

## Medicine in Greek and Roman coinage with particular reference to the history of the neurosciences

I. Iniesta

Neurology Clinic, Palmerston North Hospital-MidCentral Health, Palmerston North, New Zealand.

### ABSTRACT

**Introduction.** Greco-Roman coins constitute a primordial source of knowledge about history in general and medicine in particular, including some historical references to the neurosciences.

**Development.** While many Greco-Roman numismatic designs commemorate such pivotal events as Vespasian's conquest of Judea, they also include invocations to Apollo the Healer, Asclepius, and Salus during terrible epidemics, and they illustrate legends such as Asclepius' journey to Italy to save the Romans from the plague. Roman coins chronicle how Christian symbols replaced references to these pagan myths and gods when paganism was prohibited in the fourth century. While we cannot speak of Greco-Roman numismatic references to neurology, since neither the specialty nor the concept existed at the time, Greco-Roman allegories are mentioned in the modern or contemporary eras to enrich the vocabulary of neuroscience; examples include Ammon's horn and the inscription *MEMORIA*. Depicted with the horns of a ram, the supreme Egyptian god Amun was assimilated as an epithet of Zeus in Greece and of Jupiter in Rome. Anatomists in the 18th century named the hippocampus major *cornu ammonis*, or Ammon's horn. The structure was later meticulously mapped out by Cajal and his student Rafael Lorente de Nó. Ammon's horn would subsequently be linked to memory and learning processes through the studies performed on Henry Molaison, once known only as 'Patient H.M.'

**Conclusions.** Greco-Roman coinage provides information about the myths, realities, and legends of Antiquity that have left their mark on the medical and neuroscientific literature of today.

### KEYWORDS

Apollo, apprenticeship, Ammon's horn, Asclepius, hippocampus, history of neurology, history of neurosciences, medial temporal lobe, memory, medical numismatics, neurological numismatics, Salus, Telesphorus

### Introduction

One common practice in the ancient world was using metal images to immortalise the fortunes, ephemerides, patron saints, monuments, allegories, diverse anthropomorphic figures, and personified concepts such as Hope or Health. This was especially important in high Imperial Rome. Provincial mints could be found from the Atlantic coast to the shores of the Black Sea or the Red Sea. Emperors used images on coins to promote their exploits; mining activity flourished, leaving behind impressive conical clay deposits carved out by the artificial channelling of water that was achieved by Roman engineering. These massive natural cathedrals adorn what are now

beautiful landscapes in the historical site of Las Médulas near the Spanish city of Astorga, once known as Asturica Augusta.

The metal ore extracted from the mines was smelted for use in the dies that left behind the indelible imprints of the feats and legends of Antiquity. Coins are equally important as archaeological artefacts and as trustworthy historical sources, and their designs depict emperors celebrating their victories and commemorating important ephemerides. Examples include the Olympic victory of the athlete Hermogenes; the conquest of Judea by Vespasian; and, in the days of the latter's son and successor Tito, the eruption of Vesuvius that buried

Herculaneum and Pompeii. Others recreate such myths as the labours of Hercules, Theseus and the Minotaur, Perseus and Medusa, or Bellerophon and the chimera. Series of coins struck in times of major epidemics invoked the mercy of the gods of healing: Apollo, Asclepius, and Salus. They also referred to legendary exploits, such as Asclepius' journey from Epidauros to Tiber Island in the form of a snake to heal the Romans during one of these epidemics.

#### From primitive coins to coin collecting

Coins were introduced as a means of facilitating economic trade along the eastern Mediterranean coast. The earliest attempts date back to the seventh century BC in the region of Lydia, the inland part of the Anatolian peninsula, in the centre of modern-day Asian Turkey. The material used initially was a natural alloy of gold and silver called electrum. It formed nuggets whose value depended on their weight.

Throughout the sixth century BC, the rising standards and increased complexity of the coins used in trade led to the practice of striking or minting coins, and thus the first mints or coining houses appeared. The Assyrian Empire had collapsed and Persians, Greeks, and Phoenicians were competing fiercely for control over maritime trade. In this context, the Mermnad dynasty or Myrmidons –legendary Babylonian veterans of the Trojan War<sup>1</sup>– became the pioneers of the ancient art of coin-making. The numismatic designs showed juxtapositions of different sacred animals, such as the struggle between a bull and representing different peoples. Another sacred animal, the ram, symbolised strength and fertility. Growing commercial demand resulted in a series of variations in the shape, size, and metal used for the coins. Time also saw an increasing variety of themes depicted on the obverse and reverse (heads/tails).

