AN ARTIFACT ASSEMBLAGE FROM THE ANCIENT SHIPWRECK AT GODAVAYA, SRI LANKA

A Thesis

by

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ABSTRACT

The Godavaya shipwreck, located off Sri Lanka's southern coast at a depth of approximately 33 m (110 ft), is presently dated to between the second century B.C.E. and the second century C.E., making it the oldest known shipwreck in the Indian Ocean. The focus of this thesis is a selection of diagnostic artifacts, excavated from this site between 2012 and 2014, consisting of a glass ingot, an unknown glass object, a metal ring, an iron spear, a benchstone, a grindstone, and many ceramic sherds, for a total of 31 artifacts. Its purpose is to attempt to contextualize these items within the Indian Ocean maritime network and Sri Lanka's mercantile past, through artifact parallels, ancient sources, and previous scholarship. By identifying the likely origin, date, and purpose of each piece, the nature of this cargo and its voyage can be theorized. These in turn will address larger questions of economic activity and technological innovation within the history of the region. Primary sources from ancient cultures provide vital information on Indian Ocean trade connectivity, and the role of maritime networks in structuring Indian Ocean connectivity, and the role of maritime networks in structuring Indian Ocean socioeconomic life. Therefore, several literary works will be analyzed in this thesis, from the Mediterranean, China, India, and Sri Lanka. Finally, the terrestrial excavations at Godavaya and other relevant research will help provide a more holistic view of how this ship may have been connected to ancient seafaring activity. These 31 artifacts provide specific evidence for ancient maritime activity in the Indian Ocean and contribute to the rapidly-expanding scholarship surrounding seafaring in South Asia.

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NOMENCLATURE

H	Height in cm
D	Diameter
T	Thickness
L	Length
W	Width
R	Rim
Body	Body Wall Thickness
Max	Maximum
Min	Minimum
r	Right
l	Left
RW	Red Ware
BRW	Black-Red Ware
M	Metal
G	Glass

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CHAPTER I

INTRODUCTION: ANCIENT SRI LANKA IN LITERARY SOURCES

The Godavaya shipwreck, dated to between the second century B.C.E. and the second century C.E., is currently the oldest sunken cargo in the Indian Ocean and one of the most promising opportunities to study directly the merchandise and raw materials (as well as the shipboard items and personal possessions) that traveled between coasts. Therefore, in this chapter I will contextualize this wreck historically by incorporating various contemporaneous sources. A map is also provided to contextualize this wreck's location (Fig 1). The *Periplus of the Erythraean Sea* and Pliny's *Natural History* from the Mediterranean; the *Han Shu* and *The Sea Route from Guangzhou to Countries in the Indian Ocean* from China; early Sangam poems, the *Dīpavaṃsa* and the *Mahāvamsa* from India and Sri Lanka, respectively, are vital to this research. The Godavaya shipwreck was part of one of the most prosperous trade networks in the ancient world, which succeeded in part due to the diversity of its goods. Any network relies on different agents at different nodes, and this one was no exception. These sources describe the human interaction and connections that made this network possible.

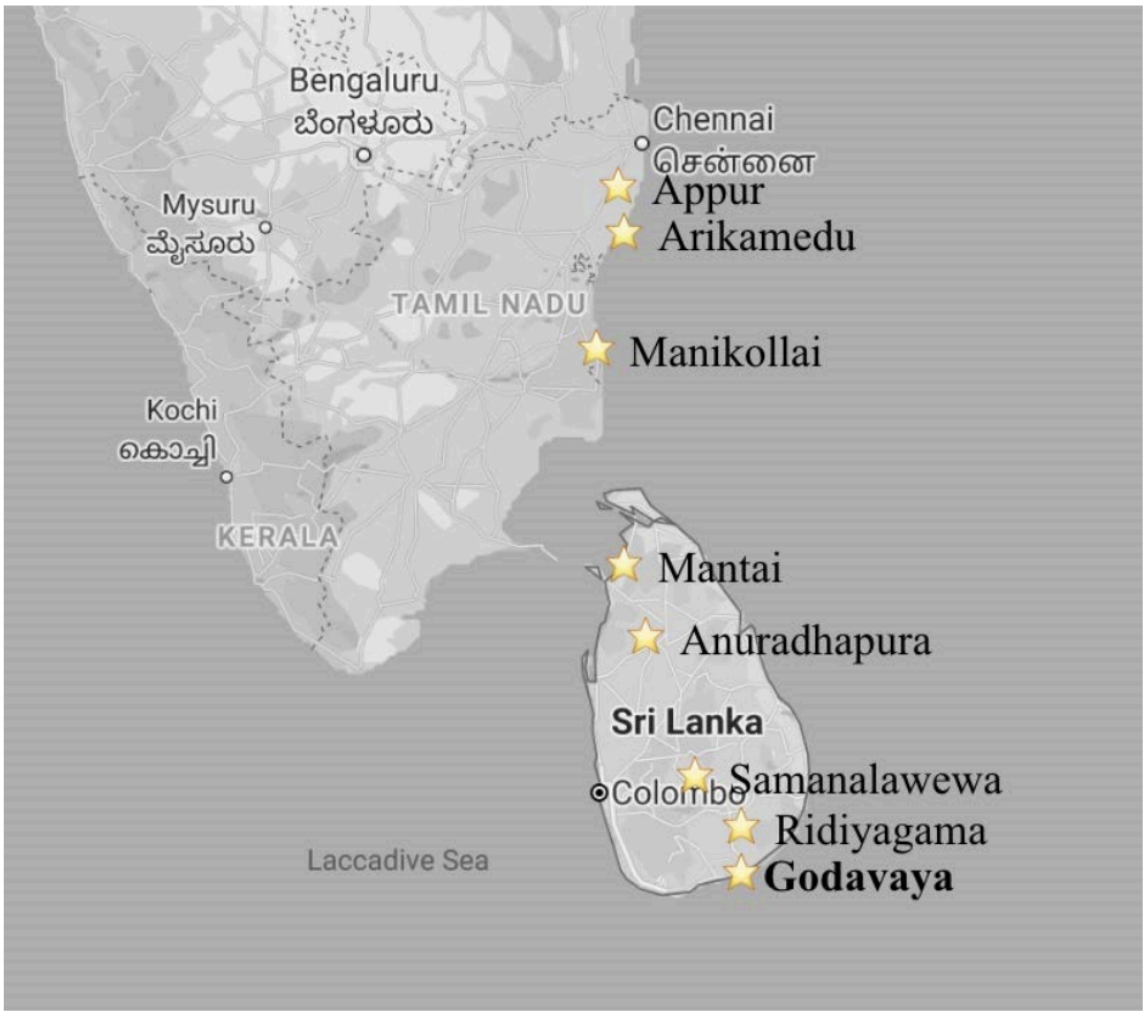

Figure 1. Map of locations mentioned in this thesis.
Created by author.

References to India occur in Greek literature from the fifth century B.C.E. onwards.[1] Further literary and archaeological evidence reaffirms that trade between India and the Mediterranean was economically lucrative.

The excavations undertaken on the Indian subcontinent have uncovered around 6,000 Roman *denarii* (silver coins) and well over 1,000 *aurei* (gold coins each worth 25 *denarii*) particularly concentrated in the Coimbatore district of southern India and around the Krishna River in central eastern India.[2] However, these coin finds only constitute a portion of the total value of goods exported alongside them, which is similarly a portion of the trade as a whole.[3] This ambiguity has periodically led some academics to wonder if the Empire suffered from these Indo-Roman transactions, an uncertainty which is echoed in the ancient literature. Pliny the Elder (c. 23-79 C.E.) wrote "in no year does India absorb less than 50 million *sesterces* [12.5 million *denarii*] of our empire's wealth, sending back merchandise to be sold with us at a hundred times its prime cost," as well as, "India, China, and the Arabian peninsula take from our empire 100 million *sesterces* every year - this is the sum which our luxuries and our women cost us."[4]These statements give the impression that citizens of the Roman Empire suffered from an imbalance of trade with India and the East. However, this perception has been subject to healthy debate, as Pliny is not explicit about the sources of information for these claims, and he could have been warning of the

[1] Lytle 2016 114; De Romanis and Tchernia 1997, 284.
[2] Cobb 2015, 187.
[3] infra n. 3, 187.
[4] Pliny, *NH* 6.26.101; Pliny, *NH* 12.41.84 trans. Rackham 1945.

negative moral effects of spending wealth on *luxuriae*, as well as the negative effects on the social stability of the elite.[5] His strong opinion on the ethical nature of decadence might have misrepresented the absolute numbers of international trade, leading to hyperbole.

Even without this cautionary tale, it is logical to wonder if the trade between India and Rome was dominated by one of the participating entities.[6] The Indian Ocean presented a unique environment for the development of maritime technology, where sailors had to face exceptionally challenging sea conditions. Sri Lanka, for example, is located six to ten degrees north of the Equator, resulting in a tropical climate where the central massif in the south and central part of the island stands in the path of monsoonal winds.[7] During the first century C.E., settlements began to develop along the coasts of the Red Sea, eastern Africa, southern Arabia, India, and Sri Lanka.[8] One sanctuary, discovered on the northeast coast of Socotra (Yemen) in 2000, contained graffiti in South Arabian, Indian Brahmi, Ethiopic Ge'ez, and Greek, as well as an inscribed tablet in Palmyrene Arabic, with a corresponding date of 257-258 C.E.[9] Even today, Socotra is considered very remote, and so the markings on the sanctuary attest to a vibrant and multilingual traffic in this area.[10] The dangers of the sea did not deter the ancients from exploring their world.

Sailing routes across the Red Sea and Indian Ocean were dictated by monsoons, which were perhaps first discovered by Mediterranean peoples toward the end of the second

[5] Cobb 2015, 190-191.
[6] Fauconnier 2012, 76.
[7] Bopearachchi and Perera 2012, 3.
[8] Pavan and Schenk 2012, 191.
[9] Seland 2014, 367.
[10] infra 368.

century B.C.E.[11] From May through September, sailing activity along the west coast of India and the south Arabian coast was suspended due to potential danger.[12] However, vessels would utilize the southwest monsoon winds for outbound voyages and the northeast monsoons for return trips, taking advantage of the seasonal changes.[13] To sail within this region, ships had to be, "good weatherly sailors, fast, good carriers, deep-drafted and able to go to windward as well. In short they had to be *real* sailing ships."[14] Sri Lanka, located at the intersection of major sea routes between the East and the West, links China and Southeast Asia with the Mediterranean and the Middle East.[15] This geographic position allowed diverse groups of traders and sailors to interact frequently and on a continuous basis. In addition, ancient Sri Lanka, called *Taprobanê* by the Greeks and Romans, was full of natural luxuries, such as gems, pearls, muslins, ivory, and tortoise-shell, along with rice, ginger, honey, cinnamon, beryl, amethyst, gold, silver, as well as other metals.[16] Pliny even wrote that, "[*Taprobrane*'s] entire mass of luxury is greater than ours."[17] It is these written records that allow us to piece together Sri Lanka's role in the Indian Ocean trade.

