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THE GIANT'S TRAIL: MOBILITY AND EXCHANGE OF WHALES AND THEIR BY-PRODUCTS IN ANTIQUITY (1ST CENTURY BC–5TH CENTURY AD)

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Abstract: This research analyzes the role of whales and their by-products as the epicenter of Eurasian exchange networks during Antiquity. To this end, we examine the available knowledge on the biology and behavior of these cetaceans. Two paradigms of transcontinental connections are presented: one through the consumption of whale meat and the other through the circulation of luminescent pearls. Based on this premise, we identify three key points where these animals concentrated their activity: the European Atlantic façade, the Mediterranean coast, and the Indian subcontinent. Regarding the nature of these connective dynamics, there was a conscious exchange of whale-related products. However, its scope was variable. Thus, we propose the coexistence of regional spaces where small-scale whaling was conducted to meet local needs, alongside large Eurasian exchange networks, which are more difficult to trace.

Keywords: *whales, ancient connectivity, animals in Antiquity, Eurasian Studies, Ancient Trade and Networks*.

1. CHALLENGES AND RESEARCH BARRIERS

One of the most significant challenges in studying whales in Antiquity is of linguistic nature, as the terminology used in primary sources to refer to these mammals is often extraordinarily heterogeneous, which frequently leads to inaccuracies. Historical written records do not correspond to cetacean species as we understand them today. In fact, the taxonomy of whales is a modern discipline.[1] In the West, both Ancient Greek and Latin reflect this disparity. In the case of Greek, we primarily encounter the terms κῆτος and φάλλαινα/φάλαινα, while in Latin, the words *orca*, *ballaena*, and *cetus* are used.

The words κῆτος and *cetus* could refer to any "monster" or large marine creature, which might include, in certain contexts, seals or tunas. It is only through the literal context that one can determine whether a reference is being made to cetaceans.[2] Meanwhile, φάλλαινα/φάλαινα/*balaena* denote predatory marine creatures, but some authors use them to refer to a non-marine animal, such as moths.[3] The term *orca* further blurs the picture. Sextus Pompeius Festus clarifies that, depending on the context, *orca* could mean either a sea creature or a large vessel.[4] Occasionally, it evokes the term

[1] RODRÍGUES *et alii*. 2018, 2–3.
[2] BERNAL CASASOLA/MONCLOVA BOHÓRQUEZ 2012, 170.
[3] NIC. *THER*. 762c.1–763a.6; GAL. *DE USU PARTIUM LIBRI III*. 631.5–9.
[4] PAUL. FEST. 181.61–66.

ὕρχη, thus referring to a type of vessel or pot,[5] and it can even be used to describe a tool for throwing dice.[6] Additionally, the term φυσητήρ, which normally refers to a blower or a device that uses air, might occasionally denote the blowhole of cetaceans and, in specific instances, as used by authors like Strabo, it can refer to a type of whale.[7] Later, in the 4th century CE, Mauro Servius Honoratus noted that *cetus* was the term used to refer to marine beasts in general, but that in some cases, the term βέλος was employed for this purpose.[8]

In the East, terms referring to large cetaceans in Sanskrit are often ambiguous. One of the most recurring is *timiṅgila*,[9] which, although commonly translated as "whale," encompasses a broad range of marine creatures.[10] We should also consider *timi* and *timiṅgilagila*.[11] According to this interpretation, *timi* refers to a large fish, though smaller than a whale, while *timiṅgilagila* denotes an enormous beast capable of swallowing the former.[12] Consequently, it has been suggested that *timiṅgila* represents a mythological creature with no equivalent among known cetaceans, which later literature will associate with demonic elements.[13]

On the other hand, we have the term *makara*,[14] which is the most frequent translation for "crocodile."[15] In Hindu mythology *makaras* are distinguished as hybrid creatures, part terrestrial and part aquatic. Although reptilian attributes are common in the representations of these beasts, the diversity in their depiction up to the Middle Ages is evident in Indian and Indo-Javanese art.[16] Despite this association with crocodiles, there are occasions when the term *makara* might refer to snakes and sea monsters in general, potentially indicating large aquatic animals.

Parallel to the issues with written sources, there are difficulties in the field of archaeology. Most of the bone remains come from archaeological contexts that are often ambiguous, complicating their interpretation.[17] Moreover, one of the significant challenges lies in the limitation of systematic records of sightings and strandings, which have only been compiled annually since the early 1980s, with a particular focus on France and Spain.[18] It is only with the advent of Zooarchaeology by Mass Spectrometry (ZooMS), which uses collagen protein analysis on fragmented marine mammal remains, that species can be identified with precision.

The trade routes connecting the Red Sea and the Arabian Peninsula to the Indian Ocean and, by extension, to the interior regions of the Indian subcontinent, present additional challenges from an archaeological perspective. ZooMS, at least to date, has not been used to identify cetaceans relevant to the chronology under consideration, despite primary sources, both foreign and indigenous, highlighting significant cetacean activity in these regions.[19] At the same time, the correspondence between literary information and the archaeological record is virtually nonexistent. The most striking example is found in present-day India and Pakistan. Despite the overwhelming presence of animal remains at sites in the region,[20] evidence related to whales is sparse. In any case, archaeological data reveals an early development of fishing communities associated with marine fauna.[21]

2. HISTORIOGRAPHICAL BALANCE

As early as the beginning of the last century, Otto Keller outlined an approach to these cetaceans, dedicating a chapter to them in the first volume of his encyclopedic *Die Antike Tierwelt* (1909).[22] The German philologist compiled some of the most renowned classical references and related them to the archaeological information available during his years of scholarly activity. He also echoed the knowledge that Greco-Roman intellectuals had about the morphology and behavior of these marine beasts, while simultaneously addressing their mythological dimension within these chronologies.

