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The Sphinx of Pattanam. A Game-Changing Workshop in India

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Abstract: The traditional historical view maintains that precious gems were mostly crafted and worked in the Mediterranean. It was thought that in classical times, cultures outside the Mediterranean world were mainly providers of raw materials. Recent unexpected discoveries in India challenge this view. The prospect of establishing an ancient gem craft workshop within the historic confines of the Pattanam archaeological site in India presents a tantalising proposition. But is it possible that a gem craft industry was established in ancient Pattanam? An outstanding intaglio with the representation of a sphinx, plus others found in the site, pose stimulating challenges in this regard.

Keywords: Pattanam, workshop, trade, engraved gems, India, Rome

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A beautiful intaglio found in 2020 in the Pattanam site of India is shrouded in mystery, giving rise to stimulating enigmas. Carved on a banded agate stone, the small piece has an oval shape, very characteristic of a Roman intaglio. Was it intended for a ring? The sphinx is a recurring Mediterranean mythological theme, a creature with the head of a woman and the wings and body of a lioness. Was it manufactured in Indian lands, or did it get there by chance? Is it simply the random product of international trade? We will try to deal with these questions and give, as far as possible, clues to address highly relevant issues in Roman-Indian relations.

Indeed, Pattanam is an archaeological site on the Kerala (Malabar) coast, first to provide a *plethora* of material evidence of maritime trade in ancient times. The trade in this site was part of the first transoceanic network in human history, uniting the continents of Asia, Africa and Europe through the water bodies of the Mediterranean, the Nile River, the Red Sea, the Arabian Sea (Indian Ocean), the Bay of Bengal and South China Sea. Based on radiocarbon dating, stratigraphic analysis and material studies, the 3rd century BCE–5th CE is marked as the culminating phase of these maritime exchanges in Pattanam (Cherian 2016: 9).

Nestled within the Periyar river delta, this coastal location lies 4 km from the Arabian Sea. The area is characterised by paleochannels, lagoons, and banks, with the Paravur Todu – a flow channel of the Periyar River – located 1 km to the south. Through a multidisciplinary archaeo-morphological study with geographers, it has been possible to reveal that this distributary was once the main course of the Periyar River (Narayana et al. 2001).

The archaeological site of Pattanam, supported by the material evidence recovered from excavations, strongly indicates its potential and identification with the legendary port city of Muciri Pattinam, or Muziris (Cherian 2016: 10). Frequently mentioned in early Indian literary sources, such as the *Puṟanāṉūṟu* (v. 343) and *Akanāṉūṟu* (v. 149), as well as in Mediterranean accounts like the *Periplus Maris Erythraei* (PME), Pliny's *Natural History* (NH VI.26), and the *Muziris Papyrus*, Muziris has long been regarded as a significant hub of maritime trade in antiquity. Nevertheless, the importance of Pattanam transcends its identification with Muziris. As a pivotal centre within the transoceanic trade networks of the ancient world, Pattanam appears to have facilitated the incorporation of the western region of peninsular India, historically referred to as Tamilakam, into the broader processes of urbanisation and economic integration during the early historic period (Cherian 2016: 9).

The assemblage of exogenous pottery at Pattanam, including Roman amphorae, Terra Sigillata, glazed turquoise ware, Sassanid jars, and dolia, provides compelling evidence of the site's integration into extensive transoceanic trade networks during the early historic period. These ceramics, along with their likely

contents, attest to imports from the Roman Mediterranean, Persian Gulf, and broader Indian Ocean spheres (Tomber 2008; Gurukkal 2016), up to China (Cherian 2016: 10). Such finds underscore the site's role as a major trading hub facilitating the exchange of goods, technologies, and cultural practices (PME p. 23; Cherian 2016).

In addition, the discovery of Rouletted Ware – a ceramic type associated with Indian manufacturing traditions – demonstrates Pattanam's connectivity to regional trade networks within the Indian subcontinent. Complementary artifacts, such as glass necklaces, Roman glazed pottery, and precious stones, further indicate a high volume of trade and the circulation of luxury goods. These findings align with scholarly observations that Pattanam may correspond to the ancient port of Muziris, a critical node in the Indo-Roman trade system (Tomber 2008; Gurukkal 2016). The material evidence reflects not only economic prosperity, but also the sociocultural and technological interactions that characterised the Indian Ocean world during the early centuries CE, a transformative period in global commerce (PME pp. 45–47; Cherian 2016).

In this period, between the 3rd century BCE and the 5th century CE, Pattanam seems to have urbanised (Cherian 2016: 24), evident in the numerous finds of clay and bricks, roof tiles, hydraulic supply systems such as wells and other evidence materials like copper and lead coins from the Chera empire (Cherian 2016: 24).

The nine excavation campaigns conducted until 2015, initially led by the Kerala Council for Historical Research (KCHR) and later by the PAMA Institute for the Advancement of Transdisciplinary Archaeology, unearthed a significant volume and variety of artifacts of both Indian and exogenous origin, representing diverse cultures and cultural periods. Continued archaeological interventions were carried out until 2024, with my own participation in the 2023 campaign, contributing to the ongoing exploration and analysis of the site and its gem industry.

Having such an extensive chronological continuity (1000 BCE–1500 CE) this variety is normal, but we note that in the period of its zenith, between 300 BCE and 500 CE, there is also this cultural variety that leads us to think of the site of Pattanam as a multicultural port city or a large-scale commercial redistribution hub (Cherian 2016: 25).

Apart from the carvings, described in more detail later, the manufacture of precious stones seems to be an almost irrefutable fact at the site (Cherian 2016: 25–26). The find of more than 700 necklace beads made of precious stones, including evidence of their production *in situ* directly related to lithic carving, reveal lapidary workshops specialising in precious stones such as agates,

amethysts, beryl, carnelian, chalcedony, quartz, topaz and onyx. The production stages involve carving the stone to achieve the desired shape, modelling it to its final shape, polishing and drilling it.