The *Periplus Maris Erythraei*

The *Periplus of the Erythraean Sea* is a description of and guide to Indian Ocean trade written in Greek.[18] It was meant for seafaring merchants, with detailed information on the

[11] Sidebotham 1996, 268.
[12] infra 268.
[13] infra 288.
[14] Villiers 1952, 56-7.
[15] Solangaarachchi 2011, 99.
[16] Weerakkody 1997, 3.
[17] Plin. *NH* 6.89.
[18] Seland 2016, 192.

commodities in demand at various ports.[19] The anonymous work is believed to have been written in the second half of the first century C.E. by a single author, who perhaps originated in Egypt.[20] As a primary source, the *Periplus* is invaluable to the study of navigation, trade, and geopolitics from Egypt in the west to the Malay Peninsula in the east. Within the larger context of Greek writings on India, the *Periplus* can be seen as both an asset for expanding Greco-Roman interests in the western Indian Ocean, as well as an attempt to codify seafaring traditions and knowledge.[21] It is considered the "most detailed and comprehensive surviving account of Roman involvement in the Eastern commerce."[22] However, researchers must be cautious and avoid over-reliance on this inherently-limited perspective. For example, the text, whilst acknowledging the wider trade originating in Arabia, Africa, the Persian Gulf, and the Malay Peninsula, goes into greater detail regarding the shipping from Egypt to Africa, Arabia, and India.[23] This, however, does not necessarily equate to an Egyptian dominance over the Indian Ocean. Rather it reflects the fact that maritime networks were divided into regions or segments, and this author was most familiar with the region between Egypt and India (or similar).

Likely intended as a guide for other merchants, the *Periplus* covers routes, ports, various anchorage points, and lists of merchandise.[24] The author's name, origin, and profession are unknown, but the general consensus is that he was a Greek-speaking professional merchant collecting a series of technical notes useful to his work in maritime commerce. In fact, the

[19] Ray 1994, 66.
[20] Seland 2016, 192.
[21] Ray 1994, 65.
[22] McLaughlin 2010, 7; 42.
[23] Seland 2016, 193.
[24] Robin 1997, 42.

variety of information within this text would have been useful for any merchant wishing to trade in the Indian Ocean.[25] The *Periplus*' author correctly describes the coast of East Africa as slanted towards the west and the Indian coastline below the Indus region as being curved towards the south.[26] They describe an Indian Ocean environment where, "...the waves are high and very violent and the sea is tumultuous and foul, and has eddies and rushing whirlpools. The bottom is in some places abrupt and in others rocky and sharp, so that the anchors lying there are parted, some being quickly cut off and other chafing on the bottom."[27] This geographical proficiency likely stems from first-hand experience, making the *Periplus* all the more indispensable to its intended audience (likely Greek sailors, given the language in which it was written).

Unfortunately, Sri Lanka is only briefly mentioned as "the island *Palaesimundu*, called by the ancients *Taprobanê*...It produces pearls, transparent stones, muslins, and tortoise shell."[28] These same items are mentioned in a fragment from the Greek writer Megasthenes (c. 350-290 B.C.E.), who described *Taprobanê* as richer in gold and pearls than India.[29] It is implied that the strait (Adam's Bridge) between India and Sri Lanka was the furthest point to which most Mediterranean vessels traveled, presumably due to their size, which made it difficult to navigate the shallow straits.[30] Of course, the *Periplus*' descriptions are not faultless. The author writes that Sri Lanka lies out at sea toward the west and that its

[25] infra 42.
[26] infra 42.
[27] Cobb 2015, 185; Schoff 1974, 38.
[28] *Periplus* 61, trans Casson 1989.
[29] Plin. *NH* 6.82-83.
[30] Young 2001, 31.

southern part almost touches the opposite shore of Azania (a portion of Southeast Africa).[31]

The *Geography* of Ptolemy

As a treatise on the mathematical geography of the inhabited world, the *Geography* of Ptolemy (c. 100-170 C.E.) is nearly contemporaneous with the *Periplus*, and emphasizes the coordination of astronomical calculations for setting the positions of locations.[32] Written around the mid-second century C.E., it is even less geographically accurate than the *Periplus*.[33] Ptolemy states that East Africa's coast turns eastwards, bordering an unknown continent before rejoining Asia, and depicts India as foreshortened from the north to the south and overstretched beyond the equator.[34] These errors, consisting generally in mistaken calculations of longitudes and latitudes, are surprising given that trade was thriving at the time of his writing.[35] Other ancient authors have also exaggerated the size of Sri Lanka and its geographic position. For example, Strabo quoted a Greek commander in Alexander the Great's fleet, named Onesicritus of Astypalea (c. 360-290 B.C.E.), as having written that *Taprobanê* was 5000 *stadia* (around 950,000 meters) in size and 20 days' voyage from the mainland.[36] Pliny also quoted Onesicritus as having written that *Taprobanê* was long considered to be another world.[37] However, Ptolemy accurately assigned Sri Lanka a north-south orientation.[38]

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[31] *Periplus* 61.
[32] Abeydeera 2009, 45.
[33] infra 1.
[34] infra 1.
[35] Vincent et al. 1807, 29.
[36] Strab. 15.1.5.
[37] Plin. *NH* 6.82-83.
[38] Ptol. 7.4.1.

The *Natural History* of Pliny the Elder

The *Natural History* by Pliny the Elder, written in the first century C.E., is encyclopedic in scope, and one of the largest works to have survived from the Roman Empire.[39] Pliny states that, while the Mediterranean world knew of Sri Lanka since the time of Alexander the Great, direct contact only began in the reign of the emperor Claudius (41-54 C.E.).[40]

Documents from both Rome and China also record that Sri Lankan kings sent ambassadors to these faraway courts as early as the first century B.C.E., setting into motion the Indian Ocean global trade network that transformed this sea into a passage for spices, cotton, rice, gold, precious stones, and slaves.[41] Although assorted classical authors wrote about India, Pliny is the only Roman writer who mentions the arrival of the embassy from Sri Lanka.[42] In his Natural History, translated by H. Rackham, Pliny wrote:

> He [the Sinhalese king] sent four envoys, the chief of whom was Rachias. From them we learnt the following facts about Taprobanê: it contains 500 towns, and a harbour facing south, adjacent to the town of Palaesimundus, which is the most famous of all the places in the island and a royal residence, with a population of 200,000. Inland (we were told) there is a marsh named Megisha measuring 375 miles round and containing islands that only produce pasturage; and out of this marsh flow two rivers, Palaesimundus running through three channels into the harbour near the town that bears the same name as the river, and measuring over half a mile in breadth at the narrowest point and nearly two miles at the widest, and the other, named Cydara, flowing north in the direction of India.[43]

Scholars have long debated the identity of Rachias. Friar Paolino made the earliest hypothesis, suggesting that "Rachia" was a transcription of "Ragia," with an etymological connection to the Sanskrit and Sinhalese word "raja," referring to "king."[44] This, however,

[39] Young 2001, 32.
[40] infra 32.
[41] Lawler 2014b, 1441.
[42] Abeydeera 2009, 55.
[43] Plin. *NH* 6.24.
[44] Abeydeera 2009, 59.

does not make sense, since Pliny's text clearly states that Rachias was sent by the king, which means that Rachias himself was not royalty. Further research reveals that "Rakkha" was a name used in Sri Lanka during Pliny's time, such as the general Rakkha in the Pāli chronicles, and the name Raki appears with some frequency in several early Brahmic inscriptions of Sri Lanka.[45] Thus Pliny's narrative may indicate that Rome had early interactions with both Sri Lanka and Buddhism, in ways that appear to have been mutually beneficial.[46]

Strabo's *Geographica*

Strabo is arguably the most interesting of the writers included here. As a geographer, he visited the newly-minted Roman province of Egypt between 29 and 26 B.C.E.[47] His travels from Alexandria to Ethiopia, where he gathered information on the ports of the Red Sea, became the foundation of *Geographica*.[48] In the second book of the *Geographica*, Strabo mentions, "We were with Gallus when he was prefect of Egypt, and we travelled with him as far as Syene and the frontiers of Ethiopia, where we learned that as many as 120 ships were sailing from Myos Hormos (Egypt) to India…," which is an astonishing figure, given that this was not even at the height of the Indo-Roman trade.[49]

Strabo placed *Taprobanê* in front of India, commenting that it was no smaller than Britain.[50] Both Britain and *Taprobanê* were thought of as possessing parallel

[45] infra 60.
[46] Plin. *NH* 7.110.
[47] Fauconnier 2012, 75.
[48] infra 75.
[49] Strab 2.5.12
[50] Strab. 2.1.15.

characteristics, and provided symmetry, with the northern part of Britain turned eastward to hug the coast of Europe and the southern part of *Taprobanê* extended westwards towards Africa's eastern shore.[51] Strabo preserved the writings of Eratosthenes of Cyrene (c. 275-194 B.C.E.), an Alexandrian scholar who stated that *Taprobanê* was seven days' journey south of India and, length-wise, a measure of 8000 *stadia* (around 1,520 km) in the direction of Ethiopia.[52] Pliny, who also quoted Eratosthenes, credited him with different measurements: supposedly Sri Lanka was 7000 *stadia* (around 1330 km) in length and 5000 (around 950 km) in breadth.[53]

The sporadic arrival in Rome of Indian ambassadors during the reign of Augustus (27 B.C.E.-14 C.E.), is documented in Strabo's *Geography*. "Embassies were often sent to me from the kings of India."[54]

SOUTH AND EAST ASIAN TEXTUAL NARRATIVES

Sri Lanka's ancient history has been recorded in a variety of textual chronicles, including the *Dīpavaṃsa*, *Mahāvaṃsa*, and *Cūḷavaṃsa*.[55] The Dīpavaṃsa (literally "History of the Island") is seen as a first attempt at collating *Pāli* verses, and it was anonymously compiled in the fourth century C.E.[56] The *Mahāvaṃsa* may have been written by various monks to record the history of Sri Lanka during the early centuries C.E., and then compiled into a single document by the Buddhist monk Mahānāma in the fifth to sixth