Research on whales regained momentum in the 1970s and 1980s, particularly with the work of Jocelyn Toynbee, who highlighted the absence of references to whales in iconographic sources, a stark contrast to literary references where proximity to these animals was evident.[23] A significant breakthrough came with the publication of Boardman's study in 1987, which became essential in the field of comparative iconography. His work connects the mythological representations of whales in the Greco-Roman world, the biblical tradition, and analogous creatures in India, such as the *makaras*. Moreover, he outlines parallels between the iconography characteristic of cetacean representations and that of Chinese dragons.[24] In fact, the late 1980s coincided with the discovery of a remarkable number of faunal remains from ancient chronologies in present-day India and Pakistan. Among these, the proportion linked to marine species is lower than that of others.[25]

Studies dedicated to the Atlantic also proliferated, examining whale bones found in South Uist, Pabbay, Sandray, and Mingulay, at the southern tip of the Outer Hebrides, dating from the Bronze Age to the medieval period. New research reveals the multifaceted value of these animals from the Neolithic to the Norse era. Among other uses, they were employed in construction, the crafting of artifacts, and as fuel. Their presence in settlements suggests a primarily intrinsic appreciation, but the evidence available does not

[5] PLIN. *HN* 9.15.82.4–10; VARRO, *LING. RUST.* 12.15.2.1–5.
[6] PERS. 3.44–51.
[7] STR., 3.2.7.9–14.
[8] SERV. 5.822.1–6.
[9] This term is also translated as "large shark" (GOLDMAN/SUTHERLAND 1996, 357).
[10] JAKL 2014, 106.
[11] Kaviraj Kunja Lal Bhishagratna defines *timi* as "kind of whale" and *timiṅgila* as "large whale" (BHISHAGRATNA 1916, 64 Ap.).
[12] GOLDMAN *et alii* 2009, 541; MEHENDALE 1987, 333.
[13] JAKL 2014, 107–109.
[14] The possibility of a specific correspondence with the species *Crocodylus porosus* has been considered (VOGEL 1929, 146). In contrast to the reptilian characterization of the *makaras*, Hsueh-Man Shen prefers the translation "sea monster" (SHEN 2013, 276).
[15] JAKL 2014, 8.
[16] VOGEL 1929, 138–147.
[17] For an in-depth discussion on the scope and advantages of archaeological techniques for identifying cetacean species, see: DEKKER *et alii* 2024, 2.
[18] PAPADOPOULOS/RUSCILLO 2002.
[19] STR., 3.2.7.9–14; AEL. *NA* 16.18.41–46; 16.12.1–9; PHILOSTR., *IMAG.* 1.29.1–2; *MBh* 1.21; 3.280; VM:*BS* 81, 29.
[20] JOGLEKAR/GOYAL 2015; BEDEKAR 2014, 43–70.
[21] RAY 2019, 75–78.
[22] KELLER 1909.
[23] TOYNBEE 1973, 208.
[24] BOARDMAN 1987, 74–84.
[25] SAHU 1987, 70.

conclusively determine whether active whale hunting was a common practice.[26]

Another significant advancement in whale studies is the emergence of the aforementioned ZooMS technique from 2010 onwards. This development has made it possible to identify the specific whale species from a bone record with greater accuracy. Consequently, subsequent studies have focused on cataloging new species and, in conjunction with this, exploring the possibility of pre-industrial whale hunting. Thus, since the 2010s, there has been a growing concern about the ecological impact humans have had on whales and how this has influenced periods for which we have less information.

This new perspective, hereafter referred to as "whaling," focuses on the multidisciplinary analysis of the historical evolution of this industry, from its emergence as a significant economic activity to its decline due to factors such as overexploitation and environmental conservation pressures. Research has delved deeper into their hunting and the utilization of their by-products, such as fats, oils, and bones, while also emphasizing the need to explore these issues further through archaeometric studies.[27]

In addition to the prominence of the whaling approach, recent research delves into iconography. Kadgaonkar dedicates an article to the representation of aquatic animals in Indian art, demonstrating their notable prominence, as well as the recognition of their role in providing "ecological balance" within societies.[28] Sharma similarly addresses the Jalacārin, mythical creatures in Indian mythology composed of various marine animal elements.[29]

Zooarchaeology has also recently made advances, further suggesting an increasingly early exploitation of animals on the Indian subcontinent.[30] In this regard, the thesis defended by Gauri Bedekar in 2014 stands out, focusing on interactions between human populations and animals in India from 1500 BCE to 300 CE. Regarding whales, although no remains associated with them are recorded, Bedekar posits that there are animals mentioned in Indian literature that are neither represented in archaeological sites nor in iconography, citing dolphins and porpoises as archetypal examples.[31] Thus, this hypothesis could account for the absence of our cetaceans in these information records.

In contrast to the outlined historiographical scenario, the present study adopts an alternative approach that is unrelated to the classification of whale species. The focus is on the connective dynamics generated through these animals. The presence of cetacean-derived products at latitudes extremely distant from coastal locations suggests the existence of extensive networks facilitating their movement. This is despite the complexity involved in their hunting, as well as the logistical challenges associated with transporting such large creatures or their body parts. Thus, starting from the conception of these cetaceans as central nodes in exchange networks that, as we will see, often attain an intercontinental scope, the study explores both the relationships between humans and whales and the operational transfer flows between distant human communities, specifically through the circulation of these marine beasts and the products derived from them.