Within a mere century, artisans were producing true masterpieces which included the decadrachms of Akragas and the coins created by the Greek artist Euainetos which remain in near-mint condition to this day. There are also numerous coins in an acceptable state of wear that possess all the historical interest of the examples cited above while remaining accessible to amateur collectors. Depending on their interests, coin enthusiasts might carry out a cross-sectional study of events such as the civil wars that broke out after the death of Nero, or they might examine the coins designed during the Plague of Cyprian in the

year 253 AD. A collector might also explore such myths as the twelve labours of Hercules or the anthropomorphic allegories of Hope, Justice, or Peace. Yet another possibility is a longitudinal study of medicine-related symbols in Greece and Rome, with emphasis on symbols and terms related to the history of neuroscience.

#### Background

Very few studies of Greco-Roman numismatics examine topics in medicine. One of Spain's first scholars to examine medical and health-related themes in the coins of Imperial Rome was Pascual Iniesta Quintero (1908–1999). Iniesta was named Numismatist of the Year in 1968 by Club Colón, the Madrid-based collector's club. And indeed, his first lecture before the Spanish Society of Physician Writers in 1957 was entitled 'Medicine in the coinage of Imperial Rome'. Our current work is a mere extension as well as an acknowledgement of Pascual Iniesta's pioneering work.

#### Working hypothesis and objectives

Building on existing numismatic studies of Greek and Roman coins with medical themes, this article will focus on Imperial and Provincial Roman coinage issued in times of epidemics and during the transition from pagan to Christian beliefs. It also examines Ancient Greece and the Roman Republic. Strictly speaking, there can be no neurological references in Greco-Roman numismatics since neither the specialty nor the concept existed at the time. Nevertheless, our study reveals Greco-Roman allegories that were used in the modern or contemporary eras to enrich the vocabulary of neuroscience. Examples include the inscription *MEMORIA* and Ammon's horn, whose origin first sparked our interest.

#### Development

##### 1. The vanquished conquerors

In the second part of *Don Quixote*, the protagonist describes a visit by Holy Roman Emperor Charles V to Rome:

The emperor was anxious to see that famous temple of the Rotunda, called in ancient times the temple 'of all the gods,' but now-a-days, by a better nomenclature, 'of all the saints,' which is the best preserved building of all those of pagan construction in Rome, and the one which best sustains the reputation of

mighty works and magnificence of its founders. It is in the form of a half orange, of enormous dimensions, and well lighted, though no light penetrates it save that which is admitted by a window, or rather round skylight, at the top...<sup>2</sup>

As with almost all of Rome's western cultural legacy, the origin of their gods and myths can be traced back primarily to Greece. Greek mythological figures entered Roman iconography through a gradual process of assimilation. As in the cases of Ares and Mars, Zeus and Jupiter, Cronus and Saturn, and Poseidon and Neptune, the gods of healing changed names in their transition from Greece to Rome; Asclepius became Aesculapius and Hygieia became Salus. These Roman gods would be replaced in turn by martyred saints in the Christian period.

Whereas the currency circulating in the Roman Republic in the third century BCE was still rudimentary, Greece had already been striking exceptionally complex and advanced coins for two centuries. These coins frequently featured portraits of the gods or of deified emperors.

Devotional practices and artistic representations of the gods in Greece and Rome can be traced back to Mesopotamia and especially to Egypt. One example of Egyptian influence is the Temple of Isis in Baelo Claudia, situated on the Bay of Bolonia in what is now the Spanish province of Cádiz. Numismatic studies also attest to the significance of the Egyptian god Amun, an epithet of Zeus/Jupiter. Amun was depicted with a ram's horns on tetradrachms from the time of Alexander the Great and on consular medallions from the reign of Claudius.<sup>3</sup> The most important Egyptian deity of medicine was Imhotep, a divine healer linked to his Greek counterpart Asclepius.<sup>4</sup> In addition, we must not overlook the decisive influence of the Etruscan gods on Roman society.<sup>5</sup> Paradoxically, the conquered Greeks, Etruscans, and Egyptians alike seem to have seduced their invaders and conquered them in turn, since the Romans adopted and promoted the habits, customs, myths, gods, and beliefs of all of these cultures.