[51] Ptol. 7.4.1.; DiMucci 2015, 15.
[52] Strab. 2.1.15.
[53] Plin. *NH* 11.81.
[54] Abeydeera 2009, 55.
[55] Coningham et al. 2017, 21.
[56] infra 21.

century C.E., with the *Cūḷavaṃsa* continuing this narrative.[57] Originally believed by Western scholars to be legends, the rediscovery of palm leaf manuscripts at Mullgiri-galla near Tangalle led to serious reconsideration of their contents as historical events.[58] Sir James Emerson Tennent, Colonial Secretary of Sri Lanka between 1845 and 1850, acknowledged that this, "long lost chronicle...thus vindicated the claim of Ceylon to the possession of an authentic and unrivalled record of its national history."[59] This is important because there was a long-standing belief in academia that Indo-European speaking people invaded South Asia during the first millennium B.C.E., introducing writing, iron, and advanced social institutions.[60] Mortimer Wheeler, when linking South Asian archaeology with established Western chronologies at Arikamedu, India, perpetuated this idea that contact with the Roman world was the catalyst for the Indian Ocean trade, saying that the port of Arikamedu was populated by 'simple fisher-folk' living in 'a leisurely and enterprising fashion just above subsistence level.'[61] It is also worth noting that while these textual narratives make frequent mention of Buddhism, there were additional religious groups on the island during the early centuries C.E. Brahmans were recorded as undertaking principal religious roles prior to the arrival of Buddhism (around the third century B.C.E.), and this importance continued after the arrival and adoption of Buddhism in Sri Lanka, as detailed in the 22 Early Brahmi inscriptions that mention Brahmans undertaking major roles regarding sacred texts.[62]

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[57] infra 22.
[58] Frasch 2011, 383-405.
[59] Biedermann and Strathern 2017, 20. Sri Lanka was known as Ceylon from 1815 to 1972 under British rule.
[60] Pollock 2006, 572.
[61] De Silva 1995, 13.
[62] *Mahāvaṃsa,* 9.1–2.

While Mediterranean sources have historically been the primary focus of recent research, the literature of ancient India also describes a well-established trade between Rome and India. For example, the Roman desire for pepper, which was used as a medical treatment, an aphrodisiac, and, of course, to flavor food, is clearly described in the epic poems of the Sangam corpus, written between the third century B.C.E. and the fifth century C.E in modern-day South India. The Sangam text *Akanaṉūṟu* states:

Musiri the prosperous city
To which the vessels of the Yavanas
Built with care by skilled ship-builders
Come laden with gold and return laden with pepper
Agitating the foaming waters
Of great Sulli river of the Cera kings.[63]

The term '*Yavana*' is used throughout ancient Indian literature and inscriptions. Originally meaning 'Greek', and coming from the Greek word '*Iaones*', meaning 'Ionian,' it eventually extended to Romans and Arabs.[64]

Pepper, however, was not the only item that the Romans sought. Another fragmentary record from the mid-second century C.E., known as the *Muziris Papyrus*, documents a cargo that included, among other goods, ivory, cloth, and *nard* (an aromatic Himalayan plant) valued at 1,154 Egyptian *talents* and 2,852 *drachmae* (almost seven million *sesterces*).[65] Various ancient Tamil texts describe *Yavanas* establishing colonies along the east coast of India, and the *Akanaṉūṟu* and *Silappatikaram* details the presence of *Yavanas* in India during the early centuries C.E.[66] Other inscriptions, written in either

[63] Tayakannanar, Poem 149, 7-11.
[64] Lal 2004, 1115.
[65] Cobb 2015, 186.
[66] Gaur et al. 2006, 117.

Sinhalese or Tamil scripts, deal directly with the south Indian shipping communities, particularly surrounding the trade relations between Tamil Nadu (a southernmost state of modern India) and Sri Lanka.[67]

The Tamil poem *Maturaikkāñci*, written in the first or second century C.E., describes:

> Large ships on which high flags on mast-tops wave
> Spread out their sails and cleave the rolling waves,
> Tossed by the winds of the great dark, treble sea
> On which rest clouds. They come to the sound of drums
> To the port, their trade successful, with the gold
> That much increases people's wealth.[68]

This 'successful trade' is echoed in another Tamil poem, *Paṭṭiṉappālai*, written before the third century C.E. It details the ancient port city of Kaveripattinam, in modern-day Tamil Nadu, and reports the following details:

So goods flow in from sea to land,
And also flow from land to sea.
Unmeasured are the abundant wares
Here brought and piled.[69]

Evidence for trade between ancient Sri Lanka and the East can also be found in texts and artifacts. The remains of six oars and ship-shaped ceramics, unearthed in the 1970s on the east coast of China, serve as evidence of Chinese navigational traditions from the early centuries B.C.E.[70] The *Historical Book of the Han Dynasty*, otherwise known as the Han Shu, was written between the second century B.C.E. and the second century C.E. It contains sailing instructions and mentions the country '*Yibuchen*' (Sri Lanka) at the south of India.[71] Specifically, the manuscript describes their travels:

[67] Bopearachchi 2004, 61; Cobb 2015, 186.
[68] Chelliah 1962, 179.
[69] infra 179.
[70] Guang-Qi 1989, 12.
[71] infra 13-14.

> "Ships sailed from Packchan Tulag for more than 2 months and arrived at Kancipura [Kanchipur, in the southeast part of India]. To the south of Kancipura there was a country called Yibuchen [Sri Lanka], from where the Chinese post officers started their journey home."[72]

The *Sea Route from Guangzhou to Countries in the Indian Ocean*, written in the eighth century C.E., mentions Sri Lanka again, this time while describing a voyage from Canton, with approximate sailing times in days, or '*Li*'.[73] The navigational information about ports, bays, courses, sailing times, and river mouths was a necessary step leading to more advanced sailing directions, with these preliminary descriptions eventually helping create more detailed, written descriptions during the Tang Dynasty (seventh to early 10th centuries C.E.).[74] Trade between China and Sri Lanka appears to have been extensive.

SRI LANKA'S EARLY HISTORY

Sri Lanka's early history was strongly influenced by merchant settlers from its subcontinental neighbor India.[75] Material culture from southern India, particularly ceramics, have been found in Sri Lanka, predating the third century B.C.E., which suggests an early trading relationship.[76]A similarly strong association with northern India is supported by archaeological evidence, particularly the discovery of currency in the form of Indian punch-marked coins (sixth to third centuries B.C.E.), as well as Indo-Greek (third to first centuries B.C.E.), Indo-Scythian (first century B.C.E. to first century C.E.), and Kushana (first to third centuries C.E.) coin types.[77] Buddhism, which was introduced

[72] infra 13-14.
[73] infra 16.
[74] infra 15.
[75]
[76]
[77]

by an envoy sent by the Emperor Ashoka in the mid-third century B.C.E, was embraced by Sri Lankans, even as they simultaneously resisted conquest attempts by Indian rulers.[78]

Throughout the early centuries C.E., there was a gradual shift in the focus of trade from the coasts of south India to the teardrop island of Sri Lanka.[79] The most extensive archaeological site in Sri Lanka, Anuradhapura, is inland and dates from 800 B.C.E. to 1,100 C.E.[80] Artifacts, such as Roman coins dating from the fifth century C.E. and a fragment of glass from the eastern Mediterranean dating back to the first century B.C.E., indicate that there were distinct external contacts as early as the first half of the first millennium C.E.[81] Excavations along the southern coast of Sri Lanka, at Tissamaharama, uncovered Roman amphorae and Islamic glazed wares dating from the second century B.C.E. to the 14th century C.E.[82]Archaeologists have found cinnamon in Egyptian tombs and inside Phoenician flasks, which may have had its origin on Sri Lankan plantations.[83]

By the fifth century C.E., Sri Lanka became the main center of trade in the Indian Ocean. Ports situated on the southern coast of Arabia and frequented by Axumite, Himyarite, and Persian traders began to play pivotal roles.[84] The most important characteristic of all ancient ports in South Asia was their geographical situation at the estuaries of rivers.[85] Sri Lanka has an extensive network of 103 rivers, which flow in a radial pattern towards the

[78] Muthucumarana et al 2014, 42; Lawler 2014b, 1441.
[79] supra n. 8, 3.
[80] supra n. 80, 42.
[81] infra 42.
[82] infra 42.
[83] Lawler 2014b, 1441.
[84] Bopearachchi and Perera 2012, 3.
[85] Bopearachchi 2004, 61.

sea.[86] However, it is the permanent rivers originating in the high mountains that became the focus of societal growth.[87] An estuary is the tidal mouth of one of these primary rivers. This strategic location facilitated transactions with the interior regions. The most important ancient capitals of Sri Lanka were inland, but each had a corresponding port on the coast.[88] For example, Mantai, the most active port in ancient Sri Lanka and the main port of the Anuradhapura Kingdom, was linked to the inland capital of Anuradhapura by the Aruvi Aru river, otherwise known as the Malvathu River.[89]

The Indian Ocean's seasonal monsoon weather patterns facilitated contact and seaborne trade between these civilizations. The wind and currents made particular months favorable for outbound journeys, while other months were utilized specifically for return voyages. Merchants from the Roman Empire operated alongside those from India, Arabia, and Persia, importing and exporting various goods, including textiles, aromatics, spices, precious stones, and even animals.[90]

[86] Bopearachchi 2004, 61.
[87] infra 3.
[88] Bopearachchi 2004, 61.
[89] infra 61.
[90] Cobb 2015, 185.

CHAPTER II

ARCHAEOLOGY OF THE INDIAN OCEAN AND THE GODAVAYA SHIPWRECK

During the later first and early second centuries C.E., the dominant centers of economic influence in South Asia were China, India, and the Middle East.[91] The Indian Ocean served a particularly important role, allowing for the development of systems of commercial interaction.[92] The wealth generated from this exchange stimulated even the outermost fringes of the Afro-Eurasian landmass, as witnessed by the expansion of overland trade from the Mediterranean to Central Europe, and the development of trans-Saharan trade routes linked to West Africa.[93] The size of this international network is astonishing, but the success of the Indian Ocean trade came from, "the regularity, intensity, and spread of the exchanges that result[ed] in the different regions being progressively integrated and shaped into a world-system."[94] Historical and archaeological evidence of this maritime trade network paints a picture of prosperity in these regions during this time. By documenting the physical remains of this moment in world history, researchers can better measure the volume, scale, and intensity of exchange.

Unfortunately, the inherent nature of available artifacts from the early historic period makes sources of information inevitably limited. Within the diverse body of historical sources relating to Indian Ocean trade during the early centuries C.E., most take the form

[91] Priestman 2013, 1.
[92] Wink 2002, 25-64.
[93] Hodges 1989, 42; Nixon 2009, 218; Priestman 2013, 1.
[94] Beaujard 2005, 412.2222

of literary texts.[95] Transaction records, stock lists, commercial charters, and other legal documents are largely lacking. This is where artifacts become an important source of direct evidence for exchange.