To assert our goal, the research at hand straddles transnational history, as it delves into processes and ideas that transcend national boundaries with the aim of achieving a deeper understanding of synchronies and connections between distant regions, one that allows for overcoming traditional geographical limits and identifying cross-border flows. To this end, it employs elements such as comparison, which, despite its constraints, remains an effective means for identifying bidirectional influences; the search for transfer dynamics, aimed at tracing regional divergences in material or cultural transmission processes; and movement, which emphasizes the circulation of people, concepts, and products across cultural and political borders.[32] To this end, global history delves into "the circulation of people, things, and ideas" and pays particular attention to phenomena such as links, networks, flows, relations, and exchanges, which convey the volatile and fluid nature of cross-border interactions.[33] Additionally, distinguishing itself from transnational history, global history diminishes the prominence of nation-states—a modern concept associated with a strong ideological charge. Its application to past societies has elicited skepticism from some scholars, who criticize its restrictive nature in this regard.[34]

The methodological approaches outlined have been applied to the study of the ancient world with considerable frequency. It is not coincidental that many of the published studies on this subject explore transcontinental scenarios that reveal networks of exchange between the Indian subcontinent and Greco-Roman civilization. The relationships between these two major Eurasian poles, or, alternatively, the influence of cross-border flows and phenomena on their evolutionary development, are evident in the works of Thapar (2002),[35] Ray (2003),[36] Hofmeyr (2007),[37] Wallace-Hadrill (2008),[38] Singh (2008),[39] Seland (2014),[40] Woolf (2012),[41] and Cobb (2019a),[42] among others.

From this perspective, we can identify two focal points of analysis concerning the relationship between whales and humans. On the one hand, there is a local focus that accounts for and explains the dynamics of specific geographic spaces, particularly those coastal areas where initial contacts with whales occurred. On the other hand, there is a global focus that allows for the identification of the bidirectional flow of whale-derived products and the various uses of these products that have been documented thus far. The spatial and temporal framework of this research has been defined

[26] MULVILLE 2002, 34–48.
[27] BERNAL CASASOLA 2010, 76–79.
[28] KADGAONKAR 2015, 123.
[29] SHARMA 2015, 39–54.
[30] DESHPANDE-MUKHERJEE *et alii* 2016, 260–261.
[31] BEDEKAR 2014, 152–154.
[32] HOFMEYR 2007; AKIRA 2013.
[33] CONRAD 2016, 61–64.
[34] CONRAD 2016, 47.
[35] THAPAR 2002.
[36] RAY 2003.
[37] HOFMEYR 2007.
[38] WALLACE-HADRILL 2008.
[39] SINGH 2008.
[40] SELAND 2014.
[41] WOOLF 2012.
[42] COBB 2019a.

in alignment with the outlined postulates. The chronological boundaries extend from the 1st century BCE to the 5th century CE, a period marked by the presence of extensive transcontinental networks facilitating long-distance exchange flows. Concerning the geographical area under study, it encompasses a connected Euro-Asiatic reality, with Imperial Rome and the kingdoms of India as the principal hubs, whose influence occasionally reached China.

3. WHAT DID THEY TALK ABOUT WHEN THEY TALK ABOUT WHALES?

As early as the 4th century BCE, through the contributions of Aristotle, it was known that cetaceans (κήτη), including whales (φάλαιναι), were viviparous animals.[43] It was also understood that they did not breathe through gills like fish, although there was no consensus regarding the internal organs used for this function.[44] Nevertheless, it was recognized that whales had mammary glands and that they fed their young through these.[45] The fact that, despite being aquatic animals, whales had a unique way of breathing through a blowhole located on their back particularly intrigued the ancients.[46] They were also aware that whales tended to give birth in summer, sometimes to two offspring, which reached full maturity at around ten years of age. Likewise, classical authors mention a method for determining the age of these animals by dissecting the tail. Through this method, they estimated that whales could live up to thirty years.[47]

There was also a geographical understanding of whales, with descriptions covering the known world of the time. According to Pliny, in the Gallic Ocean, there were species so large that they towered above the sails of ships; in the Gaditanian Ocean, the size of the whales was such that they were unable to pass through the strait, while in the Indian Ocean, they were the largest of all animals.[48] The available information on whales was so extensive that it even included relatively accurate details concerning their migratory patterns. For instance, it was known that they were not seen in the Mediterranean before the winter solstice, that they would hide at fixed times in a calm and spacious gulf, and that they preferred to give birth there under these sheltered conditions.[49] This migratory pattern aligns with current observations, as the spatial distribution of cetaceans in the Strait of Gibraltar is influenced by the favorable oceanographic conditions in the region during the summer months.[50]

Regarding the reports on whales in the Indian Ocean, the descriptions provided by Greco-Roman authors are particularly noteworthy. The core foundation of the data we possess on this matter stems from the accounts of pro-Macedonian travelers who embarked on exploratory missions sponsored by Alexander the Great. These accounts reveal a sense of fascination that, combined with a clear desire to glorify the legendary hegemon, diminishes the credibility of the narratives.[51] Despite this, it is reasonable to expect that the development of interaction routes with the Indian subcontinent from the Augustan era onwards[52] would have increased the available information about these regions and their inhabitants.