## 2. Doctors and gods: reason and religion

I swear by Apollo, the healer, Asclepius, Hygieia, and Panacea, and I take to witness all the gods, all the goddesses, to keep according to my ability and my judgment, the following Oath and agreement...<sup>6</sup>

The sixth century BC saw the rise of a new current in combating disease which went beyond mere folk empiricism and superstition. It revolved around the healer Asclepius, who was revered as a god in the northern Greek region of Thessaly.<sup>7</sup> At almost the same time, the western coastlines of Asia Minor and the nearby Ionian Islands began to perceive the influence of a form of medicine based not on religion, but rather on rational ideas inspired by pre-Socratic philosophers. This was later known as Hippocratic medicine, as it revolved around the pre-eminent figure of Hippocrates of Kos. Both approaches (the rational method behind *tekhne iatrike* or *ars medica*, in which a physician's knowledge includes understanding why the intervention is to be performed, and the irrational religion-based method) coexisted fairly harmoniously in Antiquity,<sup>8,9</sup> and both were critical of quackery and superstition. Together, these two approaches constitute the basis of modern western medicine. The Hippocratic Oath, which invokes the gods of healing in its first paragraph, reflects this interplay between reason and religion. Another enduring proof of the coexistence of medicine and religion is the devotion that led to the founding of the first hospitals in the Late Middle Ages.

## 3. Asclepius

Romans incorporated the Greek god Asclepius into their belief system after an epidemic struck the Italian peninsula circa 293 BCE. According to legend, and Ovid's account in *The Metamorphoses*, Asclepius journeyed from Epidauros to Tiber Island in serpent form to bring aid to the Romans.<sup>10</sup> In the year 150, Antoninus Pius issued coins bearing the name and mythological image of Asclepius (known to the Romans as Aesculapius). These coins recall the god's legendary journey and constitute the only series with an inscription of his name on the exergue (Figure 1). However, images of Aesculapius on coins from different provinces of the Roman Empire date back to the first century AD. The reverse of a consular medal of Agrippina struck in Kos in 33 AD shows the god leaning on his serpent-entwined staff (Figure 2). As for the central currency of Imperial Rome, Aesculapius first appeared on a cistophorus (silver tetradrachm passed down from Alexandrian Greece and typically used in the eastern Roman provinces). The coin was struck under Emperor Hadrian in Pergamon in the year 129, and instead of the two entwined serpents that usually appear on a

cistophorus, it shows Aesculapius in the same attitude as on the medal of Agrippina described above.<sup>11</sup>

Together, the incorporation of the Greek god Asclepius, and the arrival of the first Greek doctors (Asclepiads) in Rome in the first century BC, illustrate the transfer of medical culture from Greece to Rome. During the second century, the Roman Empire boasted as many as 320 temples dedicated to Aesculapius.<sup>12</sup> Hadrian was the main proponent of the resurgence of Classical Greek culture in Rome.

Even the emperor Severus Alexander was depicted as a priest of Aesculapius on a large provincial bronze coin struck in 227. The emperor appears holding the serpent-entwined staff (Figure 3).

#### 4. Salus

The Greek goddess Hygieia's assimilation into Roman culture as Salus was a more complex process. In the year 320 BC, during the Samnite Wars, a temple in Rome was dedicated to Salus. Two inscriptions mentioning worship of that goddess on the Italian peninsula predate the founding of the temple.<sup>13</sup>

The consular decemvirs in Rome proclaimed devotions to Apollo, Aesculapius, and Salus after a major epidemic.<sup>13</sup> The first paragraph of the Hippocratic oath suggests that the concept of Salus at that time was already taking on the role of the earlier Greek goddess. Hygieia was more closely linked to public health than to wealth and well-being, favours which the Romans later attributed to Salus. Additionally, under Etruscan influences, the goddess Salus was associated with the sun god Usil after about 180 BC.<sup>14</sup>

The worship of Salus in the Quirinal hills beginning in the fourth or third centuries BC, and the incorporation of the goddess under the names of Salus Augusti, Salus Augusta, Salus Publica, or Salus Reipublicae, make this goddess a more versatile and complex icon than her Greek predecessor. This is shown by the diverse representations and symbols of Salus on the reverses of different coins.