Environments free from extensive disturbance, and with a high mean temperature and exceptionally low humidity, create the best preservation for organic materials.[96] Perishable products that were common trade commodities, such as textiles, spices, and other foodstuffs, are extremely unlikely to survive a terrestrial environment, let alone a maritime one (unless buried in sediment soon after their arrival on the seabed). Even more durable materials such as metal and glass, are not immune to the damaging effects of time, and are found in varying degrees of preservation.

Ceramics possess a range of characteristics that give them unique archaeological significance: they have a short use-life, they are rarely recycled, and the durability of ceramic sherds means they consistently appear within the archaeological record.[97] Ceramic vessels were used almost universally across different communities, and were frequently supplied via routine processes of exchange, whether local or long-distance.[98] Even seemingly mundane and primarily utilitarian products, such as cooking pots, were moved over considerable distances at various geographic scales.[99]

[95] Crone 1980, 11.
[96] Wilkinson 2003, 41.
[97] Orton, Tyers, and Vince, 1993, 32.
[98] Priestman 2013, 11.
[99] Williamson 1987, 14.

Ceramic artifacts from marine sites are uncovered in varying states of preservation. High-fired porcelains and stonewares might be in excellent condition, but covered in marine concretion, while low-fired ceramics and those with poorly-formed glazes may be cracked and partially dissolved.[100] The most common form of deterioration is breakage, occurring when the ship was wrecked or from repeated water and sediment movement on site.[101]

Based on recent archaeological fieldwork and studies in Sri Lanka and South India, Egyptians, Greeks and Romans appear to have followed trade networks that already existed before the early centuries of the Common Era.[102] Sri Lanka seems to have been trading with western countries using Indian merchantmen as intermediaries before the Common Era and during the first three centuries C.E.[103] Trade between South India and Sri Lanka linked inner political centers to harbors on the coast.[104] The site of Mantai, on the Palk Strait, was related to the capital city of Anuradhapura through the Aruvi Ari River, and Ridiyagama was connected to Godavaya by means of the Walawe Ganga.[105] Mantai, Anuradhapura, and Ridiyagama have been excavated, and lapis lazuli has been uncovered in both raw and finished form (beads).[106] The earliest literary attested source of lapis lazuli is Badakhshan in the north-east of Afghanistan, but it could have also possibly traveled from Baluchistan.[107] In Anuradhapura, five beads were uncovered, ranging in date from 360 B.C.E. to 600 C.E.[108]

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[100] Pearson 1987, 100.
[101] infa 100.
[102] Saxcé 2017, 53.
[103] infra 53.
[104] infra 53.
[105] infra 53, 54.
[106] Carswell 1991, 200; Bopearachchi 2002, 107.
[107] Von Rosen 1988, 11; Coningham et al., 2006, 377.
[108] Saxcé 2017, 56.

The compositional analyses of glass beads in Sri Lanka and South India has received more attention in recent years. In Tamil Nadu and Sri Lanka mineral lime soda glass (m-Na-Al) comprises 41 and 43 percent of the glass bead samples respectively.[109] This glass was probably produced in South India, at sites like Appur or Manikollai, since no production site has yet been discovered in Sri Lanka.[110] However, that is not to say that early historic Sri Lanka imported all of its glass. Mixed soda-potash glass was produced on the west coast of Sri Lanka, and the site of Giribawa contains furnaces, as well as finished beads corresponding to widely distributed orange annular beads and red-disk shaped beads found only in South India and Sri Lanka.[111] So Sri Lanka probably had trade routes between its east and west coasts. Mineral soda calcareous glass with alumina (m-Na-Ca) has been discovered in Kelaniya (8 percent of glass artifacts) and in the southern sites of Tissamaharama (26 percent) and Ridiyagama (19 percent).[112] This m-Na-Ca glass is often associated with cobalt blue beads of Southeast Asian origin.[113]

The Godavaya ship was wrecked close to the harbour of Godavaya. This harbour has evidence of early trade, through a Prakrit-Brāhmī inscription located in the Buddhist monastery (*vihara*) a top of the rock dominating the sea.[114] This inscription, from the second century C.E., indicates that the king allowed the *vihara* to collect taxes or fees assessed on maritime trade goods arriving in both the port and the marketplace.[115] The monastery would have been clearly visible from sea, and so in addition to this grant

[109] Gratuze and Guillaume 2012, 140; Lankton 2013.
[110] Saxcé 2017, 61.
[111] Gratuze and Guillaume 2012, 140; Saxcé 2017, 61.
[112] Saxcé 2017, 61.
[113] infra pp. 61.
[114] Paranavitana 1970, 101.
[115] Falk 2001, 327-30, 329; Saxcé 2017, 62.

permission, the monastery may have been involved directly in trade and sailing activities.[116]

THE GODAVAYA SHIPWRECK / DISCOVERY AND EXCAVATION

In December 2003, fishermen B.G. Preminda and R.P. Sunil, while diving for conchs and lobsters off the southern coast of Sri Lanka, discovered the rim of a ceramic vessel.[117] A week later, they returned to the same location and spotted a small, bench-shaped stone object incised with a fish icon.[118] In 2008, a surface excavation by the Department of Archaeology and the Maritime Archeological Unit (MAU) of the Central Cultural Fund, with the assistance of the Sri Lankan Navy, uncovered the remains of an ancient sunken cargo.[119]

The Godavaya ship was wrecked 5 km from the Walawe Ganga estuary, and sank in the first or second centuries C.E.[120] It was excavated by an MAU team from December 2012 to January 2013, over a period of six weeks, as well as during April and May of 2014.[121] The Godavaya shipwreck site lies at a depth of between 31 and 33m.[122] The underwater topography consists of a reef, about 0.5 to 2m in height, surrounded by a sandy seabed, with a big patch of sand in the middle of the reef.[123] In 2010, four or five large ceramic vessels were located on the seabed, as well as a dozen plates and hundreds of sherds of

[116] Saxcé 2017, 62.
[117] Lawler 2014b, 1441.
[118] infra 1441.
[119] Bopearachchi and Perera 2012, 1.
[120] infra 3.
[121] infra 6; Carlson and Trethewey 2013, 9.
[122] Muthucumarana et al 2014, 45.
[123] infra 46.

various sizes.[124] Distinguishable artifacts included small carinated cooking vessels, plates and large globular storage jars, with six ceramic fragments being identified as BRW (Black-Red Ware), which was widely distributed in southern India and Sri Lanka.[125] The artifacts, which appear to have become a massive concretion, cover an area 44 x 22 m, suggesting that the assemblage at the Godavaya site could represent the remains of a shipwreck.[126] This hypothesis is further supported by the overlapping chronologies of artifacts, as well as the presence of two conjoined timbers, which suggests that there may be hull parts present at the site.[127] However, unfortunately the precise dimensions of the ship and the origin of the vessel are both unknown, although the cultural assemblage points to the Indian subcontinent.[128] Similar shapes in BRW have been reported from excavations on the Indian peninsula in Uraiyur from second century B.C.E. contexts, and this pottery might have been used on board for storing grain and liquids such as water and oil.[129] Some of the recovered basalt bench-shaped stone objects (presumably querns) had symbols such as *Srivasta*, *Nandipad*, and a fish, which suggest Buddhist affiliation.[130] These might be linked to the Buddhist temple in Godavaya, which also contained parallels for the stone benches.[131]

During a field season from December 2012 to January 2013, a multinational team of archaeologists and students from the United States, France, Sri Lanka, and Turkey initiated

[124] infra 47.
[125] infra 47.
[126] infra 48.
[127] infra 48.
[128] infra 49.
[129] infra 52.
[130] infra 54.
[131] This possibility is explored further in Chapter 4.

excavation of the site.[132] Led by Osmund Bopearachchi, Deborah Carlson, and Sanjyot Mehendale, this project was made possible by the Institute of Nautical Archaeology at Texas A&M University and the National Endowment for the Humanities.[133] A second season in 2014 lasted almost four months, but was unfortunately curtailed due to poor weather and bureaucratic complications.[134] As a direct result of these two seasons of excavation, which were regrettably cut short prematurely, archaeologists have been able to date the shipwreck between the second century B.C.E. and the second century C.E., making it the oldest known shipwreck in the Indian Ocean.[135]

HISTORICAL CONTEXT OF THE GODAVAYA SHIPWRECK

Although the Godavaya shipwreck is presently the oldest shipwreck in the Indian Ocean, its importance lies in the questions that it both answers and raises in regards to how maritime trade operated between India and Sri Lanka, and by extension between South Asia and Rome. Owing to archaeological excavation and literary evidence, we know, for example, that Egypt was a conduit for trade between the Mediterranean and Indian Ocean for most of ancient history, with major routes from the Nile across the Eastern Desert of Egypt and the Red Sea ports established by the Ptolemies.[136] However, the conquest of Egypt by the Roman emperor Augustus in 30 B.C.E. gave rise to an unprecedented level of East-West trade that was both profitable and well-organized.[137] The month of July saw

[132] Carlson and Trethewey 2013, 10.
[133] infra 11.
[134] Lawler 2014a, 44.
[135] Carlson and Trethewey 2013, 10.
[136] Cobb 2015, 185.
[137] Bopearachchi and Perera 2012, 3.