Finding precious stones in all these manufacturing stages *in situ* seems to indicate a gem industry totally functional in this location. The 2012 campaign report provides 275 samples of precious stone cutting evidence, among which 55 pieces of blank beads, fragments of semi-cut gems and fragments of raw material (Cherian 2015: 24). It should be highlighted that we found evidence of a large volume concentration of precious stones that would indicate a stone manufacturing industry designed for export, or in any case to supply a population very disproportionate in relation to the figures estimated for the site.

1. Manufacturing and infrastructure

As initially conceived, this paper theorises the possibility of an intaglio producing and exporting centre in the port settlement of Pattanam. But what characteristics should show the infrastructure and material culture of the site?

Firstly, obtaining such precious resources as gems is a key factor in the development of a producing hub. The mining of precious stones such as those found in Pattanam, specifically carnelian and agate, or the gathering of these resources through a regional trade network, are essential characteristics. A settlement must supply such production with sufficient surplus to export.

Secondly, the material culture of the settlement should show evidence of a mastery of certain techniques of engraving or gem manufacture, from the stone's base form to the final engraved product. In India, the working of agate and carnelian demonstrates a remarkable technological continuity that can be traced back to the Indus Valley Civilisation, dating to the 3rd and 2nd millennia bce (Borell 2017: 26; Kenoyer 1998: 65). Ethno-archaeological studies conducted in Gujarat have provided critical insights into the production processes, revealing that the manufacture of agate and carnelian involves a highly specialised set of techniques that have persisted through millennia (Kenoyer et al. 1994: 23; Francis 1991: 87; Borell 2017: 26–27; Kanungo 2017: 191–193). This study is based on some extracts from the study carried out by Brigitte Borell in Khambhat, in Gujarat (India), the experience of Alok Kumar Kanungo from ITT Gandhinagar, also in Gujarat, and our personal experience in Kerala and Gujarat in 2023.

For the polishing of the stone in its basic form, the people of Khambhat have a method of carving by indirect percussion with hammer blows (Borell 2017: 27). For the preparation of this method, previously, the stone nodules are heated to facilitate carving (Borell 2017: 27). There will probably be several firings

of the stone during this process. After the stone is in the desired shape, the object is forged to achieve the characteristic orange colouring of carnelian. This process is currently carried out using modern ovens (Borell 2017: 27), but in the contextual framework proposed in this study the ovens were probably made of bricks or clay, because of its easy extraction in the surrounding area of Pattanam.

The proposal of Kumar Kanungo (Kanungo 2017; personal communication, May 10, 2023) of clay-based furnaces is quite significant, since a very clear image would be transposed in the strata of a succession of different furnaces, for the treatment of precious stones. The functioning of this interpretation is based on the fact that clay-coated furnaces, in high-temperature operations such as the firing of precious stones, usually crack. The crux of this point is that instead of reusing the infrastructure, they abandon the structure and create a new furnace. When translated to the archaeological record, this pattern appears as multiple combustion layers with comparable characteristics, yet without statigraphic superposition.

When the shape has already been achieved, and if there is a desire to turn the stone into necklace beads, the product is drilled before or after its polishing using a diamond-tipped bow drill (Borell 2017: 27). It is a complex set of specific techniques, which require years of learning. The traces of these techniques are consistent with those found in archaeological interventions, suggesting that, in the past, similar techniques were used (Kanungo 2017: 193–223; Borell 2017: 27).

Studies conducted by Bérénice Bellina (2007), primarily focused on the findings at Khao Sam Kaeo in Thailand, reveal not only a wide array of finished objects in Indian styles, but also raw materials and evidence of gem processing. It is plausible to conclude that high-quality agate and carnelian raw materials were transported from India to Southeast Asia, accompanied by a set of advanced manufacturing techniques. This likely also included skilled Indian craftsmen, as suggested by Bellina's analysis (Bellina 2007: 27).

In the third instance, the settlement should show characteristics of suitable architectural infrastructure to carry out the manufacture of gems such as agate and carnelian. As we have already seen, this production – which changes the raw material into a gem – has certain specific characteristics. Therefore, the settlement should have designated spaces for pyrotechnics and carving (Kanungo, personal communication, May 10, 2023), a space where combustion structures, furnaces, and carving spaces could be related. Also, the material evidence found in the same stratigraphic contexts should contain a large volume of gem finds in different states of manufacture.

If the site has infrastructure of these characteristics, or similar, it could be identified as a gem production workshop for intaglios. In addition, the material culture of the settlement should respond positively to this context, producing numerous samples of precious stones in different stages of manufacture. The stages run from raw material, to polished, drilled, cameo blanks and the final product, engraved precious stones, as the material evidence derivate of this industrial process, debitage and unfinished precious stone elements.

2. Extraction of gems

To investigate which gemstones were most valued in the classical Mediterranean world, it is essential to examine classical literary sources, with *Naturalis Historia* (Natural History) by Pliny the Elder serving as a foundational text (Pérez González 2019: 142; Thoresen 2017: 159). In Book XXXVII of this encyclopaedic corpus, Pliny provides an extensive catalogue of the most prestigious and widely recognised gemstones in the Roman Empire, detailing their origins – whether through extraction or trade – and describing their perceived qualities and uses (Pérez González 2019: 142; Francis 1991: 35).

The corpus of Book XXXVII identifies a total of 240 varieties of gemstones, although the place of origin is explicitly mentioned in only 93 cases (Pérez González 2019: 142; Kenoyer 1998: 78). Notably, Pliny emphasises the predominance of stones originating from India, Persia, Egypt, Arabia, and Africa, which were considered the most desirable by the Roman elite due to their quality, rarity, and exotic appeal (Pérez González 2019: 142; Gurukkal 2016: 118; Thoresen 2017: 159–161). This prioritisation underscores the significant role of long-distance trade networks, such as the "precious stone route", in facilitating the movement of luxury goods across the Indian Ocean, Middle East, and Mediterranean (Pérez González 2019: 142; Vidale 2000: 45; Borell 2017: 26–28).