Onesicritus of Astypalaea, pilot of Alexander's fleet, describes the sighting of sea monsters that moved along the coast of Gedrosia and were of such size that their exhalations could stir up the waves, creating genuine waterspouts.[53] Naturally, it has been suggested that the creatures Onesicritus refers to were whales.[54] Another trusted companion of Alexander, in this case Nearchus, also mentions these animals, which his sailors could only drive away by the sound of trumpets and the beating of their oars,[55] in an episode with clear peri-autological overtones.[56] It was said that they could be five times larger than elephants[57] and that their dimensions exceeded those commonly known in the West.[58] Encounters with these whales appear to have occurred once they were dead,[59] though there is also the possibility that they were hunted in latitudes near present-day Sri Lanka.[60]

To assess the veracity of these data, it seems advisable to compare them with those provided by Indian sources. These narratives align with Western accounts in emphasizing the enormous size of whales.[61] Their dimensions endowed them with considerable physical prowess. In light of this, it is not surprising that the sources attribute to these cetaceans the ability to agitate the waters and generate currents when moving abruptly.[62] Furthermore, there was knowledge of their capacity to surface occasionally.[63]

On the other hand, we can infer a certain understanding of their feeding patterns. Mythological references that include whales allude to the predation of small fish,[64] but also to other marine creatures (*timiṅgila*) that preyed upon smaller cetaceans.[65] Although these texts are distant from the pseudobiological approach of Greco-Roman tradition, they contain details that reveal a notable awareness of the morphology and behaviour of these animals. This suggests that their familiarity with whales was comparable to that of their Western counterparts. In this vein, there is evidence

[43] ARIST. *GEN. AN.* 718B.27–32.
[44] Aristotle had already alluded to the possibility that whales might have lungs, while Pliny was not entirely convinced by this idea (PLIN. *HN* 9.16–17).
[45] ARIST. *HIST. AN.* 521B.21–26; PLIN. *HN* 11.235.1–4.
[46] GAL. *DE USU PARTIUM LIBRI III.* 444.2–11; AEL. *NA* 2.52.1–6.
[47] PLIN. *HN* 9.21–22.
[48] PLIN. *HN* 9.8.
[49] PLIN. *HN* 9.12–13.
[50] STEPHANIS *et alii* 2008, 280–287.
[51] This topic is extensively addressed in the study by Manuel Albaladejo Vivero (ALBALADEJO VIVERO 2005).
[52] GUZMÁN ARMARIO 2012, 249–260; COBB 2015, 362–390; COBB 2019b, 17–34.
[53] AEL. *NA* 17.6; *FHG* 39.50.
[54] ALBALADEJO VIVERO 2005, 94.
[55] ARR., *IND.* 29.15.1–30.6.4. *FHG* 39.50.
[56] ALBALADEJO VIVERO 2005, 110.
[57] AEL. *NA* 16.12.1–9.
[58] PLIN. *HN* 9.4–5.
[59] ARR., *IND.* 30.
[60] AEL. *NA* 16.18. Numerous studies have explored the subject of whale hunting (BERNAL CASASOLA *et alii* 2016, 914–927; BERNAL CASASOLA 2018, 15–22; RODRÍGUEZ *et alii* 2016, 928–938; RODRÍGUEZ *et alii* 2018; VAN DEN HURK 2020; 2021, 1–12).
[61] *MBh* 1.21; 1. 22; 6. 113; 10.7; *KS.* 1.2.
[62] *MBh* 8.55; 6. 113; *KS.* 1.2; *BhāgP* 10.71.16–18.
[63] *KS.* 1.2; *BhāgP* 10.71.17–18.
[64] *MBh* 5.57; 7.43.
[65] *BhāgP* 10.71.16–18.

that, at least from the Gupta period (4th–5th centuries CE), Indians were aware that whales expelled a vertical jet of air, or, as it appeared to human observers, water, through their blowholes.[66]

The comparison between the knowledge of whales in Greco-Roman and Indian contexts does not reveal significant differences in the volume of information provided by each. However, there is a noticeable disparity in the approach with which cetaceans are presented in literary sources. In the former case, there is an intentional study of whales, with their nature analyzed in a specific manner. In contrast, Indian texts do not display this predisposition; the data compiled are a by-product of incidental treatment within narratives that address other themes, generally of a mythological nature, in line with the essence of Indian literature.[67] It goes without saying that this approach does not constitute an incontrovertible reality, as there are Indian references where mentions of whales are endowed with epistemological connotations.[68]

In any case, we posit that the accounts and information about whales found in Western literary sources suggest bidirectional flows of information, channeled through both local and global focal points. From a local perspective, we know that species of whales inhabited both the Atlantic and the Mediterranean during these periods, a fact confirmed by archaeology.[69] There were indeed communities confined to specific coastal areas that interacted with these species.[70] It is likely that these groups, being the first to encounter the cetaceans, would facilitate the dissemination of information and products related to these creatures in exchange networks they shared with inland populations. Thus, ideas concerning whales would circulate from one region to another, eventually being incorporated into the official narrative.

In contrast, regarding the species from the Indian Ocean, which were notably of greater interest in Greco-Roman narratives, the situation was different. For obvious reasons, Western intellectuals would not have had direct access to data from local hubs interacting with these whales. Moreover, to date, there is no record of any Roman author who personally traveled to the Indian subcontinent; hence, they would have had to obtain information through other means.

This is where two probable global exchange focal points come into play. On the one hand, there are the naval explorations of the Alexandrian era, which underpin much of the discourse of imperial Rome regarding India,[71] and by extension, the creatures inhabiting it, in this case, whales. These expeditions were exploratory in nature and would have necessarily required cooperation from local inhabitants. Thus, we can infer that, concealed beneath the literary exaggerations promoted by Alexander's followers, there were flows of ideas exchanged between indigenous populations and visiting groups. Alongside the incidental information they might have gathered through direct observation, these visitors would have acquired additional references about creatures such as whales,[72] which they later embellished according to the biases they wished to project.

