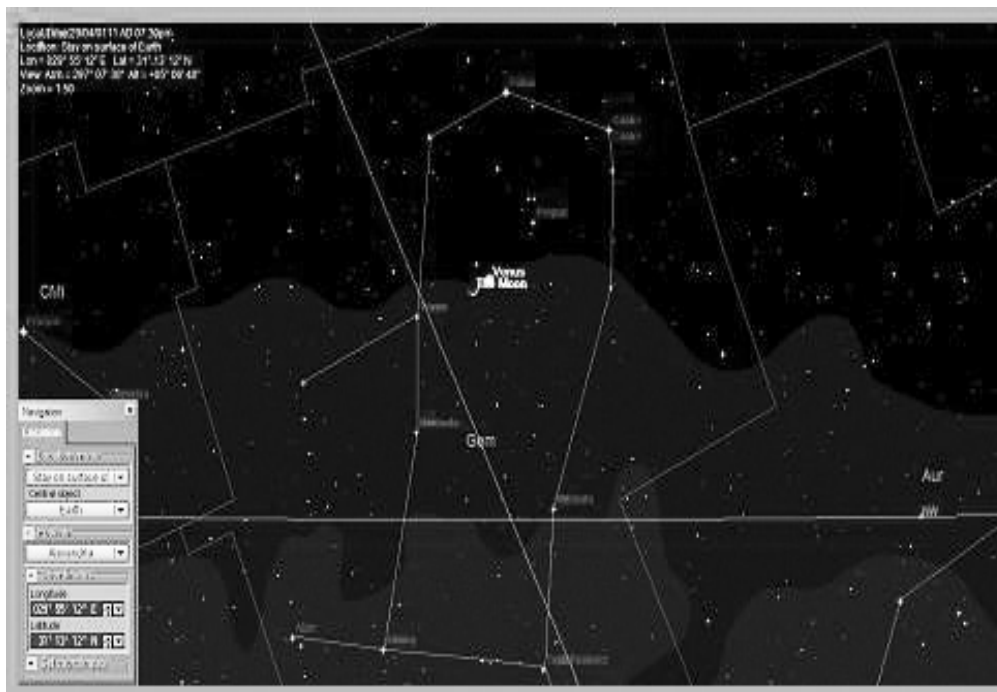
The world of coins is a very interesting virtual universe. Coins have been used in the last three Millennia for purposes of financial transactions. However, many of them are small works of art that imply a different –more cultural and sometimes also cultic– significance. By their representations and motifs they were used for political, religious and financial reasons. Still, the motifs and pictures on some of them have a mere cosmovisional approach and present us with the ancient *imago mundi* of their creators, that make of the related coins small virtual worlds inside our Universe.

We have studied 10 coins of the I. Dēmētriou Collection of the NMA, dating from the Ptolemaic and the Roman Period. Most of these characteristic pieces depict in a direct (2–10) or indirect way (1) important cosmographic and (archaeo)astronomical information (stars, constellations, zodiacal asterisms, planets, and the like). Astronomical simulations of the related ancient skies were made for some of the principal–ones, and useful conclusions have been