In fact, efforts to compile this type of mineral seem to come from Greek sources, since Pliny's work is largely based on older collections, such as the *Περὶ λίθων (Peri Lithon*) of Theophrastus. This work, also cited as *De Lapidibus* by Latin writers, is a treatise that was used as a reference source for the study of lapidary materials from its writing, around 314 bce (Thoresen 2017: 157), until in the Renaissance (Walton 2001: 359).

The contemporary idea of established, one-way trade routes is not contemplated in this study, which aims to show a trade framework with networked and multi-directional connections. Free market trade, in my opinion, would be the most realistic mode to accommodate such large-scale trade without the guidance or

control of any state power. Contrary to the traditional historiographical view, the precious stone trade network was not only carried out overland, such as along the Silk Road. In fact, the commercial network would extend to the south of India, connecting by sea with powers in areas such as the Mediterranean area, Arabia or China; a trade well attested archaeologically and logically, as it was cheaper, faster and safer than land trade (Evers 2017: 95–112; Cherian 2016; Sidebotham et al. 2023).

Recent research by Eivind Heldaas Seland (2017) has revealed that the trade in precious stones during antiquity was far more complex and multidirectional than previously assumed. Seland explores the motivations behind the demand for exogenous gemstones among African, Arabian, and Indian elites, despite the apparent availability of similar resources within their own territories (Seland 2017: 107–109).

Through a critical analysis of classical sources, particularly the *Periplus Maris Erythraei*, Seland identifies evidence of the circulation of Egyptian stones in ports across Africa, Arabia, and India, highlighting the complex dynamics of this luxury trade and the demand for foreign commodities as a marker of status and prestige (Seland 2017: 108; Thoresen 2017: 159–161). These findings underscore the interconnectedness of ancient trade networks and challenge assumptions regarding localised resource utilisation, illustrating the broader socio-cultural significance of gemstone exchange within elite consumption practices (Gurukkal 2016: 112; Francis 1991: 35–37).

But how does this information, exemplified in the classical sources, translate into the tangible Indic world? The art of gem cutting achieved inimitable importance in human history for its economic value and aesthetic appeal. Despite technological improvements, artisans today continue to use the same traditional methods used in India since ancient times (Rajan 2017: 347). The art of cutting and engraving precious stones has been the most refined aspect of minimalist art in India, as opposed to other maximalist art forms such as architecture, painting or, in general, classical fine arts (Rajan 2017: 347). Many specialists have tried to reveal the techniques and extraction sites involved in this art in different parts of the subcontinent (Possehl 1981: 39–47). But this technology cannot be accurately discerned without a deep study of the traditional gem cutting carried out today.

In this aspect, the site of Kodumanal is a perfect example to analyse this phenomenon, due to its continuity in the extraction and manufacture of precious stones from antiquity to the present day. The role of this site in the commercial network that led to Pattanam, and encountered the Roman world, is evidenced through the various samples of numismatics in the area, located along the route to Pattanam. At the site of Kodumanal itself, three Roman coins have been

identified, found on the surface, belonging to the coins issued by the emperors Augustus, Tiberius and Antonius Pius respectively (Suresh 2004).

The sources of Sangam literature, specifically chapters 67 and 74 of the work *Patirruppattu*, referring to the Chera dynasty, speak of this settlement as Kotumanam, and describe it as a place recognised for the great value of its precious stones (*arun-kalam*). The presence of mines around it, such as the beryl mines of Padiyur, with continuity until the 20th century, added to the great evidence of stone beads, in various phases of their manufacture, shows us an active gem industry at the site. Two pottery inscriptions from Kodumanal, known as a place of manufacture of gems and weapons, reads ni Ka ma (nikama) indicating that merchant guilds were established at several industrial and trade centres in ancient Tamil country (Mahadevan 2003: 141). The other one, referring to a gem evaluator as *maniya-vannakan,* strengthens this theory (Mahadevan 2003: 141).

It should be noted that this settlement does not operate in isolation but is integrated into a network of extraction and distribution of precious stones that includes the Kongu region (Rajan 2017: 352). This region is marked by small hills that constitute conglomerates of crystalline gneiss rocks with veins of quartz and limestone rock that make this area an extremely rich spot in minerals, while also playing a dominant role in the trade network of the Indian subcontinent (Rajan 2017: 352).

Despite the intense extraction of minerals in this area, such as beryl, sapphires, quartz and corundum, from the Kongu region we can only extract the traditional manufacturing techniques of precious stone carving, such as the way in which their trade was organised up to Pattanam. This fact occurs as it is an area, currently, exempt from the minerals that are the subject of this study, mainly agate and carnelian. Despite this fact, the artisans living in this region inherited the skill and technology of their ancestors without any cultural-technological gap (Rajan 2017: 348). In India, the working of agate and carnelian has a long history going back to the time of the Indus civilisation in the late 3rd and 2nd millennium bce.

The gem industry exposed at Kodumanal, and its survival to the present day, lends credence to this perception (Rajan 2017: 348). The absence of precious stones such as carnelian, agate and lapis lazuli in the region suggests that these were procured from the Gujarat area and Afghanistan (Rajan 2017: 360; Verma 2022: 82), either directly or through intermediaries in commercial transactions (Verma 2022: 82), to Pattanam. Despite this fact, the Kodumanal site shows clear evidence that this trade network existed as a large quantity of sapphires, beryl, agates, carnelians, amethysts, lapis lazuli and quartz have been identified in domestic contexts (Rajan 2017: 347–350), while the most carnelian bodies

were restricted to necropolises, possibly as prestige goods differentiating social class (Rajan 2017: 350).

Currently, the archaeological trend favours a new possibility of extracting these minerals. Research groups such as PAMA have turned their sights to the southern Deccan region. The Deccan is a plateau that occupies most of the central and southern part of the Indian subcontinent. The name derives from the Sanskrit *dakṣiṇa*, which means southern. In a broader sense it includes all southern India, but in a more restricted sense it is defined as the territory between the Narmada and the Krishna rivers. Although archaeological interventions have not been made on the southern side of this plateau, the area where the possibility of agate and carnelian mines with a connection with Muziris is theorised, the area of Gujarat north of the plateau has been working intensively in this research line with very satisfactory results in terms of precious stones trade (IIT Gandhinagar). It is easy to fall into the temptation of expecting similar results on the southern slope, but the reality is that there is currently no information available to support this hypothesis.