The first Roman coin to feature a personification of Salus was a denarius serratus in the Republican series struck by moneyer Roscius Fabatus in 64 BC.<sup>15</sup> The coin shows Juno Sospita wearing a goatskin hood on the obverse and a maiden feeding an erect serpent on the



**Figure 1.** Medallion of Antoninus Pius, 150 AD. The reverse illustrates the legend described by Ovid in *The Metamorphoses*: Asclepius, in the form of a serpent, journeys from Epidauros to Tiber Island to save its residents from the plague that struck Italy in the third century BCE. Tiberinus (or Faunus) welcomed Asclepius on his arrival. AESCVLAPIVS is inscribed on the exergue.



**Figure 2.** Consular medal of Agrippina struck in Kos in 33 AD. On the reverse, Aesculapius is shown standing with his serpent-entwined staff.



**Figure 3.** Provincial coin from the reign of Severus Alexander, minted in Cilicia in 227 AD. The obverse shows the diadem-crowned emperor garbed as a priest of Asclepius and holding the serpent-entwined staff. The Greek inscription is a reference to the rebuilding of the Asclepeion.

reverse.<sup>16</sup> In the following decade, the gens Acilia (a plebeian Republican family that traced its ancestry to the first Greek doctor to practice medicine in Rome) coined a denarius whose reverse shows the goddess



Salus looking to her right and the inscription SALVTIS (Figure 4).

During the reign of Antoninus Pius, the Senate commissioned eight series of coins displaying Salus in different poses (seated, standing), and one of them bore the inscription SALVS PVBLICA. But in contrast to the series of imperial coins portraying Salus is the dominant deity, provincial series of coins and consular medals were more likely to invoke Aesculapius as the god of healing, especially in the province of Aegyptus.<sup>17</sup>

### 5. Telesphorus

Telesphorus, assistant to Aesculapius and a late arrival among the Greco-Roman gods of healing, first appeared on coins in the third century, specifically on provincial bronze coins struck during the reign of Caracalla. Telesphorus is considered one of the most problematic figures in the history of ancient religions. According to Robert Graves, Telesphorus was the guardian spirit of convalescence and he is represented wearing a hooded cape, the costume of those who had just recovered from illness.<sup>18</sup> However, other authors believe Telesphorus was more likely to have been introduced by way of Egyptian mythology, and they associate him with Harpocrates, the god of silence.<sup>19</sup> Telesphorus is typically depicted as a hooded figure accompanying Aesculapius, or standing between Salus and Aesculapius (Figure 5).

### 6. Galen of Pergamon (129-201) and the Greek Asclepiades

Galen's long life spanned the reign of six emperors. In his early years, he witnessed the Hellenisation campaign largely carried out by Hadrian and Antoninus Pius. Galen settled in Rome in 169 and was a prestigious surgeon to the gladiators at first. He treated Commodus both as a Caesar (junior emperor) and during his subsequent reign as emperor; he also treated Commodus' father Marcus Aurelius and his co-emperor Lucius Verus. Galen's last ruling patient was Septimius Severus. It is thrilling to hold up an aureus of Marcus Aurelius depicting Salus on its reverse and imagine that the emperor might in fact have handed the very same coin to Galen in payment for his services (Figure 6).

Be that as it may, physicians were only portrayed on Roman coins on extremely rare occasions. Republican and Imperial numismatic series contain very few references to medical practitioners. As Suetonius stated in his biographies, Octavius erected a statue next to that of Aesculapius and dedicated it to his physician Antonius Musa for having cured his severe illness.<sup>20</sup> According to Tacitus, Claudius granted tax immunity to the residents of Kos since the island was the birthplace of his doctor Xenophon.<sup>21</sup> A few provincial Roman coins commemorate Xenophon and even Hippocrates of Kos, the father of medicine, with the inscription IP.<sup>22</sup> Despite Galen's considerable prestige and influence, there are no known coins honouring him.<sup>17</sup> The rareness of physicians in Greco-Roman numismatics may be partially due to the influence in Late Republican Rome of Cato and one of his contemporaries, Roman author Pliny the Elder. Their scepticism for imported Greek medicine was a stumbling block for Roman civilization that would



**Figure 4.** Denarius (the source of the Spanish word *dinero*) minted by the gens Acilia in 55 BC. The obverse shows the profile of Salus, goddess of health, and she also appears as Valetudo with an entwined serpent on the reverse.