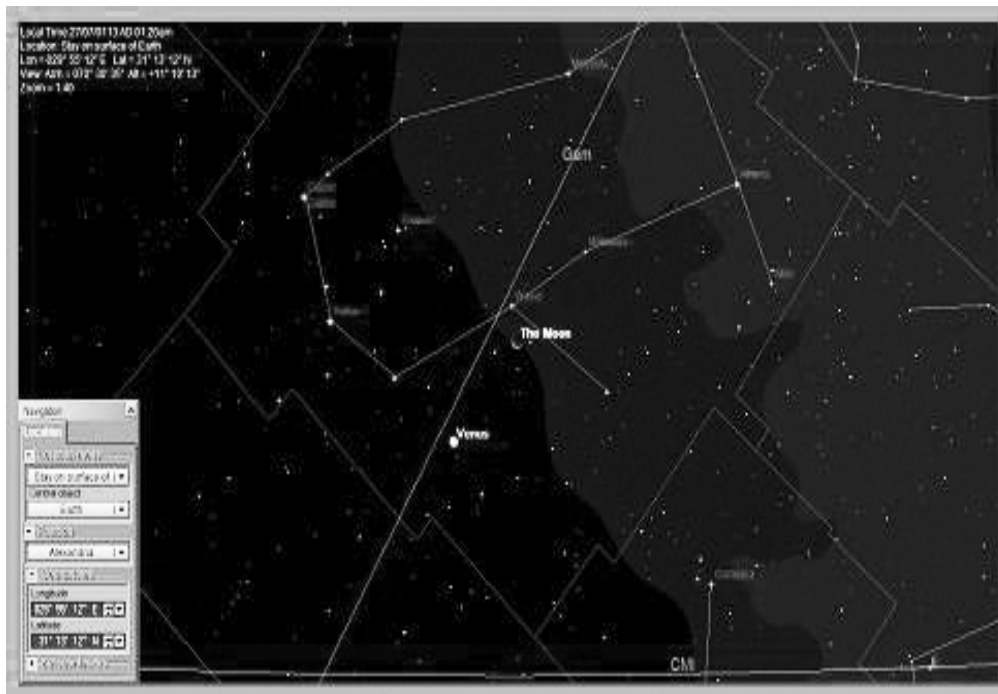


(Fig. 14) A partial lunar eclipse in Gemini: Alexandria, 21-XII-112 CE, LT 03:28', 1<sup>D</sup> before the Winter Solstice, 2<sup>D</sup> after Coma Berenicids.<sup>22</sup>

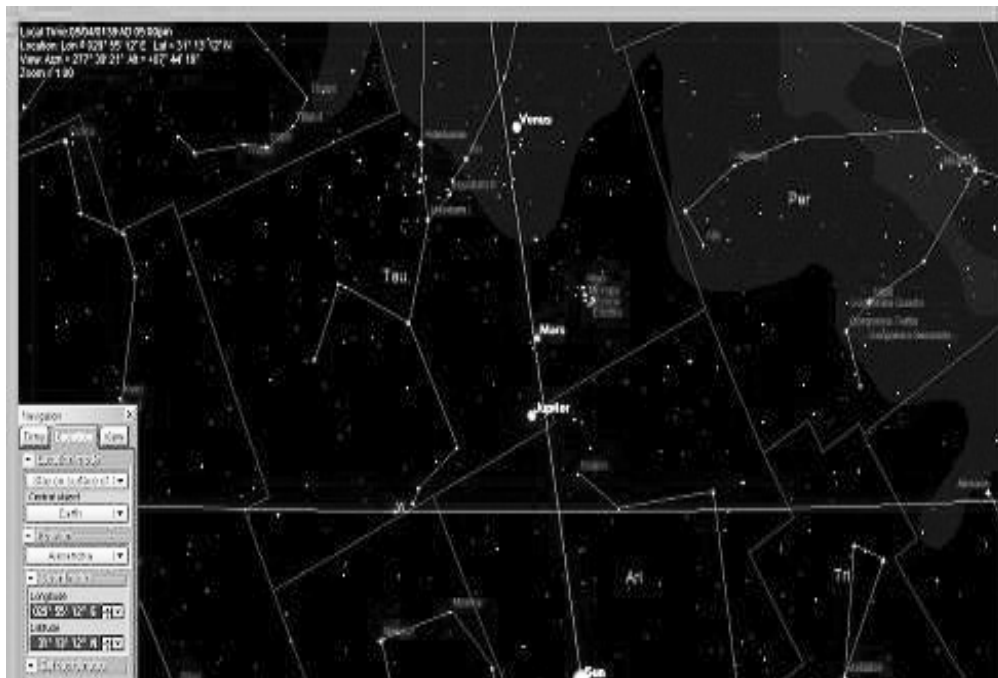


(Fig. 15) A conjunction of the Moon (☾) and Venus (♀) in Gemini: Alexandria, 29-IV-111 CE, LT 19:30'.