It must be firmly stated that the perspective proposed in this study, regarding the organisation of Roman demand in India, forces us to consider other issues. Namely the parallel organisation of the supply of the western Deccan and southern India, thus including in the study the commercial performance of areas such as the eastern Deccan, northern India and even south-east Asia. A good example of the functioning of trade networks within the Indian territory, witnessed by the *Periplus Maris Erythraei* (PME pp. 49, 56) and the *Papyrus of Muziris* (verse, col. ii), tells us how wares containing nard from the Gangetic, the areas low in the Himalayas in northern India, could achieve the transport of large volumes of cargo, with frequent availability (80 boxes for one buyer) at ports such as Muziris and Barygaza (Evers 2017: 171). Data such as these raise the question of how this organisation of extraction/production, processing, packaging and transportation could have worked from the northern areas to the ports on the western coast of India.

Based on an analogy with evidence from the western Deccan and southern India, this complex supply operation may have been organised by groups of possibly similar organisations. For instance, the association of perfumers (e.g. Skt. *gandhika*s) of Kausambi, an association trade network that became important enough to issue its own coins around the second century BCE (Schenk 2006: 130), or in cooperation with prominent merchants using their own corporate seals, dating from the early historic period after the Maurya empire and up to Gupta domination chronologies of locations such as Bhita and Varanasi.

3. Trade context of Pattanam

As revealed in this study, southern India was an important supplier of long-distance goods for Mediterranean consumption (Cherian 2016; Evers 2017: 171–172; Sidebotham et al. 2023; Tomber 2008), but also on its Asian side (Cherian 2016). Thus, pearls from the shallow waters between India and Sri Lanka, as precious stones from the inland mining centres (for the *margaritarii*, *gemmarii*, etc., of the *collegium aurificum* in the Roman Empire) and pepper from the southern tropical forests of the Deccan region (for *collegium aromatariorum* and *horrea piperataria*), were cultivated, exploited and collected by the inhabitants of the ancient Tamil kingdoms (Evers 2017: 173).

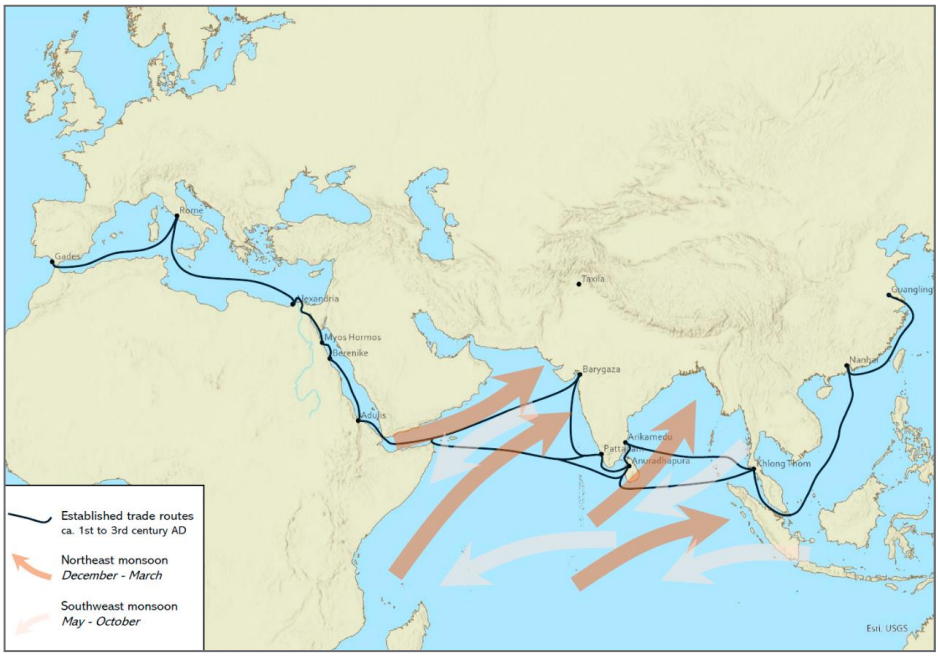

Fig. 1. International maritime trade routes c. 1st BCE–3rd CE.

As previously explained, the precious stones with which the Pattanam carvings were made, carnelian and agate, correspond to certain minerals with unique characteristics. Before exemplifying the possible candidates, which ended up as intaglio of Asian origin and manufacture, it is important to examine two instances that characterise these two minerals as products of Indian origin.

In the first case, the high value of both minerals is due to the extreme scarcity of available extraction mines for these precious stones in the world. Based on the sources and studies already stated (Cf. Pliny, NH XXXVII; Pérez González 2021; Rajan 2017; Thoresen 2017), it can be concluded that both

the largest part, and the best quality, of carnelian and agate introduced into the Roman Empire came from India. Keep in mind that this precious stone has only been found in India, Saudi Arabia, Germany (Bavaria and Saxony), Sri Lanka, Thailand, Madagascar, Brazil, the United States and Siberia (Kulke and Rothermund 2004: 18–50).

Secondly, the techniques used with regard these precious stones are of Indian tradition. In the case of carnelian, it is usually processed through ovens to achieve a brighter and more polished orange coloration. And in the case of agate, pronounced banded marks, so characteristic of this gem, are achieved through a process based on sugar and baking (Possehl 1981; Bhan et al. 1994; Francis 1991; Borell 2017). The bow drill, used in the carnelian beads, is also a traditional technique of the Indus Civilisation, with parallels going back to the 4th–5th millennium bce in Mehrgarh, Pakistan (Kulke and Rothermund 2004: 18–50) or Dholavira, India (Prabhakar 2018: 475–485).

As we have already seen, jewellery and stamps are not a rare or innovative phenomenon in the Mediterranean. Some of the earliest examples of such writing are found in a seal or personal identity format, such as Egyptian scarab seals (Newberry 1908). So, what drove the trade of these prestige goods globally?