**Figure 5.** Large bronze of Caracalla struck in Lydia circa 210 AD. On the reverse, the Emperor consults Asclepius (centre), shown with Salus and Telesphorus (the hooded figure between them).



**Figure 6.** Aureus of Marcus Aurelius struck in the lifetime of his physician Galen of Pergamon (163 AD). On the reverse, Salus feeds the serpent emerging from an altar; the inscription reads SALVTI AVGVSTO.



**Figure 7.** Medallion of Caracalla struck in 215 AD. On the reverse, the Emperor and his followers reach Pergamon and are welcomed by Aesculapius, atop a column.

prove long-lasting.<sup>23</sup> At the same time, we should not underestimate the popularity of the myth of Asclepius among citizens from all walks of life.<sup>24</sup> In any case, almost all numismatic portraits fall into one of two categories: emperors and their consorts, descendants, and favourites; and the gods. The numerous health-themed series of coins that appeared from time to time, and not only in plague years, probably represent an indirect display of trust and admiration for Galen and his fellow Greek Asclepiads. When they reached Rome, their activities were accepted and integrated into the worship of the gods of healing and the practices of the priests of Aesculapius.

Evidence of the medical significance of Pergamon to the Romans can be found in a medallion that shows Caracalla reaching in that city during one of the last military campaigns along the complicated eastern front. On the reverse, Aesculapius is depicted atop a column and greeting the mounted emperor, who is probably on his

way to the Asclepeion to perform some type of a curative or therapeutic sacrifice (Figure 7).

#### 7. Apollo the healer, Chiron, and the Plague of Cyprian

The personification or anthropomorphic representation of such abstract concepts as health, concord, hope, and peace probably dates back to the early years of the Roman Republic. It seems quite clear that these personifications were imported from practices and ideas that had arisen in Ancient Greece.

Following an assimilation process resembling the one that included the gods in the *indigitamenta* (lists of deities kept by the College of Pontiffs), Roman society adopted a religious philosophy according to which there was one divine presence for each sacrifice and form of suffering. As Livy recounted, “ever since the time of the decemviri, the Greek god Apollo has been celebrated in Rome...as a useful god who wards off illness”.<sup>25</sup> This fact is attested to by numerous supplications to Apollo the Healer on coins issued during major epidemics, such as the series created under Gallienus and Trebonianus Gallus during the Plague of Cyprian toward the middle of the third century. These series feature Aesculapius, Salus, and the ubiquitous Apollo, accompanied by the inscriptions APOLL SALVTARI or SALVTI that may still be read on Imperial double-aurei, aurei, asses, and sestertii (Figure 8).<sup>17</sup> During the reign of Gallienus, a centaur appeared on an antoninianus alongside the inscription APOLLINI CONS AVG.<sup>26</sup> This is an allusion to the legend of Chiron, whom Apollo had entrusted with teaching medicine to Aesculapius.<sup>27</sup>

#### 8. Currency reforms in times of crisis

“And perhaps we will see the return of Ammon’s horn and the face of Cajal to new Greek drachmas and Spanish pesetas”.<sup>3</sup>

To provide an idea of the value of these coins at the time, the yearly salary of a Roman legionary in the first century was 225 denarii, or 9 aurei. Beginning in the year 64 AD, Nero began to apply major numismatic reforms, and he arranged for the mint that produced gold coins to be moved to Rome from Lugdunum (now Lyon). Coins were now lighter than they had been in the reign of Augustus, although gold and silver coins maintained their purity until well into the third century. Progressive monetary devaluation gave rise to



**Figure 8.** Sestertius of Trebonianus Gallus minted during the Plague of Cyprian in 253 AD. On the reverse, Apollo the Healer is invoked by the inscription APOLLO SALVS AVG.