Roman ships travel from Egypt to the Gulf of Aden, and from the Gulf of Aden to the western Indian ports of Barygaza and Muziris.[138]

GODAVAYA TERRESTRIAL SITE

Godavaya is a port that lies on Sri Lanka's southern shore. Ancient seafarers avoided the waters on the northern coast of Sri Lanka due to the dangerous shallows there, so strategic points to the south experienced continuous traffic as ships moved between the eastern and western halves of the Indian Ocean.[139] In modern times, Godavaya is primarily a fishing hamlet, situated halfway between the coastal towns of Hambantota and Ambalantota.[140] The coast around the village consists of a series of wide bays adjacent to well-defined headlands, and the beaches are broad with steep gradients and plentiful dunes.[141] However, in the past, Godavaya was a seaport known for its advantageous location at the estuary of the Walawe Ganga.[142] The Walawe Ganga was listed by Palladius Rutilius Taurus Aemilianus, an ancient Roman author from the late fourth or early fifth century C.E., as being one of five easily navigable rivers in Sri Lanka.[143]

A Mesolithic (10,000 B.C.E.-8,000 B.C.E.) site is situated on the eastern bank of the Walawe Ganga, and the projecting boulders here might have served as shelter.[144] Godavaya's participation in the maritime silk route, starting from at least the

[138] infra 3-4.
[139] Lawler 2014b, 1441.
[140] Roth 1998, 4.
[141] Muthucumarana et al 2014, 42; Swan 1983, 134.
[142] Bopearachchi 2004, 61.
[143] Bopearachchi and Perera 2012, 3.
[144] Muthucumarana et al 2014, 44.

second century C.E, is better documented in the archaeological record.[145] In terms of physical remains, the ancient settlement of Godavaya, can be separated into three distinct units: a monastic complex, a huge residential area, and the sea port; these are the result of excavations carried out by archaeologists from the German Archaeological Institute between 1994 and 1997.[146] The Godavaya temple, which is part of the monastic complex, is situated close to a high point overlooking the sea.[147] The remains consist of a quadrangular-shaped house, and, according to pottery finds, date between the first and third centuries C.E.[148] One of the most diagnostic artifacts is a Brahmi inscription that lies within the Godavaya temple, dating to the second century C.E.[149] The inscription reads, "Siddham Bodapavata patanahi Su(ka) su(ri)yil Raja Gamani Abaya viharata dini," which translates as "Success! King Gamani Abaya granted the customs duties of the port of Godapavata to the vihara (temple)!"[150] According to epigraphical and contextual evidence the inscription can be connected to King Gajabahu I (113/14-135/46 C.E.).[151] The ancient site of Godavaya is presumably that of 'Godapavata-patanaha' in Brahmi inscriptions and 'Gotapabbata' in the Mahāvamsa (a historical chronicle of Sri Lanka from the fifth century C.E.), where Gajabahu's father-in-law, Mahalaka Naga, is credited with building the Gotapabatta temple.[152]

[145] Roth 1998, 4.
[146] Muthucumarana et al 2014, 43; Roth 1998, 12.
[147] Lawler 2014b, 1441.
[148] Roth 1998, 12.
[149] Muthucumarana et al 2014, 43.
[150] infra 43-4.
[151] Paranavitana 1983, 101.
[152] Roth 1998, 6.

The physical remains of a sea port were found by German archaeologists in the late 1990s near the local village. Four stone pillars, each averaging 3.30 m in height, are dated paleographically between the first century B.C.E. and the sixth century C.E.[153] Further evidence for the identification of Godavaya as an ancient harbor is given by a coin hoard excavated 1 km north of the Beragama temple in southern Sri Lanka.[154] It consists of thousands of Roman and Indo-Roman coins, dating to the second half of the fourth century and the first half of the fifth century C.E.[155] This hoard has not yet been published, but it is stored partly in the offices of the Department of Archaeology of Sri Lanka and partly in private possession in Colombo.[156] The combined evidence of the inscription and the coins may suggest that residents or officials of the temple collected custom duties during the early centuries C.E.

Further upstream of the Walawe Ganga, in hilly areas, archaeologists have uncovered ancient mines and facilities for iron and steel production dating to the centuries before and after the start of the Common Era.[157] In addition, from 1994 to 1996 archaeological excavations were carried out at Ridiyagama, about 12 km from the river mouth.[158] The Department of Archaeology and the French Archaeological Mission in Sri Lanka's joint exploration uncovered six strata, subdivided into 45 different contexts determined by significant features that marked distinct phases of occupation.[159] The ancient settlements were distinguished by pottery fragments. The fourth layer, in particular, was characterized

[153] Roth et al 2001, 324.
[154] Roth 1998, 12.
[155] infra 6.
[156] infra 6.
[157] Lawler 2014a, 44-5; Juleff 1996, 60.
[158] Bopearachchi and Perera 2012, 3.
[159] Infra 3.

by a significant shift in human activities, represented by mica, burnt charcoal, early Black-Red Ware (BRW), terracotta objects, and beads made of various materials.[160] These archaeological sites are still under excavation, but they appear to paint a picture of societal growth and innovation in this region during the first three centuries C.E.

[160] infra 6.

CHAPTER III

CATALOG OF SELECT ARTIFACTS FROM THE GODAVAYA SHIPWRECK

The focus of this thesis is not the conservation of the artifact assemblage. However, the importance of conservation for any archaeological material from a marine context must be discussed. Examining objects, analyzing their history, and preserving them for future generations is integral to the field of archaeology. It is the responsibility of excavators to see that material recovered is properly conserved, which is both a time-consuming and expensive process.[161] Without artifact preservation, data will be lost not only to current archaeologists, but also future researchers who may wish to reexamine the material.[162]

This catalog consists of drawings, photographs, measurements, and descriptions, all of which were completed on site between 2012 and 2014. Unfortunately, due to the COVID-19 pandemic, I was unable to observe and study the artifacts myself, as originally planned, and cannot provide my own photo-documentation or commentary through the benefit of in-depth examination.

The format for the following catalog is adapted from the Athenian Agora catalogs published by the American School of Classical Studies at Athens. All measurements are in cm.

[161] Hamilton 1999, 4.
[162] infra 4.

ANALYZING THE GODAVAYA CERAMICS

Most of the potsherds found on the Godavaya shipwreck site have been identified as Red Ware (RW) and Black-Red Ware (BRW). RW is a type of unglazed earthenware, common amongst many different ancient societies, while BRW is unique to South Asia and has been made since the 13th century B.C.E..[163] Many shipwrecks will have remnants of the cooking ware used by its crew, but the high density of potsherds at this site indicate that the Godavaya vessel possibly carried ceramics as cargo.[164]

During the 2014 season, rims, bodies, and bases of vessels of various sizes were recovered from the Godavaya shipwreck. The ceramic fragments from the Godavaya shipwreck include 17 pieces of RW and four pieces of BRW found. The sherds of RW vary in size and wholeness, and none of them possess visible stamps, graffiti, or tool marks (Figs 4, 7, 13, 14, 18). Small carinated cooking vessels, plates, bowls, and storage jars can be distinguished (Figs 2, 3, 5, 10, 12). The rims vary between featureless straight side to thickened out-turned, but are mostly curved and well-defined (Figs 6, 8, 9, 11, 15, 16, 18, 19, 20). The pieces of BRW are similarly varied, from rounded bowls to indistinguishable sherds (Figs 21, 22, 23, 26). The majority of the ceramic fragments are covered with a thick layer of marine encrustation. Some, such as **RW 6** and **RW 18**, have a curved bottom, potentially to use as storage (Figs 7, 19). Larger-sized jars have been used for maritime cargo transportation from the Bronze Age to the late medieval period, but the appearance of carinated dishes such as **RW 7** place the Godavaya shipwreck around the

[163] Muthucamarana 2013, 6.
[164] infra 6.

second century B.C.E. to second century C.E (Fig. 10).[165] One object, **RW 16**, is an almost complete ceramic vessel, with a domed body and wide, flat, cylindrical rim (Fig. 17).

The sherds of BRW similarly feature wide diameters and rounded rims. These artifacts were previously compared to artifacts found in Tissamaharama, Sri Lanka, dating 400-200 B.C.E.[166] **BRW 23**, a ceramic rounded rim shard with a small portion of the original neck maintained, may have incised lines on the interior of the rim, possibly as a form of decoration (Fig 24). **BRW 24**, a sherd with a thin, rounded rim, and part of the wide base preserved, has three scalloped or sculpted lines about 0.5 cm below the rim (Fig 25). This may also be a form of decoration, however, it is difficult to tell just from the few photos originally provided. These are the only markings that have so far been documented in this artifact assemblage, and further study is necessary.

RW 16 is a strange ceramic bowl from the Godavaya shipwreck (Fig 17). It has a round bottom and wide, flat rim. Partially broken and obscured by marine encrustations, it is difficult to discern what its original purpose was. Given its singular nature, this artifact may have belonged to a crew member, as opposed to being an item for trade. It is a size that rests comfortably in an adult's hand, and the original cataloguer, Laura White, hypothesized it might be an incense burner. Incense has been used around the Indian Ocean since early centuries B.C.E., and the use of incense in India is recorded in the Vedas, a large body of religious texts, to create pleasing aromas and as a medicinal tool.[167]

[165] Bass 1973, 29-38.
[166] Muthucumarana 2014, 47.
[167] Heesterman 1993, 59.

However, this was in the form of incense sticks (*agarbathi*).[168] The shape of **RW 16** is similar to *appam*, which is a type of bowl-shaped thin pancake made from a fermented batter of rice flour and coconut milk that is popular in Sri Lanka and India to this day. The word *appam* comes from the Sanskrit word *apupa* for 'rice cake', and *appam* is mentioned in the Tamil *Perumpanuru*, a poetic work in the *Pathinenkilkanakku* anthology of Tamil literature (c. 100 B.C.E. to 100 C.E.).[169] *Appam* get their bowl shape from the small wok (*appachatti*) in which they are cooked, so perhaps RW was used for food preparation, although no verified *appachatti* have yet been found in the archaeological record from this time period. Given the proximity of the ship to Godavaya's Buddhist monastery, as well as its visual similarity to Tibetan meditation bells, a religious purpose would not be unlikely for **RW 16**. This object might perhaps be an offering bowl (Roman *patera*), but an early historic artifact with similar features has not, to my knowledge, been uncovered in South Asia.

[168] infra 59.
[169] Achaya 1994, 80.

CATALOG OF RED WARE

RW 1 Vessel

Figure 2. RW 1 / Lot 0012

Courtesy of Institute of Nautical Archaeology.

Lot 0012	Fig 2.0	Catalogued 4 JAN 2013

Round bellied ceramic. There are no visible markings, stamps, graffiti, or tool marks. Measurements unknown. Date: second century B.C.E. - first century C.E. Similar to **RW 4**, **RW 11**.

Fabric: Redware. Lightly covered in marine encrustation.

RW 2 Oil Lamp

Figure 3. RW 2 / Lot 0023

Courtesy of Institute of Nautical Archaeology.

Lot 0023	Fig 3.0	Map M11	Catalogued by A.W./ 7 JAN 2013

Presumed oil lamp. There are no visible markings, stamps, graffiti, or tool marks. Unfortunately, catalogue sheets have been lost and measurements are unknown. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Lightly covered in marine encrustation.

RW 3 Sherds

Figure 4. RW 3 / Lot 0024

Courtesy of Institute of Nautical Archaeology.

Lot 0024	Fig 4.0	Map R9	Catalogued by K.T.T./ 7 JAN 2013

Fifteen ceramic pieces. There are no visible markings, stamps, graffiti, or tool marks. Measurements unknown. Date: second century B.C.E. - first century C.E. Similar to **RW 6**, **RW 12**.

Fabric: Redware. Heavily covered in marine encrustation.