The conquests of Alexander the Great, in the late 4th century bce (335–323 bce), seem to mark the crucial turning point (Higgins 1969). With the introduction of Indian gems to the Mediterranean world, thanks to the Eastern conquests carried out by Alexander the Great, Eastern gemstones were easily delivered in the West. This translated into a commercial "boom" for the acquisition of these prestigious goods globally (Richter 2006). Both the sources and the material culture show this change, since all kinds of jewellery (Mediterranean) will be adorned with precious stones, especially jewellery and articles of clothing (cf. *Aeneid* I, 647–655; NH XXXVII.6).

Despite the great evidence in Mediterranean settings of carnelian and agate gemstones manufactured in the Indian typology, it is not possible for us to discern the exact location from which they came or where they were engraved in the final state. But the archaeological record seems to show that the closer we get to the extractive centres, such as the mines of India, the more finds occur of mineral-supported intaglio with Indian characteristics. The fact that all the carvings found in Mediterranean contexts, in the proposed chronological framework, are linked to the Roman Empire could be due to a misconception of the techniques used and the locations where they were manufactured. In this sense, our study leaves open the proposal of the origin of certain carvings with Indian characteristics currently identified as Mediterranean. But, because this line of study goes beyond the general objective of our research, our claims are based on questioning the preconceived ideas of Eurocentric thought.

The variety of finds in the field of South Asia, in terms of engraved precious stones, raises a large number of doubts as to how the flow of trade in this region really worked.

As for sites in India, it is necessary to focus attention on the site of Arikamedu. This site is located south of Pondicherry, on one of the drainage systems of the Ponnaiyar River, in southeastern India. Currently the location of this emporium, called by the Roman sources *Poduke Emporium* (PME pp. 47, 89), has been identified with the site of Arikamedu (Wheeler 1954). This settlement on the Coromandel Coast is currently located in an area of marshland, but maps and sources from the 17th and 18th centuries ce suggest that it belonged to one of the branches of the Gingee River, before discharging into the Bay of Bengal (Deloche 1980: 144–147).

The Mediterranean-centric view tends to propose that the Romans controlled trade in the Indic area, which is far from what must have been the scheme at the time (Rawlinson 1916; Wheeler 1954; Begley 2004). The material evidence does show close commercial contact, and probably some Roman populations would also reside there during waits for the Monsoon winds. What is evident in Arikamedu, as in Pattanam, is the presence of a multicultural society. The collection of graffiti found in the settlement, include Northern Brahmi, Tamil-Brahmi and Ceylon-Brahmi scripts, mostly written in Tamil or Prakrit (Mahadevan 2003: 63). This fact suggests the wide multiculturalism of the inhabitants of Arikamedu, or those who made intermittent stays, coming from different cultural strata and probably from a plurilingual society.

Arikamedu or Poduke was also an important centre for the manufacture of precious stones; this is evident from the finding of more than 100 white cameos, mostly amethyst gems, during archaeological interventions (Francis 1991: 504). But the most important find of this site, in relation to this work, is that of an artifact identified as an intaglio. It would be an unfinished piece of quartz, with the artistic representation of an engraving recreating a winged cupid with a bird identified as an eagle. It should be noted that this artifact, together with another carnelian intaglio with a bust representation of Augustus (Wheeler 1954: 21, 101), were reported as surface finds in the area surrounding the Arikamedu site; the second of the carvings is currently missing (Begley 1983: 3, 29). The singularity of this finding, with the piece uncut but including an engraving, raises the question of whether engravers with knowledge of Greco-Roman iconography were present in Poduke. The initial hypothesis, proposed by Begley (1983: 481), was that native craftsmen must have been inspired by models imported from the Western world, or that craftsmen of Mediterranean origin would be present at the Poduke Emporium settlement.

To date, a substantial corpus of carvings with classical motifs have been identified, not only from the regions of southern India, but from locations such as Gandhara, Taxila or Varanasi, in northern Pakistan and India respectively, also large centres connected to the commercial network, in this case the terrestrial one. Samples include an intaglio with a representation of the winged goddess Nike, found in Gandhara (Thaplyal 1971: 35–38). The example of Taxila is the perfect material evidence to make comparisons; the intaglio TM 06.07.02 found on the surface at this site shows the representation of a cupid with a bird. Therefore, it shows clear parallels in the iconography located at southern sites such as Arikamedu.

Such empirical evidence challenges the traditional idea that intaglio engravings with Mediterranean iconography might not be exclusive to the Mediterranean geographic framework. However, now that the Arikamedu quartz and carnelian intaglios have been identified with certainty, they can be considered in relation to the three Pattanam intaglios, especially the two carnelian intaglios. From the beginning, this paper has sought to adopt a neutral position regarding Mediterranean-centric reasoning; the intention has been to propose ideas from a critical side of historiography. The hypothetical proposal of a Roman diaspora, involving the establishment of a population and artisan workshops, such as the *gemmarii* of Rome, in settlements such as Pattanam, proposed by traditional historiography (Wheeler 1954; Begley 1983: 481), seems like a Europocentric vision on this matter, not coinciding with the development that the Pattanam site is providing in its material culture (Cherian 2016: 25–27).

Through the intaglio of Arikamedu, a new possibility arises as to what could have been the operation or journey of the precious stones from their raw material state to their final destination. The idea that the gems were sent from Rome in a semi-worked format, with the engraving carried out but not having been cut, is a prospect that has not been properly analysed. This practice is already observed, in the opposite situation, in sites like Berenike. The cameo blanks found at this site, imported from India and unpolished, would have required engraving and finishing at a location far removed from their source of extraction (Sidebotham 2011: 238).