the greatest currency reform in the history of Rome, which was undergoing political collapse and a lengthy process of disintegration. Since coins were being minted in far-away border towns, the Emperor and the Senate were unable to keep a close watch on the process. Diocletian established a tetrarchy in which imperial power would be shared between the eastern and western regions, each of which would have one Augustus and one Caesar. The production of provincial coins increased during a period marked by continuous barbarian invasions. The mint creating each coin systematically left its mark, which is very helpful for classifying coins both historically and numismatically. As the Roman Empire became decentralised, coins lost their uniform appearance. The economic crisis gave rise to major cutbacks in gold and silver production. Between the late third and early fourth centuries, Diocletian introduced a series of monetary reforms in order to revalue Imperial Roman coins. This project failed because it did not consider the close ties that have always linked politics to the economy. The weight of the aureus was initially increased; silver, in the form of the argenteus, made a comeback after having disappeared from the antoniniani (or double denarii) of Caracalla's reign and the denarii of Gallienus in earlier devaluations. A new silver-dipped mid-sized bronze coin, the follis, substituted the as. Dupondii and sestertii were no longer minted, and semisses were reintroduced. When Domitius Domitianus usurped the purple in Aegyptus at the end of the third century, Alexandrian coins, which had been under the direct control of the Emperor since the time of Augustus, disappeared. Imperial authority over coin-making in the provinces began to diminish.

## 9. The spread of Christianity and the decline of the Roman Empire: *Salus Reipublicae*

You, who were the embodiment and ensign of Hispania; the Matron holding in your right hand, the symbolic harvest on the denarii and bronzes of Hadrian, who with Italica honoured this land...<sup>28</sup>

The successors of Constantine the Great introduced coins with the Christian monogram Chi-rho, which was followed by the cross; both symbols marked the western expansion of Christianity. Beginning in the fourth century, martyred saints recognised as healers would progressively fill the gap left by the gods of healing that no longer appeared on the coins of the Late Roman Empire. The allusions to medicine and the extraordinary beauty of the invocations of the gods of healing on high Imperial Roman coinage would not be seen again. Later Byzantine reproductions of the Hippocratic Oath attest to the changing times. The classical medical text, now arranged in the shape of a cross, censored the names of the gods invoked by Greco-Roman doctors in the first paragraph.<sup>29</sup> Both Roman coins and the conversion of the Roman Pantheon into a temple dedicated to the saints provide proof of this transition.<sup>17</sup> After Trajan and Hadrian, Theodosius I was the third and last emperor to be born in the province of Hispania. During his reign, he made use of new symbols and signs associated with the inscriptions SALVS or SALVS REIPVBLICAE. Theodosius I definitively prohibited the worship of all pagan gods of healing, from Apollo the Healer to Aesculapius and Salus, and his devotion is illustrated by a solidus from his reign (Figure 9).

## 10. Ammon's horn and Memoria

Constantius I, the father of Constantine the Great, kept up the custom of portraying pagan gods of healing on his currency,<sup>16</sup> a practice which was subsequently suppressed by Theodosius I. An interesting posthumous follis of Constantius I refers to the happy memory with the inscription MEMORIA FELIX on the reverse (Figure 11).

The term 'Ammon's horn' reached medical literature through Garengot and Flurant, 18th century French anatomists who were influenced by the Renaissance current that had been ushered in two centuries earlier by the great anatomists of the Padua school. The common ground for these anatomists was their interest



in recovering ancient texts in the original Greek and reinterpreting them according to the new structural paradigm established by Vesalius.<sup>3</sup> References to the realities and myths of the Greco-Roman era were being adopted by medical texts.

Ammon the Protector was the supreme deity in the theogony of Ancient Egypt, and his role and attributes were associated with the human soul. Also known as Amun or Amen, meaning obscure, mysterious, or cryptic, he was the main deity of Thebes and his cult reached its apex during the twelfth dynasty. Before Amenhotep IV banned the cult of Amun and mandated a short-lived period of monotheistic worship of the sun-god Ra, the Priest of Amun had held the highest rank within Egyptian society.<sup>4</sup> Amun's place of worship, an oasis in the Libyan desert where the oracle of Siwa resided, was visited by successive waves of Greek pilgrims, and Amun was later added to the Greco-Roman theogony.

In his description of Greece, Pausanias recalls that temples to Amun could be found throughout Ancient Egypt, especially in the capital city of Thebes and in Sparta.<sup>30</sup> Pindar helped bring the cult of Amun from Cyrenaica in Libya to Greece in the fifth century BC; a statue of the god riding in a chariot was also displayed in Delphos. However, the first place in Greece where the god was depicted with a ram's horns was Megalopolis, the capital of the southern province of Arcadia.<sup>30</sup> Egypt was overrun by the Persians in the fourth century BC before falling into the clutches of Alexander the Great. After the conquest, he proclaimed himself the son of Amun and was deified before the oracle of Siwa.<sup>4</sup> A tetradrachm minted under Lysimachus in the northern Greek province of Thrace in the third century BC shows the



**Figure 9.** Solidus of Theodosius I from 380 CE. The obverse bears the bust of the Emperor. The reverse is inscribed with SALVS REIPUBLICAE; Christian symbols have replaced the Greco-Roman gods of healing



**Figure 10.** Tetradrachm of Lysimachus minted in Thrace in 285 BCE. Alexander the Great deified as Zeus Amun on the obverse. Pallas Athena on the reverse.