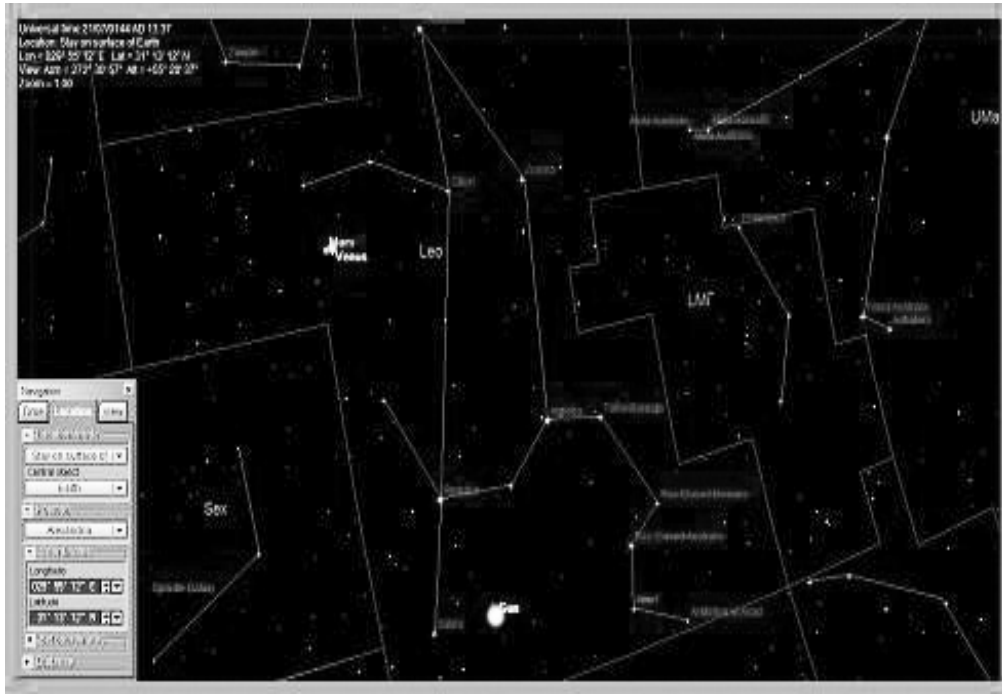




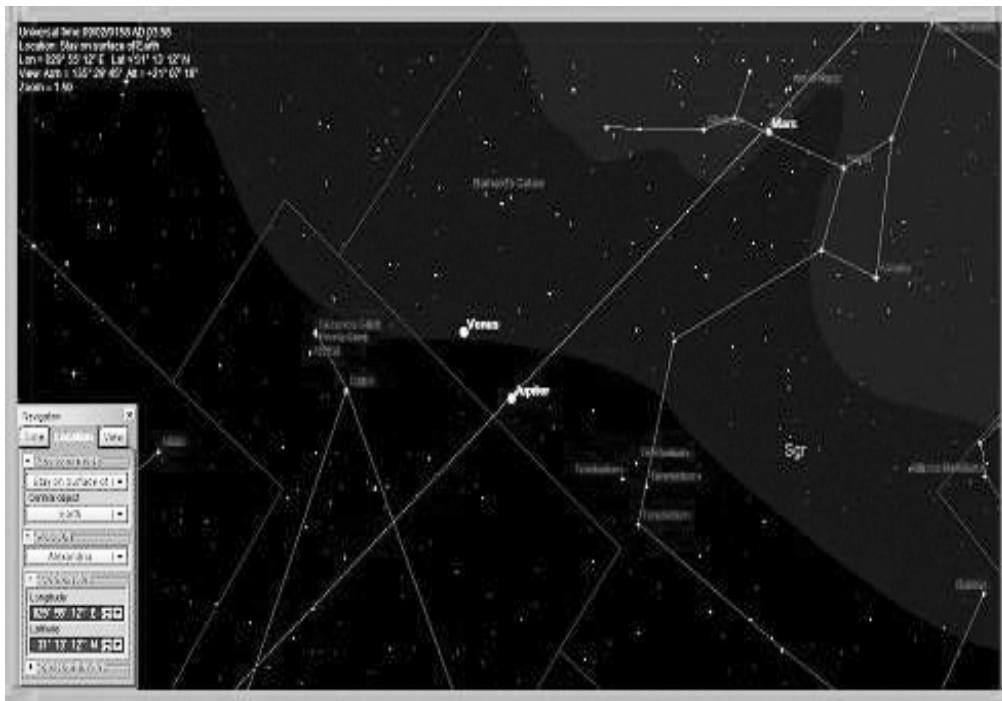
(Fig. 16) A conjunction of the Moon (☾) and Venus (♀) in Gemini: Alexandria, 29-VII-113 CE, LT 01:20'.



(Fig. 17) Venus (♀) and a conjunction of Jupiter (♃) and Mars (♂) in Taurus: Alexandria, 05-IV-138 CE, LT 17:00'.



(Fig. 18) The Sun (☉) and a conjunction of Mars (♂) and Venus (♀) in Leo: Alexandria, 21-VII-144 CE, LT 15:37'.



(Fig. 19) Mars (♂) and a conjunction of Jupiter (♃) and Venus (♀) in Sagittarius: Alexandria, 09-II-158 CE, LT 05:58'.

deduced. The coins have been studied as to their reverse depictions, following strict cosmographic criteria, hence not a numismatic typological pattern or method! We hope that our study will shed new light on these issues and that our questions will be answered soon by our colleagues in the disciplines of Roman History and Numismatics!

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