RW 4 Vessel

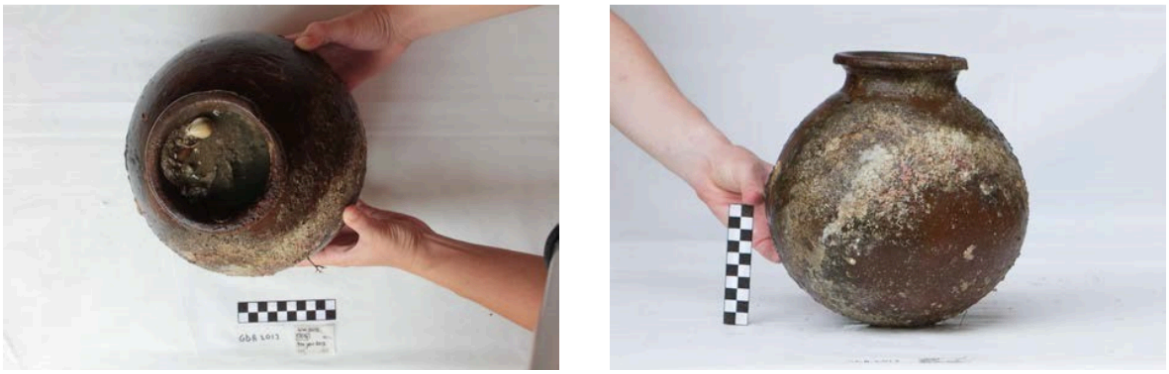

Figure 5. RW 4 / Lot 0031

Courtesy of Institute of Nautical Archaeology.

Lot 0031	Fig 5.0	Map M11	Catalogued by A.W./ 7 JAN 2013

One whole pot. There are no visible markings, stamps, graffiti, or tool marks. Measurements unknown. Date: second century B.C.E. - first century C.E. Similar to **RW 1**, **RW 11**.

Fabric: Redware. Lightly covered in marine encrustation.

RW 5 Sherd

Figure 6. RW 5 / Lot 0034.01

Courtesy of Institute of Nautical Archaeology

Lot 0034.01	Fig. 6.0	Lm: 8.9	Wm: 4.8	W of raised edge: 1.65-1.9
T: 0.6	H of raised edge: 0.2	Map M12 UL 1	Catalogued by A.D.. / 20 APR 2014	

Ceramic sherd, possibly the bottom of a base with a raised, rounded edge. Sherd is small (Lm: 8.9 cm), with an odd curvature to it. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Lightly covered in marine encrustation.

RW 6 Sherds

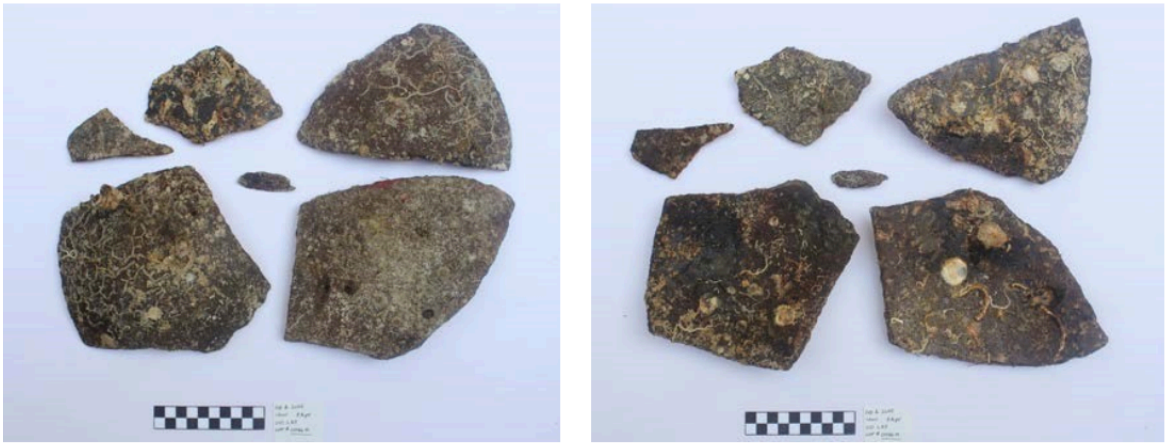

Figure 7. RW 6 / Lot 0044.01

Courtesy of Institute of Nautical Archaeology

Lot 0044	Fig. 7.0	Lm: 13.3	Wm: 8.8
RH: 3.8	T: 0.4-0.7	Map L10 LR3	Catalogued by L.W. / 18 APR 2014

Six ceramic base sherds, all roughly triangular with a curved bottom and a soft transition between side and bottom. Shaved corner may be the result of deterioration or may be part of the original design. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 3**, **RW 12**.

Fabric: Redware. Covered in white marine encrustation.

RW 7 Rim

Figure 8. RW 7 / Lot 0051.01

Courtesy of Institute of Nautical Archaeology

Lot 0051.01	Fig. 8.0	Lm: 10	RT: 1.7	Hm: 4.3
H of neck: 1	Body: 0.4	Map N11 LL3	Catalogued by A.D. / 8 MAY 2014	

Ceramic partial rim. Rounded rim is well defined and the artifact shows a short neck. Very little of the body has been preserved. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 10**.

Fabric: Redware. Lightly covered in marine encrustation.

RW 8 Pot Sherd with Rim

Figure 9 RW 8 / Lot 0051.02

Courtesy of Institute of Nautical Archaeology

Lot 0051.02	Fig. 9.0	L: 15.6	
H: 5.5	R: 1.8	Map N11 LL3	Catalogued by W.K.S. / 18 APR 2014

Ceramic pot sherd with curved rim. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Covered in marine encrustation and staining.

RW 9 Bowl

Figure 10. RW 9 / Lot 0051.03

Courtesy of Institute of Nautical Archaeology

Lot 0051.03	Fig. 10.0	L: 12	
H: 2.5	T: 0.7	Map N11 LL3	Catalogued byW.K.S. / 14 APR 2014

Ceramic, slightly curved sherd. Estimated 20% of plate or bowl. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Lightly covered in marine encrustation and black staining.

RW 10 Rim Sherd

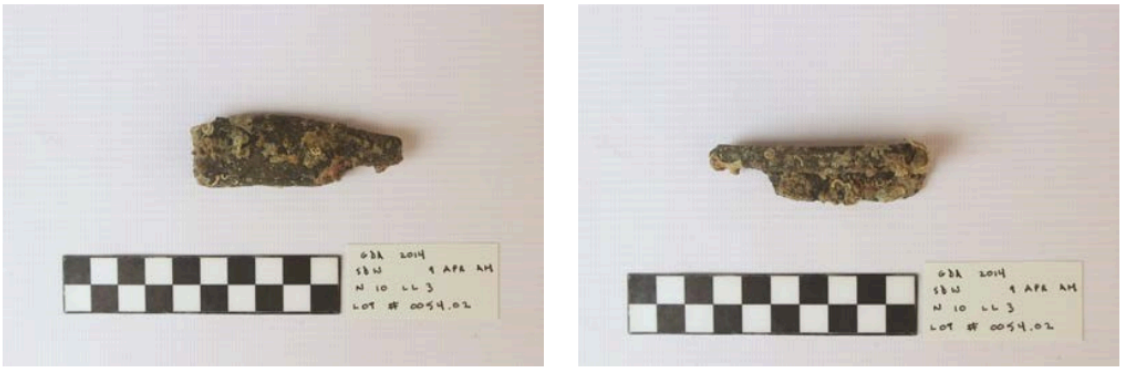

Figure 11. RW 10 / Lot 0054.02

Courtesy of Institute of Nautical Archaeology

Lot 0054.02	Fig. 11.0	L: 7.4	H: 2.5	T of neck: 0.6
RT: 2.2	RH: 0.8	Map N10 LL3	Catalogued by S.W. / 18 APR 2014	

Ceramic, rounded rim sherd. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 7**.

Fabric: Redware with a brown-greenish tint. Heavily covered in marine encrustation.

RW 11 Ceramic Fragment

Figure 12. RW 11 / Lot 0059.

Courtesy of Institute of Nautical Archaeology

Lot 0059	Fig. 12.0	L: 24	H: 7.9	D: 11	Circumference of Neck: 4.7
BT: 0.6-0.7	RT: 2.0	RH: 2.6	Map L14	Catalogued by S.W. / 22 APR 2014	

Ceramic, rounded whole rim fragment with cylindrical neck and a portion of the body intact. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 1**, **RW 4**.

Fabric: Redware. Heavily covered in marine encrustation.

RW 12 Rim Sherd

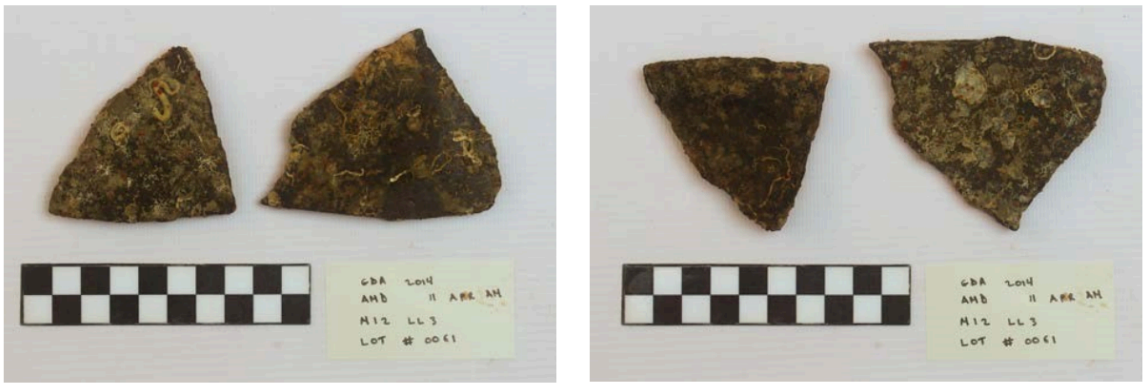

Figure 13. RW 12 / Lot 0061.01.

Courtesy of Institute of Nautical Archaeology

Lot 0061.01	Fig. 13.0	L: 4.8	
W: 0.9-1.5	T: 1.0	Map M12 LL3	Catalogued by A.D./ 6 MAY 2014

Two ceramic sherds, one with a partial rounded rim. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 3**, **RW 6**.

Fabric: Redware. Heavily covered in marine encrustation.

RW 13 Rim Sherd

Figure 14. RW 13 / Lot 0061.03.

Courtesy of Institute of Nautical Archaeology.