On the other hand, we must highlight the robust commercial network that, during the first centuries of our era, connected the Roman East with the Red Sea, the Arabian Peninsula, various points of the Indian subcontinent, and even with Sri Lanka[73]. This new transnational scenario stimulated the flow of ideas, surpassing the foundations established during the Hellenistic period, as suggested by the innovations observed in the works of Isidore of Charax.[74] It seems undeniable that mobility reached unprecedented levels, and with respect to Eurasian connections, aside from the activities of the Yavana, a Western population frequently mentioned in Indian sources, there are well-founded reasons to propose the permanent settlement of expatriate communities from Roman Egypt in Indian ports during the early centuries of our era.[75] In summary, it seems plausible that the extensive knowledge about whales in Antiquity could have been constructed from both local and global interaction points that facilitated the circulation of ideas across the Eurasian continent.

4. WHALE BY-PRODUCTS FOR CONSUMPTION

The particular interest in whales during Antiquity was partly due to their value as a food resource. While the consumption of whale meat is documented, it is not possible to determine how common it was in the markets of the Atlantic and the Mediterranean.[76] However, literary evidence provides clues regarding the presence of whale meat in the diet of the elites as early as the 3rd century BCE, where it was described as a delicacy of certain prestige.[77] This trend, as reflected in literary records, extends until the 1st century BCE.[78] With the Roman expansion and the increase in commercial relations in the Red Sea, mentions of the high nutritional value of whale meat appear, suggesting its consideration as a food source in this context.[79]

Whale hunting is attested as early as the 2nd century BCE,[80] a practice that continued in the following centuries. Archaeological evidence shows that some whale vertebrae were associated with food processing areas. Of particular interest is a vertebra fragment, dated between the 5th and 6th centuries CE, found in a Roman factory in Algeciras.

[66] *Rv* 13.10.
[67] RUBIO ORECILLA 2021a, 461–464.
[68] See *Suśruta* 1.45; *Aṣṭāṅgahṛdaya* 6, where the authors' aim is to catalog sea creatures, including whales.
[69] SPELLER *et alii* 2016; BERNAL CASASOLA 2010; BERNAL CASASOLA 2018; BERNAL CASASOLA/MONCLOVA BOHÓRQUEZ 2012; BERNAL CASASOLA *et alii* 2016; VAN DEN HURK/RIELLY/BUCKLEY 2021; VAN DEN HURK *et alii* 2023.
[70] A notable example is the fragment of a whale's inner ear, discovered in Wijster (present-day Netherlands) that may have been transported from distant coastal regions, potentially to satisfy local trade demands in the 3rd or 4th centuries CE (PRUMMEL *et alii* 2019, 44–47).
[71] ALBALADEJO VIVERO 2019, 69.
[72] Guzmán Armario's interpretation of Strabo's account of whales colliding with Nearchus's ships is notable. According to Strabo (STR., 15.2.13), sailors used trumpets to scare the whales away. Guzmán Armario suggests such stories were likely spread by Egyptian merchants to boost the value of Indian goods (GUZMÁN ARMARIO 2012, 255).
[73] SEE GRØNLUND EVERS 2017; VERMA 2005, 125–132.
[74] HARTMANN 2017, 116.
[75] ANDRADE 2017, 54–59.
[76] PAPADOPOULOS/RUSCILLO 2002, 203–204; BERNAL CASASOLA 2018, 20.
[77] PLAUT. *AUL*. 371–376; PLAUT. *CAPT*. 851–852.
[78] PERS. 3.73–76.
[79] CELSUS, *MED*. 2.18.2.3–8.
[80] BERNAL CASASOLA 2010, 77.

According to analyses, this fragment was subjected to the continuous action of one or more blunt-cutting tools, possibly metal. This has led to the hypothesis that the vertebra was used as a working surface for butchery tasks, which, given the nature of the find, suggests an association with the cutting and processing of fish.[81] However, it is important to note that in Western contexts, cut marks on bones can sometimes be ambiguous, reflecting either butchery damage or modification. Therefore, it is not possible to definitively assert that the presence of cut marks on whale bones is direct evidence that all whales were hunted for their meat.[82]

The evidence of cetacean exploitation is not limited to a single bone; various findings have been discovered, primarily in *Gades*, *Baelo Claudia*, *Septem Fratres*, *Tamuda*, and *Iulia Traducta*. In fact, the osteological records from the Mediterranean suggest the existence of a whale-hunting hub in the region, beginning in the Bronze Age and continuing, as indicated by the case of *Septem Fratres* on the African coast,[83] over time (5th–6th centuries CE). Literary sources reinforce this hypothesis, such as Pliny, who mentions whale hunting in Gades and the port of Ostia,[84] Cassius Dio, who locates it on the coast of Gaul,[85] and Strabo, who documents it in the Red Sea.[86] All these references, which allude to different geographies, demonstrate the synchronicity of a widespread practice within a shared reality.

When contrasting the scenario with India, the study of whale meat consumption presents a contradictory picture, influenced by the absence of remains of these animals in the archaeological sites located there. Despite these challenges, several noteworthy factors emerge. Indian sources provide a wide array of information regarding animal consumption. In addition to their role in the diet, these sources offer data on hunting practices and the ritual value of animals, and they delineate the species that are permissible for consumption, along with the appropriate sanctions for violations.[87] Similarly, they highlight various forms of government control over workers in the meat industry and their goods, whether through espionage[88] or tax oversight.[89]

In certain contexts, the consumption of specific animals, particularly certain species of fish, is discouraged.[90] In other cases, however, the opposite is true, with the consumption of aquatic animals being strongly recommended, as they are considered especially beneficial for enhancing certain qualities in children, particularly speed.[91] While there are no direct references to the consumption of whale meat, there are mentions of other cetaceans, specifically porpoises and dolphins.