A crucial aspect to consider is the historical context of Southeast Asia and its role within ancient maritime trade networks. For a long time, Southeast Asian archaeology remained peripheral to research on ancient transoceanic exchanges, which traditionally focussed on Indian Ocean trade and rarely extended beyond the Indian subcontinent. However, recent developments have marked a departure from Western-centric paradigms in the humanities, leading to an increasing recognition of Southeast Asia's significance in these networks. A growing body of regional studies has identified key archaeological sites spanning from the Bay

of Bengal to southern China, positioning this region as an essential intermediary in the exchange of goods, technologies, and cultural practices between the East and West during antiquity (Hoppál 2021: 197; Bellina 2007: 62–63; Seland 2017: 108–110).

International collaboration, coupled with local efforts, has sparked renewed interest in the collection of Roman artifacts among local communities. Among these objects, carved gems are particularly notable for both their quantity and craftsmanship (Hoppál 2021: 198). In the Roman Empire, such carvings were generally owned by private individuals, with the motifs chosen reflecting personal preferences, thus endowing these items with rich human and historical symbolism (Richter 2006).

In Southeast Asia, the presence of Roman or Western-style carvings indicates a degree of recognition and likely an appreciation of these materials by indigenous populations. This suggests that these objects held cultural significance, providing valuable insights into the cultural fabric of the societies that received them. Although many of these engraved gems, featuring Western influences to varying extents, are found in private collections and often lack clear archaeological provenance, a significant portion can be traced to specific sites in Thailand (Hoppál 2021: 198).

Fig. 2. Influence areas of trade c. 1st BCE–3rd CE. Credit: Cherian.

The site of Khlong Thom, in the contemporary city of Krabi, is a great example, counting with four objects of Mediterranean origin (Borell et al. 2014: 101–102). One of the carvings is the carnelian representation of the goddess Fortuna, currently in the Wat Khlong Thom Museum (Hoppál 2021: 198). This object resembles the intaglio of the goddess Fortuna from Pattanam, a depicted

standing female figure dressed in a chiton and a himation; another detail that identifies her as this goddess is the cornucopia engraved on her arms, as a sign of abundance.

Even if parallels between some of the motifs may connect the objects with the West, they are not a proof of origin; in fact, the proximity with eastern cities like Pattanam (**Fig. 2**) makes much more sense in practical terms of trade, such as reduced production and transport costs.

4. The intagli of Pattanam

The main object under study is an intaglio with the representation of a sphinx. This was found during excavations on April 25, 2020, in the PT20 LXV borehole. The methodology of archaeological interventions in Pattanam is carried out following the division into locus. The studied artefact would thus be found in locus 5 of this trench, at a relative depth of 1.15 m. This locus has been identified thanks to the material evidence collected in the following section (referring to the material found in relation to the stratigraphic context), in the chronological framework named by the local archaeological team as the "Early Historic era" (c. 1st BCE–3rd CE), a highly suitable range for the chronology in which this study is framed.

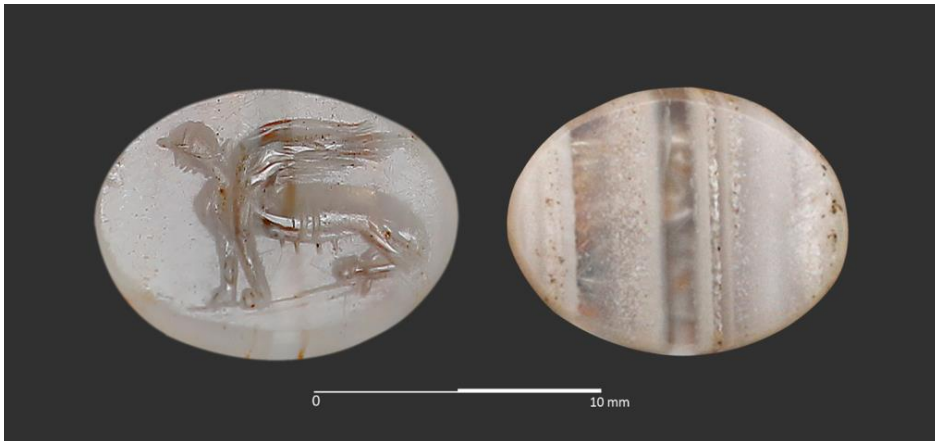

Fig. 3. The Sphinx intaglio of Pattanam. Credit: CHERIAN (2016: 32).

As for the object, it would be an intaglio made on a banded agate stone, a stone derived from chalcedony (**Fig. 3**), a precious stone very abundant in the surrounding areas of Pattanam. It would present an oval shape, very characteristic of Roman intaglio, with dimensions of 1.2 cm in height, 2 cm long and 1 cm in width, thus highlighting its dimensions for the suitability of the gem in a ring, and not to be modelled as a cameo. The subject matter engraved

in the intaglio would consist of a recurring Mediterranean mythological theme such as the sphinx, a creature with the head and torso of a human woman, often depicted with the wings and body of a lioness (Gantz 1996: 24).

The mystery behind this object is further aroused with reference to this artifact's iconography. In Roman sources, we are told that the emperor Augustus, in the first years of his reign, would have used two identical intaglios with the representation of the sphinx as a personal seal (NH XXXVII.4, 10). The chronology given for this object is from 1st c. ce, during or immediately after the principality of Augustus. This chronology has been based mostly on the location and stratigraphic sequence in which the artefact is found, in strata that clearly mark this chronology thanks to the dating of the material remains recovered. Encompassing the finding of 49 amphora sherds, 7 terra sigillata, 13 TGP sherds, 6 Arabic Torpedo jars and 1 Chinese sherd that mark a clear chronological scope.

Fig. 4. Tyche-Fortuna intaglio of Pattanam. Credit: Cherian (2016: 32).

Apart from this artefact, it is worth noting the presence of two more carvings in the northern sector of Pattanam, currently only 1% intervened, which also have similar characteristics. These show the raw material, the gem of Indian origin, but the subject of the engraving is of Mediterranean origin. In this context we find the intaglio of Fortuna (**Fig. 4**), made on a carnelian gem, a semi-precious stone consisting of a variety of orange or red coloured chalcedony, and measuring approximately 1.5 x 1 cm in height. The anthropomorphic figure stands in a central space and in profile, facing left, framed within a thin oval piece of carnelian. This figure is positioned vertically within the gem. The piece was recovered during the 2014 campaign, from locus 13, within trench PT14 XLII,

at a relative depth of 1.3–1.4 cm. The chronology has been based mostly on the location and stratigraphic sequence in which the artefact is found, in strata that clearly mark this chronology thanks to the dating of the material remains recovered.