**Figure 11.** Posthumous follis of Constantius I minted in 307. The reverse bears the inscription MEMORIA FELIX.

diademed head of Alexander, conqueror of Egypt, portrayed as Zeus Amun on the obverse (Figure 10). Amun was later transformed into an epithet of Jupiter in Rome, as we see on provincial bronze coins from the reign of Claudius.<sup>3</sup>

In *Studies on the human cerebral cortex*, Cajal (Figure 12) describes the anatomical details of Ammon's horn or cornu ammonis (CA). Lorente de Nó later introduced the abbreviations CA1 to CA4 to describe the interconnected anatomical circuits in this exceptional structure,<sup>32</sup> as Balcells informs us in *Historia General de la Neurología*.<sup>33</sup> The CA1 region is also known as Sommer's sector after the German scientist whose pioneer studies described mesial or hippocampal temporal sclerosis.<sup>34</sup> The association between this entity and epilepsy had been described several decades earlier.<sup>35</sup> However, memory and learning processes were directly linked to Ammon's horn only recently, as a result of the bilateral hippocampectomy performed on Henry Molaison, (the famous case known only as "Patient H.M." until his death in 2008).<sup>36</sup>





**Figure 12.** Bronze medal with a bust of Cajal, created in 1973 by artist Abram Belskie, Danbury, Connecticut. "Great Men of Medicine" series. The obverse shows Cajal with the inscription "charting the nervous system". The reverse shows an inferior view of the brain flanked by male and female nudes symbolising the origin of humanity.

## Conclusions

Studying Greco-Roman numismatics teaches us about the myths, realities, and legends of classical antiquity, many of which are mentioned in medical and neuroscientific literature even today. In addition to their role as economic tools, coins themselves constitute a magnificent historical legacy and an educational aid providing a first-hand account of life and legend in ancient times. In addition to their beautiful artwork, coins display symbols linked to medicine that may be seen even today in pharmacies, hospitals, and ambulances. Examples include the serpent-entwined rod of Asclepius and Hygieia/Salus feeding the serpent from a libation bowl. Likewise, other elements, such as Ammon's horn and the term 'memory', have been assimilated by the medical literature into the field of the neurosciences. Depicted with the horns of a ram, the Egyptian god Amun was incorporated as an epithet of Zeus in Greece and of Jupiter in Rome. French anatomists of the Enlightenment gave the name 'cornu ammonis' or Ammon's horn to the coiled structure in the medial temporal lobe. It was meticulously described by Cajal and Lorente de Nó and later found to be linked to memory and learning processes when Henry Molaison underwent bilateral hippocampectomy. Intriguingly, some Latin terms like 'memoria' and ancient gods such as Amun, once featuring so prominently on Greek and Roman coins, have now been granted a new place in history through the neurosciences.

## Conflicts of interest

The author has no conflicts of interest to declare and has received no funding for this article. Illustrations were taken from the author's private collection and feature pieces, such as the denarii of Hadrian and Acilia, are being donated to the MAH SEN, the Spanish Society of Neurology's museum.