These animals were not to be used for food purposes,[92] so it would be expected that a similar restriction applied to whales. However, the archaeological record reveals inconsistencies with textual sources. For instance, crocodiles, whose meat was theoretically not to be consumed,[93] have been found at various archaeological sites,[94] suggesting occasional hunting and consumption.[95] Moreover, in his encyclopedic *Bṛhat-saṃhitā*, which slightly transcends the chronological scope of this study (6th century CE), Varāhamihira describes a community in southern India, seemingly near the area of influence of present-day Sri Lanka, as "whale eaters."[96] This suggests that Indians were indeed familiar with the consumption of whale meat, although the extent of this practice remains unclear.

In the West, the osteological records suggest the consumption of whale meat. The cuts observed on various bones, as evidenced by zooarchaeological findings, indicate that whales were processed in coastal areas. In addition to these incisions on bone remains, there are two significant Roman-era sites whose infrastructure supports this hypothesis by attesting to the presence of ramps that facilitated the transportation of whales into the processing facilities (*fabricae*). The first case is *Iulia Traducta*, where a ramp was discovered connecting the urban industrial districts, located on a hill, with the reservoir area of the Río de la Miel. The second example is *Baelo Claudia*, where the port area has been recently interpreted as a stone ramp with wooden piers,[97] which would have facilitated the transport of heavy loads.

It is plausible to conjecture that, once processed, whale meat was distributed in the market in amphorae and various types of containers. This meat was possibly preserved with salt, a scenario supported by the fact that fish salting factories began to proliferate throughout the Mediterranean by the mid–1st century BCE. We must take into consideration that the regions with the most significant presence in the western Mediterranean (Italy, Spain, Portugal, northwest Brittany), North Africa (Morocco, Algeria), and the Black Sea region between the 1st and 3rd centuries CE[98] coincide with the locations where whale bone remains have been found.

In any case, the sources allow us to infer the existence of local markets for whale meat. Specific coastal areas, both in the Atlantic and the Mediterranean, had direct contact with cetaceans and facilitated the circulation of their meat. However, due to the previously discussed limitations, it is challenging to confirm the extent of this consumption through broader trade routes. Nevertheless, it is plausible that other whale-derived products were involved in more extensive trade. A notable example is the use of whale fat in veterinary practices. Pliny mentions that in Arabia, whale fat was traded and valued for its effectiveness, along with that of other fish, in preventing the appearance of horseflies on camels, indicating its circulation through the region's trade routes.[99]

On the other hand, it is important to note that whale-derived products were not solely valued for their nutritional

[81] BERNAL CASASOLA/MONCLOVA BOHÓRQUEZ 2016, 101–103.
[82] BERNAL CASASOLA *et alii* 2016, 925–926.
[83] BERNAL CASASOLA 2018, 16–18.
[84] PLIN. *HN* 9.5–15.
[85] DIO CASS. 54.21.2.
[86] STR., 16.3.7
[87] BEDEKAR 2014, 77–97.
[88] *AŚ* 4.4.
[89] *AŚ* 5.2.
[90] *MDhŚ* 5.15–16; *ADh* 1.5.17.38–39.
[91] *Sh GrS* 1. 27.4; *Par GrS* 1. 19.9.
[92] *VDh* 14.41.
[93] *VDh* 14.41.
[94] For example, the archaeological sites of Rajghat, Yelleswaram, and Nagda (BEDEKAR 2014, 154).
[95] BEDEKAR 2014, 154.
[96] VM:*BS* 14, 17–21.
[97] BERNAL CASASOLA 2010, 78–79.
[98] LIMBERGEN 2018, 1071.
[99] PLIN. *HN* 32.10.

purposes. In fact, a significant aspect of their use lies in medicine, due to the healing properties associated with various biological components of these animals. As early as the 1st century CE, it was noted that when people experienced lethargy, inhaling the essence of whale blood was used as a therapeutic measure.[100] Additionally, cooked and salted whale meat was employed as a dentifrice, intended to counteract decayed and foul-smelling teeth.[101] Coastal areas where marine products, especially fish, were predominantly consumed provide valuable information regarding oral hygiene. This has allowed researchers to establish a link between these dietary practices and the low presence of dental caries.[102]

Whether for local consumption or through routes connecting different regions, there was a particular interest in whales concerning matters related to food and health. Notably, this reflects a transnational scenario that stimulated the mobility of goods. Regarding potential Eurasian connections and exclusive routes dedicated to the exchange of whale products, there are no significant testimonies to attest to specific trade hubs, making it plausible that the flow of these products occurred through established commercial networks, and, based on the available evidence, the trade in whale by-products was more likely to have fulfilled local needs, a reality common to both the Atlantic and Mediterranean regions.

5. FROM LUMINOUS PEARLS TO CETACEAN EYES: A PATHWAY FOR THE CIRCULATION OF IDEAS THROUGH WHALES

One of the most remarkable connective pathways that might have been established through whales and their derived products concerns a type of precious stones renowned for their luminescence, as mentioned in Chinese sources. Specifically, this is noted in the *Book of the Later Han* (後漢書; *Hou Han Shu*), compiled by the Chinese historian Fan Ye, and in the *Brief History of Wei* (魏略; *Wei Lüe*), by Yu Huan. In chapter 88 of the former, a series of products from Da Qin, that is, the Roman Empire,[103] are listed. Among them, John E. Hill translated in 2003 the term 夜光璧 (*yèguāng bì*) as "luminous jade."[104] Similarly, the *Wei Lue* provides a list of Roman products of a similar nature, mentioning "luminescent 'pearls' or pearl-like jewels" (夜光珠; *yèguāng zhū*).[105] According to Hill, both sources appear to refer to the same type of jewel, distinguished primarily by its ability to glow in the dark.