Most of the evidence related to the manufacture of precious stones in Muziris was uncovered on the campaigns carried out in 2020. Due to the large number of loci and evidence found in the trenches, in this section we only highlight the evidence related to the trench with the Sphinx intaglio and chronologies marked at the beginning of the study, that is, c. 1st–3rd CE.

From Trench PT20 LV, with special reference to loci 5–11, the significant finds are the pottery artefacts of non-Indic origin. Among these are fragments of *amphorae*, *Terra Sigillata*, Torpedo Jar, TGP, Indian Rouletted Ware and Chinese porcelain. The type of pottery identified in the survey are mostly bowls, jars, basins and storage jars. We should add the identification of iron keys, and 182 precious stone related objects listed as 1 banded Agate intaglio, 3 Carnelian cameo blanks, 17 Carnelian stone debitages, 15 Carnelian roughouts, 1 Agate inlay, 2 Agate beads, 1 Agate debitage, 2 Agate roughouts, 86 glass beads, 41 precious stone geological samples, 2 Amethyst beads, 1 Amethyst roughout, 1 Amethyst debitage, 4 Quartz debitage and 5 Citrine roughouts.

Fig. 5. Lion intaglio of Pattanam. Credit: CHERIAN (2016: 32).

The third example of intaglio found in Pattanam is that of the lion (**Fig. 5**). This artifact is also engraved on one carnelian gem and measures approximately 1.2 x 1 cm in height (as we see standardised for the use of gems in rings).

This gem contains the engraving of a lion supported on it's both rear paws, configured horizontally within the stone design. The intaglio was recovered in the 2010 campaign, at locus 22 of the trench PT XVII, at a relative depth of 1.15–1.2 m. By stratigraphy, this one piece can also be dated to the 2nd century CE (Cherian 2016: 32). In Greece, the lion symbolised heroism, courage, and the triumph of the living over the dead (Henig 1978: 356). The image of a deity flanked by two lions is a recurring motif in ancient art; in Greek iconography, the lion specifically functions as a symbol of victory. Interestingly, statues commemorating military successes often depicted lionesses rather than lions, as lionesses were regarded as more courageous and formidable than their male counterparts (Sagiv 2018: 94), as could be the case with this model (Cherian and Rocco 2020: 2).

The stratigraphic data of the trench where this artifact was found, dated to the Classical Era (c. 3rd BCE–3rd CE), offers us other precious stone-related archaeological materials. Apart from the Lion intaglio, it was possible to recover 2 Agate inlays, 8 Carnelian beads, 4 Carnelian debitage, 3 Carnelian roughouts, 3 Agate beads, 1 Agate debitage, 10 stone beads, 4242 glass beads, 4 Amethyst beads, 5 Amethyst roughouts, 4 Amethyst debitage, 12 Quartz debitage, 2 Chalcedony beads, 4 Chalcedony roughouts, 8 Garnet debitage, 1 Garnet roughout, 54 Beryl beads, 4 Beryl roughout, 6 Onyx beads, 3 iron rings and 8 geological samples; a great amount of gem industry-related materials.

Fig. 6. Carnelian stages of production found in Pattanam. The left group consists of carnelian on its cut process, and the right-side group consists of carnelian polished and rounded. Credit: Cherian (2016: 33).

Therefore, we verify a certain uniformity between the three intaglios recovered. The presence of Mediterranean themes or designs in all the pieces, the contemporaneity of the objects, interpreted thanks to the stratigraphic location in similar contexts, oblige us to think that the finding of these artifacts at Pattanam does not constitute a random archaeological coincidence.

Based on the evidence chronogram shown below, based on all the precious stones and exogenous material recovered in trench PT20 LXV, it seems that Pattanam experienced a precious stone "boom" during the Classical Era. In this table it could appear as if this factor is directly related to the exogenous material

recovered, but in fact during the Classical Era the local manufactured pottery in Pattanam totals 12,192 sherds, representing 96% of the total pottery recovered in the site.

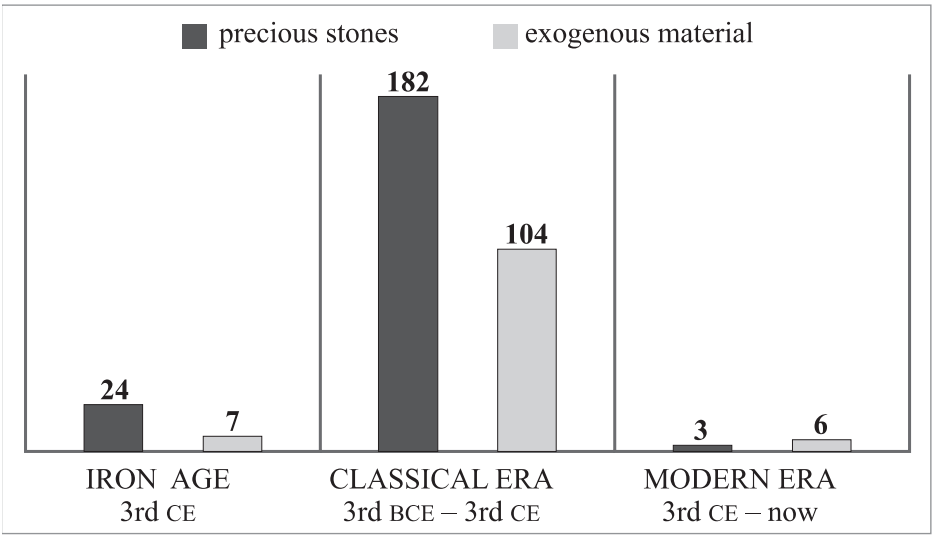

Fig. 7. Chronogram of material evidence in Trench PT20 LXV.