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## References

1. Heródoto. *Historia*. Schrader C, trad. Vol.1, libros 1-2. Madrid: Gredos; 1992.
2. Cervantes M. *El ingenioso hidalgo Don Quijote de La Mancha*. Madrid: Biblioteca Nacional de España; 1605. [The ingenious gentleman Don Quixote of La Mancha, trans. J.Ormsby. London: Smith, Elder and co., 1885.]
3. Iniesta I. Sobre el origen del asta de Amón. 2014;29(8):490-496.
4. Pijoán J. El arte egipcio hasta la conquista romana. In: Cossío MB, Pijoán J, editors. *Summa artis: historia general del arte*. Vol. 3. Madrid: Espasa-Calpe; 1932.
5. Weinstock S. Martianus Capella and the cosmic system of the Etruscans. *Journal of Roman Studies*. 1946;36:101-129.
6. Hipócrates. *Tratados hipocráticos*. Lara MD, trad. Madrid: Gredos; 2000. [Hippocrates. Hippocratic writings. trans. Lloyd GER, Chadwick J, and Mann WN. London: Penguin Books, 1983.]
7. Edelstein EJ, Edelstein L. *Asclepius: a collection and interpretation of the testimonies*. Vol. 2. Baltimore: John Hopkins Press; 1979.
8. Gil L. *La medicina popular en el mundo clásico*. Madrid: Guadarrama; 1969.
9. Laín Entralgo P. *La curación por la palabra en la antigüedad clásica*. Barcelona: Anthropos; 2005.
10. Ovidio Nasón P. *Las metamorfosis*. Barcelona: Fontana; 1995.
11. Sear DR. *The Accession of Nerva to the Overthrow of the Severan Dynasty A.D. 96 - A.D. 235*. Londres: Spink; 2002. (Roman Coins and their values; vol. 2).
12. Hart GD. *Asclepius: the god of medicine*. London: Royal Society of Medicine Press; 2000.
13. Marwood MA. *The Roman cult of Salus*. Oxford: BAR; 1988.
14. Fowler WW. *The Roman festivals of the period of the republic: an introduction to the study of the religion of the Romans*. London: Adamant Media Corporation; 2004.

15. Sear DR. Greek imperial coins and their values. London: Seaby; 2001.
16. Gold- und Silbermünzen, Pharmacie & Medicina in Nummis; 14-16 Nov 1990; Frankfurt a. Main: Frankfurter Münzhandlung; 1990
17. Iniesta I. La medicina en la numismática grecorromana: desde Apolo el médico, Asclepio e Higeia hasta Telesforo y la decadencia bajo imperial romana con la incorporación del Cristograma. *Gaceta Numismática*. 2010;178-179:17-46.
18. Graves R. The Greek myths. London: Penguin Books; 1992.
19. Stevenson SW, Roach Smith C, Madden FW. A dictionary of Roman coins, republican and imperial. Londres; Norwich: G. Bell & Sons; 1889.
20. Suetonius Tranquillus G. Los doce Césares. Barcelona: Iberia; 1972.
21. Tacitus PC. The annals of Imperial Rome. London: Penguin Books; 1996.
22. Seaby HA Greek coins and their values. London: B.A Seaby; 1966.
23. Porter R. The greatest benefit to mankind: a medical history of humanity from antiquity to present. London: W. W. Norton & Company; 1997.
24. Sigerist HE. Early Greek, Hindu, and Persian Medicine. Nueva York: Oxford University Press; 1961. (A History of Medicine; vol. 2).
25. Duruy V. Historia de los Romanos. Tomo I. Barcelona: Montaner; 1888.
26. Sear DR. The accession of Maximinus to the death of Carinus AD 235-285. Londres: Spink; 2005. (Roman Coins and their values; vol. 3).
27. Caro J. Vida del centauro Quirón. Madrid: Magisterio Español; 1978.
28. Iniesta P. Canto al olivo. In: Almazara. Jaén: Reca; 1999.
29. Iniesta I. Hippocratic Corpus. *BMJ*. 2011;342:d688.
30. Pausanias. The description of Greece. Vol. 1. Taylor T, trans. London: Priestley and Weale; 1824.
31. Ramón y Cajal S. Estudios sobre la corteza cerebral humana IV: estructura de la corteza cerebral olfativa del hombre y mamíferos. *Trab Lab Invest Biol Univ Madrid*. 1901-1902;1:1-140.
32. Lorente de Nó R. Studies on the structure of the cerebral cortex II. Continuation of the study of the ammonic system. *J Psychol Neurol*. 1934;46:113-77.
33. Balcells M. Historia general de la neurología. Esplugues de Llobregat: Grupo Saned; 2009.
34. Sommer W. Erkrankung des Ammonshorns als aetiologisches Moment der Epilepsie. *Arch Psychiatr Nervenkr*. 1880;10:631-75.
35. Bouchet C, Cazauvieilh JB. De l'épilepsie considérée dans ses rapports avec l'aliénation mentale. *Recherches sur la nature et le siège de ces deux maladies. Archives générales de médecine*. 1826;10:5-50.
36. Scoville WB, Milner B. . *J Neurol Neurosurg Psychiatry*. 1957;20:11-21.