The identification of these precious stones has sparked a complex debate within the scientific community.[106] For the study at hand, Schafer's proposal is particularly relevant. According to him, luminous pearls were a characteristic element of Chinese tradition from the Zhou period. These objects appear in other cultures as well, suggesting that their origin might be traced to India. Schafer argues that "actually, the luminescent 'gems' seen in China were often the eyes of whales, which, like the body parts of many marine creatures, were naturally phosphorescent."[107] Schafer's hypothesis does not clarify whether the jewels cataloged as Roman products in the *Hou Han Shu* and the *Wei Lüe* had parallels in other parts of Asia or if, alternatively, these texts referred to Roman jewels by drawing an analogy based on similarities they perceived between the shine of these products and the eyes of whales.[108]

Nevertheless, the connection between luminosity, precious stones, and large sea creatures is a recurrent theme in Antiquity. In the Greco-Roman context, an intriguing indication of this is the apparent terminological confusion that leads classical authors to use terms originally designed to denote whales to refer to other animals strongly associated with nocturnal brilliance. A clear example is the case of the moth, which, in certain contexts, is referred to as φάλαινα and is typically described as pursuing light.[109] This situation may not be entirely coincidental. The glow emitted by cetaceans was well known in the West, as noted by Philostratus "the Younger" in the 3rd century CE.[110]

The connection becomes much more substantial in Indian sources, which consistently depict whales as radiant creatures[111] and portray the ocean as a mystical realm that harbours countless wonders and serves as a repository for precious stones.[112] Particularly noteworthy is the *Bṛhat Saṃhitā* by Varāhamihira. According to the work of this astrologer from Madhya Pradesh, whales were among the marine animals from which pearls could be extracted. These jewels were of immense value.[113] Authorities refrained from setting a fixed price for them, and their perforation was generally discouraged.[114] Beyond possible mythological significances, the description of these pearls only serves to strengthen the correlation, as they are depicted as objects of notable size with purifying properties and, most relevant to our study, similar in shape to a fish's eye.[115]

Naturally, translating this network of shared ideas into a tangible framework related to the exchange of precious stones, and especially the material link between these stones and whales, is much more challenging to establish.

[100] PLIN. *HN* 32.116.4–9.
[101] PLIN. *HN* 32.82.1–3.
[102] LIMBERGEN 2018, 1071.
[103] SEVILLANO LÓPEZ 2015, 17; SCHEIDEL 2009, 120.
[104] *HHS*. 88. Although, according to Hill, the literal translation of the Chinese characters would be "night-shining bi." Regarding the character *bì*, Hill notes that it "sometimes denotes ceremonial stone disks, usually of jade, but sometimes it is used more loosely to refer to jade in general" (HILL 2003).
[105] *WL*. 30. Regarding the literal translation, Hill proposes: "Night-shining pearls" or, more accurately, "night-shining (pearl-like) jewels or beads" (HILL 2004).
[106] See HILL 2004.
[107] SCHAFER 1963, 238.
[108] The eyes of aquatic beasts are prominently featured in various accounts of Sinitic literature. A notable example is found in the *Great Tang Dynasty Record of the Western Regions* (大唐西域记, *Dà Táng Xīyù Jì*), written by Xuánzàng. The narrative details an episode in which a group of merchants encounters a mountain that turns out to be a colossal sea monster. The eyes of this creature are described as large, "bright suns" (*SYJ* 8.917a). Trans: Li Rongxi 1996, 222.
[109] NIC. *THER*. 762C.1–763A.6.
[110] PHILOSTR., *IMAG*. 12.17.
[111] VM:*BS* 12, 7; *BhāgP*. 8. 24–26.
[112] VM:*BS* 12, 7; *MBh*. 1.22.
[113] Although the most valuable pearls were those obtained from pearl oysters (VM:*BS* 81, 1–4).
[114] VM:*BS* 81, 29.
[115] VM:*BS* 81, 23. Note the connection with Schafer's 1963 hypothesis, who proposed the possibility of identifying these pearls with whale's eyes.

Nevertheless, it is worthwhile to outline a series of pieces of information that provide an interesting starting point for future research. To begin with, it is important to recall that the intercontinental transit of jewels and precious stones is well documented in both Eastern and Western written records.[116] Chinese chronicles confirm the quality of Roman jewelry and the possibility of acquiring it in the markets of the kingdom of Tianzhu (currently northwest of India) during the early centuries of our era.[117]

In the Indian subcontinent, there were specific regulations governing the transactions of native jewels.[118] Regarding foreign precious stones, transnational exchange flows became an ordinary reality that permeated literary accounts.[119] In this context, Indian sources emphasize the opulence of the Yavana. In mythological narratives, local rulers would often defeat these foreign groups and subsequently seize their wealth, which prominently included the gems.[120]

Beyond this pseudo-mythological perspective, we can be certain that the manufacturing skill of Western societies was highly valued in the East. Indian literature provides examples of light-related objects made by the Yavanas. The case of lamps is the most evident,[121] as archaeology has confirmed their presence in these regions.[122] Some specimens even exhibited iconography related to the sea.[123] The Yavanas also conceived other products from which we infer connections. In this regard, we know of the manufacture of musical instruments in the shape of makaras,[124] aquatic creatures from Hindu mythology, which have been associated both with Greco-Roman sea monsters and Chinese water dragons. This association arises from similarities noted by specialists in their various representations.[125]

In summary, based on the arguments presented, we can conclude that, during Antiquity, there was an association between whales and nocturnal brightness. It is surprising given that the anatomical features of these cetaceans are far more striking at first glance. This connection operated across various Euro-Asiatic civilizations, which serves as further evidence of the extent and viability of the transnational networks active at the time. It seems plausible to suggest that these channels facilitated the flow of information, which eventually converged to generate shared ideas across distant regions.