Lot 0061.02	Fig. 14.0	L: 4.7	
Wm: 1.1	T: 0.6	Map M12 LL3	Catalogued by A.D. / 6 MAY 2014

Ceramic rim sherd. There are no visible markings, stamps, graffiti, or tool marks.

Date: second century B.C.E. - first century C.E.

Fabric: Redware. Heavily covered in marine encrustation.

RW 14 Rim Sherd

Figure 15. RW 14 / Lot 0071

Courtesy of Institute of Nautical Archaeology

Lot 0071	Fig. 15.0	L: 14.4	H: 13.8	W: 17.4	D: 4.9
RH: 3	RW: 2.1-3	BT: 0.8	Map L15	Catalogued by A.D. / 6 MAY 2014	

Large ceramic rounded rim sherd with part of the body preserved. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 15**.

Fabric: Redware. Heavily covered in marine encrustation and staining.

RW 15 Rim Sherd

Figure 16. RW 15 / Lot 0072.

Courtesy of Institute of Nautical Archaeology.

Lot 0072	Fig. 16.0	H: 2.6	H: 4.5-7.1	RD: 44
RW: 4.7	RH: 3.3	Map L16	Catalogued by A.M. / 6 MAY 2014	

Ceramic rounded rim sherd with part of the vessel's neck preserved. There appears to be an indentation separating the rim from the remaining neck but it is difficult with the coral encrustation to be sure. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 14**.

Fabric: Redware. Heavily covered in marine encrustation and staining.

RW 16 Ceramic Object

Figure 17. RW 16 / Lot 0074.

Courtesy of Institute of Nautical Archaeology.

Lot 0074	Fig. 17.0	L: 12.9	H: 5.5	L of Bottom: 9.4
RT: 0.9	RW: 2.2	Map L10	Catalogued by L.W. / 29 APR 2014	

About 90% complete. Domed body and wide, flat, cylindrical rim. Potentially an incense burner, bowl, lid, etc. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Heavily covered in marine encrustation.

RW 17 Fragment

Figure 18. RW 17 / Lot 0075.

Courtesy of Institute of Nautical Archaeology.

Lot 0075	Fig. 18.0	L: 20.0	
H: 12.0	&: 0.4	Map L13	Catalogued by L.W. / 29 APR 2014

Partial body or base of a ceramic vessel. Substantially thicker side than bottom. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Lightly covered in marine encrustation.

RW 18 Rim Sherd

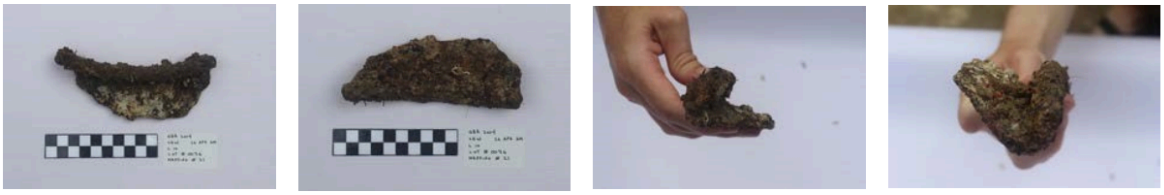

Figure 19. RW 18 / Lot 0076.

Courtesy of Institute of Nautical Archaeology.

Lot 0076	Fig. 19.0	L: 13.7	
H: 2.8-4.3	T: 0.8	Map L21	Catalogued by L.W. / 29 APR 2014

Partial ceramic rounded rim. Very defined lip. Body is not preserved, but there is a wide-angle curve. Potentially a fairly large pot. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 19**.

Fabric: Redware. Lightly covered in marine encrustation.

RW 19 Rim Sherd

Figure 20. RW 19 / Lot 0078.

Courtesy of Institute of Nautical Archaeology.

Lot 0078	Fig. 20.0	L: 8.2	
H: 5.0	RT: 0.5-1.2	Map L2	Catalogued by L.W. / 29 APR 2014

Partial ceramic rounded rim, which doubles back on itself aggressively. Obvious vertical neck which flares out. Body is not preserved. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **RW 18**.

Fabric: Redware. Lightly covered in marine encrustation.

BRW 20 Bowl

Figure 21. BRW 20 / Lot 0027.01

Courtesy of Institute of Nautical Archaeology.

Lot 0027.01	Fig 21.0	Map L11	Catalogued by S.K./ 7 JAN 2013

Round piece of BRW. There are no visible markings, stamps, graffiti, or tool marks. Unfortunately, catalogue sheets have been lost and measurements are unknown. Date: second century B.C.E. - first century C.E.

Fabric: Redware. Lightly covered in marine encrustation.

BRW 21 Sherd

Figure 22. BRW 21 / Lot 0050.

Courtesy of Institute of Nautical Archaeology.

Lot 0050	Fig. 22.0	L: 10.5	
T: 0.5-0.8	H: 8.1	Map P10 LR 4	Catalogued by P.W. / 18 APR 2014

Ceramic basal sherd with the appearance of a wide diameter. Substantially thicker side than bottom. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Black-Red Ware. Heavily covered in marine encrustation.

BRW 22 Bowl Base

Figure 23. BRW 22 / Lot 0052.01.

Courtesy of Institute of Nautical Archaeology.

Lot 0052.01	Fig. 23.0	L: 13.0	H: 2.5
T: 0.5	W: 6	Map P10 LR 4	Catalogued by P.W. / 18 APR 2014

Ceramic basal sherd with the appearance of a wide diameter. Outside base corner has a small chip. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Black-Red Ware. Heavily covered in marine encrustation.

BRW 23 Rim Sherd

Figure 24. BRW 23 / Lot 0054.01.

Courtesy of Institute of Nautical Archaeology.

Lot 0054.01	Fig. 24.0	L: 9.6	H: 3.3	T of neck: 1.5
RT: 2.3	RH: 1.8	Map N10 LL3	Catalogued by S.W. / 18 APR 2014	

Rounded rim sherd with a small portion of the neck of the vessel. There may be incised lines on the interior of the rim. There are no visible stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Black-Red Ware. Lightly covered in marine encrustation.

BRW 24 Bowl Sherd

Figure 25. BRW 24 / Lot 0055.

Courtesy of Institute of Nautical Archaeology.

Lot 0055	Fig. 25.0	L: 21.4	H: 10.8	RL: 12.4
RH: 1.1	RT: 2.7	Map L17	Catalogued by S.W. / 18 APR 2014	

Thin, rounded rim and part of the wide, flared base are preserved; appears to be a bowl similar to a shallow cooking pot. There are three scalloped or sculpted lines about 5mm below the rim. There are no visible stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Black-Red Ware. Heavily covered in marine encrustation.

ANALYZING GLASS FROM THE GODAVAYA WRECK

Glass was first invented in the Middle East around 2500 B.C.E., but Indians probably learned the technique of bead manufacture independently around 1200 B.C.E.[170] More than 200 ancient Indian sites have yielded evidence of glass, with about 150 reported to have glass beads and 36 that are claimed to be manufacturing sites.[171] The earliest evidence of glass beads in India is from Bhagwanpura c. 1400-1000 B.C.E., and the port of Mantai in Sri Lanka exported glass beads for regional trade during the first century C.E., but glass ingots are not often found in South Asia, especially ones as old as those in the cargo of the Godavaya shipwreck.[172]

The chemical composition of the Godavaya glass hints at a trade link with South India. Semi-circular glass ingots were discovered on the surface of the marine site and two samples have been analyzed at the Physical Research Laboratory in Ahmedabad, India.[173] They consist of mineral soda glass with high alumina (m-Na-Al) and share many chemical features with the glasses found on the Tamil coast, including manufacturing sites like Appur or Manikollai.[174] The trace elements do not match exactly any particular site, and do not seem to come from the Giribawa site in Sri Lanka, where furnaces of mixed alkali glass were found.[175] The glass ingots found on the Godavaya shipwreck have a very high percentage of vanadium, a type of metal that has no exact equivalent on any Indian or

[170] Kanungo 2004, 123.
[171] infra 123.
[172] Kanungo 2004, 124; J. Carswell et al., 2013, 350.
[173] James Lankton and Bernard Gratuze, in Bopearachchi et al., 2013, 1.
[174] Saxcé 2017, 63.
[175] infra 63.

Sri Lankan sites currently excavated.[176] About a dozen glass ingots were observed on the seabed during earlier investigation of the shipwreck, but only two were subjected to chemical analysis. These high vanadium concentrations have been characteristic of glass found in southern India at Tamil coastal sites such as Arikamedu, although there they do not have the same very high V/Fe2O3 ratios as the Godavaya glass ingots.[177] **G 24**'s dark blue hue can be compared to the true blue (C1B015) glass beads found in the 9th century C.E. site in Chaul, India, which has 121% of vanadium (ppm), although they are not the same.[178] On the other hand, glass from contemporaneous Sri Lankan sites, such as Giribawa, have much lower V/Fe2O3 ratios and lower quantities of vanadium in general, making Sri Lanka an unlikely origin.[179] The closest archaeological site with similar glass could be Alagankulam, a village in India, which is the closest port to Sri Lanka.[180] A dark blue standard pressed hexagonal biconical glass bead was found at Alagankulam dating from the early centuries C.E.[181] These types of beads were made by winding glass on a mandrel and have been found in Karur, south India, as well as Mantai, Sri Lanka.[182] Currently-unexplored sites such as Manikollai and Appur in south India could also reveal more information about the source of the Godavaya glass.[183] Chemical analysis also dates the ingots to the second or first century B.C.E.[184] Recovery of the glass ingots from the Godavaya shipwreck suggests that glass was a popular, or at least desirable, wholesale trade item/ raw material in South Asia during this period.

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[176] infra 63-64.
[177] Bopearachchi 2014, 180.
[178] Dussubieux et al. 2008, 806.
[179] infra 123.
[180] Saxcé 2017, 63.
[181] Francis 2002, 138.
[182] infra 138.
[183] Bopearachchi 2014, 180.
[184] Saxcé 2017, 62.