As can be seen from the material recovered in the surrounding contexts of the extraction area of the sphinx intaglio, the Pattanam site has enough evidence to prove that there was local production and manufacture of precious stones and products derived from these, such as beads or inlays. On the other hand, the findings of these manufactured and blank artefacts related to the numerous evidence of non-Indic ceramics inclines us to believe that these products were not only designated for the local population's own consumption but also export.

5. Conclusions

As we have observed in this study, Pattanam increasingly appears as a commercial urban centre with all the characteristics of an international hub. A settlement with such a volume of material evidence can only be equated with a large-scale centre of imports and exports. Based on a commercial model, such as the proposed free-scale network, in which certain settlements show commercial pre-eminence within a series of main commercial flow routes, Pattanam would have had a series of regional commercial networks that would have been integrated into a global network.

In our opinion, the proposed model is evidenced in the development of the commercial network between the different states and regions of India, based on a system of private and mutually regulated organisations, such as the association

of perfumers (*gandhika*s) of Kausambi. And it would receive trade flows from areas further away from the main trade network to the cities pre-eminent in this globalised trade, with better established connections in south Indian ports. The connectivity offered inland by the river Periyar and the abundance of natural resources of the various regions allows for effective inter-regional trade. Thus, the trade in precious stones must have worked in similar patterns; the organisational evidence in regions such as Kongu or Gujarat indicates established gem trade networks.

We find a clear parallel of a city with these characteristics, save for all the differences, with Alexandria. The port par excellence of Egypt was used by the Roman emperors as a Mediterranean "hub", a city that served to redistribute Mediterranean trade and the entire volume of imports from the East. As in the case of Pattanam, the city would become a multicultural centre thanks to the great demographic fluctuations that global scale commerce offers, entailing the grafting of exogenous cultures into the local ones, the more connections the more cultural diversity. The port-city of Berenike would be a great parallel to this vision, in a geographical context of Egyptian culture, with the constant incision of Eastern cultures through the commercial pre-eminence of this port.

Regarding the possibility of infrastructure related to the trade of precious stones in Pattanam, the archaeological evidence has been quite satisfactory. In the first place, the large volume of material found in trenches PT20 LXV, PT14 XLIII and PT10 XVII, referring to the finding of precious stones in different states of manufacture, indicates production of products related to gems and carvings. Despite having only found intaglio samples on a mineral support of carnelian or agate, the samples of a great diversity of precious stones, and glass, in the process of jewellery manufacturing at the site, open the possibility that Pattanam's gem production is not limited only to these minerals.

Pattanam's strategic connectivity with inland mining regions underscores its importance within both regional and transoceanic trade networks. The presence of Tamil-Brahmi inscriptions across areas such as the Deccan Plateau attests to sustained cultural and commercial interaction between southern and northern India, suggesting a well-established overland corridor facilitated by Tamil-speaking polities. These networks likely ensured secure and efficient movement of goods, including raw materials such as semi-precious stones and metals, from resource-rich regions into coastal exchange centres. In this context, Pattanam may have been supplied not only by the celebrated mines of northern India and the Deccan, such as those near Vidarbha and Telangana, but also by those of the Kongu region in western Tamil Nadu, and potentially even from sites closer to Karnataka and Andhra Pradesh, areas known for beryl, and carnelian production.

When viewed within the broader geography of the Indian Ocean world, and accounting for the maritime corridors shaped by the monsoon system, Pattanam's role as a nodal point in the redistribution of goods between the Mediterranean, South Asia, and Southeast Asia becomes particularly evident. Its position allowed it to mediate both the influx of Roman and West Asian imports and the outflow of Indian and Southeast Asian commodities, supported by both coastal navigation and its access to inland production zones.

In fact, in the scheme presented to us by Pattanam, we see a clear desire for intensive production to satisfy strong external demand, possibly from the Mediterranean, that is, from Rome. We note how, contrary to the common perception that only the raw material of precious stones was mined in India, a settlement like Pattanam shows sufficient characteristics to prove production and manufacture of gems, including all stages of production, with nothing to envy compared with the productive or manufacturing centres of the Mediterranean orbit. This is a context where, from our point of view, the emergence of a precious stone engraving workshop would be possible, due to the great source of natural supply in the area and the constant demand of Western fashion for manufactured products in this art.

In terms of iconography and symbolism, this study has no possibility of discerning the nature of the carvings found in Pattanam. The fact that we find iconographic motifs of Mediterranean indole in a clearly local context endorses the rethinking of the international production centres of engraved gems in antiquity, placing a city like Pattanam at the centre of the productive and export world of gems.

The cultural link that the intaglio of the Pattanam sphinx shows with Rome, and more specifically with the figure of Augustus, demands additional research on the preconceived schemes about exogenous artisans in the final engraving process. However, were it to be proven that it is the product of a wholly local workshop, albeit of a multicultural nature, this would surely provide a ground-breaking contribution. In this regard, and responding to the initial hypothesis of this study, it can be concluded that the Pattanam site shows enough archaeological evidence to verify the presence of an autonomous gem manufacturing workshop, even though it cannot be discerned as a specialist workshop exclusively of intagli. Pattanam and its Sphinx could be real game changers in the archaeology and history of South India, indicating its significant mark on its economic and trading mark on ancient global networks.

Author's note

Previous versions: Red Sea Conference 2024 Poster. Pattanam, breaking ground on classical gem industries in India. Barcelona 7th of June 2024.

Abbreviations

Aeneid	Publius Vergilius Maro, *Aeneid.* Trans.: Fagles (2006).
ITT Gandhinagar	Indian Institute of Technology Gandhinagar.
KCHR	Kerala Council for Historical Research.
NH	Gaius Plinius Caecilius Secundus, *Naturalis Historia*. Ed. and trans.: Bostock and Riley (1855).
PAMA	Paternal and Maternal Ancestry for Transdisciplinary Archaeology.
PME	*Periplus Maris Erythraei.* Ed. and trans.: Casson (1989).
TGP	Turquoise glazed pottery.

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