The alignment of this scenario with the material exchange flows related to precious stones remains problematic. Despite the robust intercontinental trade in jewelry during this period, the available data do not yet allow us to decipher its connection to whales. Thus, we are unaware if similar items were directly extracted from these marine beasts, or if the connections can be explained by the availability of gems with properties associated with them due to specific characteristics, such as their nocturnal luminescence. Likewise, the precise meaning of references pointing to whales as animals from which such gems could be extracted remains unclear.

6. CONCLUSIONS

The study of whales and their derived products, enhanced by the methodological standards inherent to transnational and global history, reveals a promising research landscape. In this regard, our contribution represents an initial approach to the possibilities offered by this field. Based on this procedural foundation and the analysis of relevant evidence, we can conclude that, during Antiquity, networks were in operation that channeled both conceptual and material exchange flows centered around these creatures.

However, this was a complex network, far from homogeneous. While in some cases, the reach of these connective routes was confined to local contexts, in others, we observe links of intercontinental scale. This duality becomes evident when we delve into the literary records. Those associated with the Greco-Roman world point to the East, particularly India, as a key area concerning large cetaceans. In contrast, Indian sources provide a perspective from which we can infer primarily indigenous centers of data and product circulation.

Be that as it may, the comparison of these narratives with other records of information, particularly those of an archaeological nature, has allowed us to identify three major geographical regions where whales concentrated their activity during Antiquity: the European Atlantic facade, the Mediterranean coast, and the Indian subcontinent. It is important to emphasize that, despite the distance separating these regions, there was a mutual awareness of cetaceans and their products, particularly evident in the West.

In this vein, based on the arguments put forward in the article, it seems plausible to suggest that there was a conscious exchange of products derived from whales or somehow linked to them. However, the areas designated for such transactions were limited and confined to specific centers, where small-scale hunting of these cetaceans likely took place. Ultimately, we should consider these activities as being more focused on meeting local needs rather than large-scale commercial enterprises involving state entities.

Finally, to further explore these issues in future research, we believe it is essential to expand the interdisciplinary approach that we have sought to implement in our preliminary study. In this regard, we consider the creation of a database that systematically records data provided by zooarchaeology to be crucial. Similarly, the integration of information from other auxiliary sciences of history, particularly those of a numismatic and iconographic nature, would be particularly fruitful.

[116] SEVILLANO LÓPEZ/SOUTAR MORONI 2012, 139–155; PÉREZ GONZÁLEZ 2017, 43–174 or FARIDA 2022, 61–65.
[117] *HHS*. 88; *WL*. 30.
[118] *VDh* 2. 13–25; *AŚ* 2. 28.
[119] *BKŚS* 18, 663 and 668.
[120] BṇḍP 2.3.73.102.
[121] *Pk* 1.17.175; *Neṭu*: 101 f.
[122] See: RAY 1988, 314–322; CHRZANOVSKI 2010, 185–206; AUTIERO 2019, 575–581.
[123] *Perump*. 316–318.
[124] Specifically, to the *Vīna*, a stringed instrument renowned in ancient India (*Pk* 3.16.22).
[125] BOARDMAN 1987, 82–84; SHEN 2013; 274–289.

ABBREVIATIONS OF INDIAN SOURCES[126]:

ADh = Āpastamba Dharmasūtra
Aṣṭāṅgahṛdaya = Aṣṭāṅgahṛdayasaṃhitā
AŚ = Arthaśāstra
BhāgP = Bhāgavatapurāṇa
BṇḍP = Brahmāṇḍapurāṇa
BKŚS = Bṛhatkathāślokasaṁgraha
KS = Kalpa Sūtra
MBh = Mahābhārata
MDhŚ= Mānavadharmaśāstra
Neṭu = Neṭunalvāṭai[127]
Par GrS = Pāraskara-Gṛhyasūtra
Perump = Perumpāṇāṟṟuppaṭai
Pk= Peruṅkatai
Rv = Raghuvaṁśa
Sh GrS = Śāṅkhāyana-Gṛhyasūtra
Suśruta = Suśrutasaṁhitā
VDh = Vasiṣṭha Dharmasūtra
VM:BS = Bṛhatsaṁhitā

ABBREVIATIONS OF CHINESE SOURCES[128]:

HHS = Hou han shu (後漢書)
WL = Wei Lüe (魏略)
SYJ = Dà Táng Xīyù Jì (大唐西域记)

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[126] Regarding the abbreviations of Ancient India, the following reference works have been consulted: VIJAYALAKSHMY 1982, 27; DUNDAS 1992, 23; CHANDRASEKHARAN 2011, 53; BEDEKAR 2014, 3; WILDEN 2014, 10; KARTTUNEN 2015, 411–413 and RUBIO ORECILLA 2021b, 82.

[127] Some sources have been consulted from Karttunen, K., *Yonas and Yavanas in Indian literature* (Helsinki: Finnish Oriental Society). Specifically, the references from *Neṭunalvāṭai* of Nakkīrar, *Perumpāṇāṟṟuppaṭai* of Uruttirangannanar and *Peruṅkatai* of Koṅkuvēḷir

[128] See bellow for the full reference to the original texts.

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