This catalogue consists of a single glass object, which is blue and disk-shaped, weighing c. 2-3 kg and with a diameter of c. 20 cm.[185] Researchers used energy-dispersive X-ray spectroscopy (SEM-EDS) to analyze these samples. Clear specimens (size 0.2-0.4 cm) of these artifacts were placed on a carbon conductive tape stuck on a nylon stub, then mounted on a separate stub so that the analyzed surface faced upwards.[186] The specimens were then sputter coated with a 20-nanometer thick gold coating and analyzed by SEM (model JSM 5600) with an EDS attachment (model JOEL 5800 LV).[187] Using this method, researchers discovered that these glass specimens consisted of 62.67% silica oxide, with a narrow value of 60.61% minimum and 64.17% maximum.[188]

G 26 is a glass object with a cylindrical, flat top and bottom, a pinched, short body, and a small hole running through its middle (Fig 27). Glass beads are first mentioned in early Sanskrit and Buddhist literature, from the *Yajurveda* (c. 1200 B.C.E.) which mentions female ornaments that were strung with gold thread, to the *Satapatha Brahmana* (c. 1000 B.C.E.), which mentions decorating horses with glass beads.[189] In spite of numerous references to glass objects and beads both in literary and archaeological records, there is sparse information regarding the people, techniques, tools, and furnaces involved in production.[190] A few excavation reports of Indian sites hint that beads were produced by

[185] infra 47.
[186] Muthucumarana 2013, 7.
[187] infra 7.
[188] Muthucamarana 2014, 47.
[189] Kanungo 2004, 126.
[190] infra 127.

winding on a wire.[191] Therefore, the hole in the middle of **G 26** might be from its manufacturing techniques.

G 26's shape parallels Buddhist ear reels. Ear studs have been used for adornment in South Asia since the early centuries B.C.E., and have a variety of shapes, including flattened disk-shaped.[192] In Indian literature these disk-shaped ear studs are referred to by the Sanskrit term *tatankacakra*, and have been ascribed to the Kayatha Period V, dating between 200 B.C.E. to 500 C.E.[193] Both men and women wore them for apotropaic, medical, or aesthetic reasons, with the cordon of the ear lobe fitting into the groove on the barrel of the ornament.[194] Large glass *tatkankacakras* were worn by nobility in India until the 11th century, and one glass ear plug measuring 5.2 cm in diameter and 1.9 cm in thickness was discovered in Arikamedu, dating to the 1st century C.E.[195] Another glass ear reel, 3.9 cm in diameter, was found in Taxila, dating between the sixth and fifth centuries B.C.E.[196] This artifact had a rosette on one side and was made from dark green glass, but was partially pulverized while being shipped to England for analysis.[197] Small ear reels, many made of blue glass, were found at Ter, otherwise known as the ancient site of Tagara mentioned in the Periplus and by Ptolemy.[198] These ear reels were found in an unstratified deposit dating to the Satavahana period (100 B.C.E.-200 C.E.), and one specimen of blue iridescent glass measuring 2.8 cm in diameter and 1.5 cm in thickness is reminiscent of **G**

[191] Deo 1974, 361; Dikshit 1952a, 98; 1952c, 53; Thapar et al. 1965, 110-111.
[192] Rispoli 2005, 246.
[193] Postel 1989, 11-19; Rispoli 2005, 248.
[194] Postel 1989, 5-6.
[195] infra 48.
[196] Marshall 1951, 102.
[197] infra 102, 690; Dikshit 1969, 4.
[198] Dikshit 1969, 42-44.

26.[199] One researcher made the distinction between poor objects of terracotta and objects for wealthier consumers, saying, "A single specimen of a glass disk with shell inlay speaks not only of expert workmanship but also of fanciful taste" and asserting the these ornamental items may have formed part of long-distance trading.[200] Specifically glass ear reels have been found at Taxila, Pakistan (500-200 B.C.E.), Ujjain, India (500-200 B.C.E.), Kaundinyapura, India (300 B.C.E.-250 C.E.), Atranjikhera, India (600-300 B.C.E.), Nasik, India (400 B.C.E.-50 C.E.), Maheshwar, India (400 B.C.E.-100 C.E.), Kayatha, India (600-200 C.E.), and Dharanikota, india (1-100 C.E.).[201] **G 26** may not be an ear ornament, given its atypical concave faces and the small central perforation. However, glass ear ornaments fit comfortably into the timeline for the Godavaya ship, and **G 26**'s discoid shape mirrors objects that were used for religious and ornamental purposes, perhaps tying the shipwreck to the monastery in Godavaya. In India, the *tatankacakra* is sometimes associated with mother goddesses, but imagery of the Buddha with stretched ear lobes began to appear around the first century C.E.[202]

Deterioration of Glass

The rate of deterioration of glass is affected by changes in pressure, temperature, and time of exposure.[203] The more stable the glass, the less likely it is to deteriorate. The pH of the surrounding environment also controls the rate of deterioration. When the object is buried under sediment or marine concretion, acidic, thick, hydrated silica layers "are formed

[199] Dikshit 1969, Fig 10.1 and Pl. 1E
[200] Banerjee 1986, 19-29.
[201] Dikshit 1969, 17.
[202] Postel 1989, 189.
[203] Pearson 1987, 101.

which lead to the typical iridescent films observed on the surface of deteriorated glass."[204] These layers are not so well formed on glass exposed to an alkaline environment like seawater. Physical damage similar to that of any other object can also occur underwater. Chemical deterioration can continue when glass artifacts are raised from the sea and, therefore, these objects must be properly conserved.[205]

GLASS ARTIFACTS

G 25 Glass Ingot

Figure 26. G 25 / Lot 0030.

Courtesy of Institute of Nautical Archaeology.

Lot 0030	Fig. 26.0	Map n/a	Catalogued by P.K./ 9 JAN 2013

Half of a glass ingot. There are no visible markings, stamps, graffiti, or tool marks. Unfortunately, catalogue sheets have been lost and measurements are unknown. Date: second century B.C.E. - first century C.E.

Fabric: Glass. Heavily covered in marine encrustation.

[204] infra 102.
[205] infra 102.

G 26 Glass Object

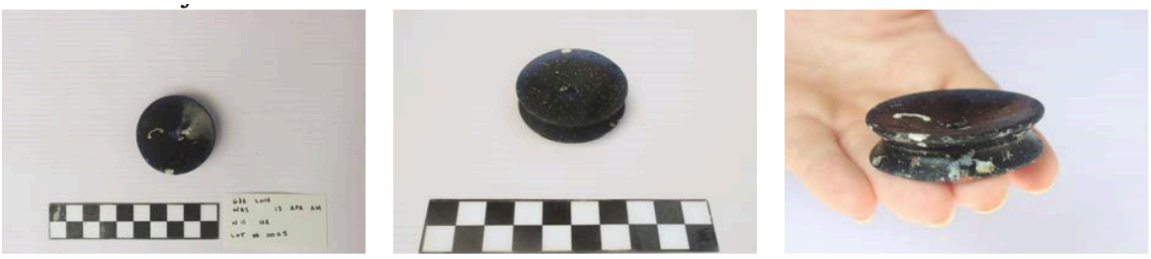

Figure 27. G 26 / Lot 0065.

Courtesy of Institute of Nautical Archaeology.

Lot 0065	Fig. 27.0	Depth of curve: 0.3	
D: 4.5	T: 1.2	Map N11 RU	Catalogued by W.K.S.. / 14 APR 2014

Glass object. Cylindrical, flat top and bottom, with a pinched, short body. Small hole in the middle. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Blue glass. Lightly scratched but otherwise not damaged.

METAL FROM THE GODAVAYA SITE

Metallurgy was clearly established in South Asia by the early centuries B.C.E., and even early Brahmi inscriptions (c. second century B.C.E. to the first century C.E.) refer to metal craftsmen.[206] Furnaces used for forging iron or cementation and wind-blown furnaces were uncovered at Ridiyagama and Samanalewewa, respectively, which support the theory that iron smelting technology existed in Sri Lanka and, specifically, the upper Walawe Ganga river valley, as early as the beginning of the Common Era. Archaeo-metallurgist Gillian Juleff, who authored the most comprehensive study of ancient iron production on Sri Lanka, proposes that the local community at Samanalawewa was harnessing monsoon winds to stroke furnaces as early as the fourth century B.C.E.[207] Ironsmiths were called *kabara*, and the Sri Lankan chronicle, the *Cūḷavaṃsa* (c. fourth century C.E. to 18th century C.E.), records implements such as bellows, blowpipes, anvils, hammers, sledge-hammers, etc., being used in the iron production process.[208] Interestingly, iron smelters, called *yamannu*, were different from ironsmiths, and occupied a low tier called *paduas* in Sri Lanka's *kshoodra wanse* caste system.[209] The aforementioned bellows-operated system was used in South Asia as early as the first century B.C.E.[210] An excavation at Tissamaharama, Sri Lanka, yielded a number of iron tools dating from 200 B.C.E. to the first century C.E.[211] Spearheads also were found, as well as two pieces of iron that the lead excavator, Henry Parker, suggested might be daggers.[212]

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[206] DiMucci 2015, 46.
[207] Carlson, Trethewey 2013, 9.
[208] DiMucci 2015, 47.
[209] Coomaraswamy 1961, 31; Davy 1821, 111-2.
[210] DiMucci 2015, 48.
[211] Parker 1884, 38.
[212] infra 38.

The Godavaya shipwreck gives clues to a close relation to South India and to navigation along the east coasts of India and Sri Lanka.[213] Metal samples taken from the site were positively identified as copper and iron by Marys Blet-Lemarquand by MEB-EDX, which is a chemical microanalysis technique used alongside scanning-electron microscopy.[214] The technique detects x-rays from the artifact via an electron beam. The biggest part of the Godavaya shipwreck's cargo visible on the surface consists of what appear to be iron strap ingots.[215] This iron cargo may be related to the iron industry in the city of Ridiyagama, which was connected to Godavaya through the Walawe Ganga.[216] This local exchange with India, evidenced by excavations at Ridiyagama and the Godavaya shipwreck, may have been the nucleus of a long distance trade with the Red Sea in later centuries.[217] EDS analysis of the iron artifacts indicates advanced metallurgical techniques, and communities during this time had the ability to produce durable and high quality iron.[218]

M 27 is a presumed spearhead was discovered among the Godavaya shipwreck's cargo (Fig 28). With an overall length of 36 cm, it has a raised ridge down the middle, lengthwise, on one side, and a hollow rounded end, for insertion of the wooden spear shaft. Its appearance is similar to spearheads discovered in Wari-Bateswar, Bangladesh, which also participated in macro-level Indian Ocean maritime trade during the early historic

[213] Saxcé 2017, 62.
[214] Bopearachchi and Perera 2012, 7.
[215] Trethewey 2012, 29.
[216] infra 29-30.
[217] Saxcé 2017, 62.
[218] Chandratne 2012, 485.

period.[219] A terrestrial site, Wari-Bateswar has a plethora of cultural remains, including a four-legged sandstone quern bearing three auspicious symbols (a *swastika* and two *nandipadas*) in relief, a ring stone, numerous potsherds of redware, glass beads, and iron spearheads.[220] These artifacts are all similar to those uncovered at the Godavaya shipwreck site. The east Indian site, Orissa, has a similarly rich trading heritage. A large number of BRW potteries, iron objects like axes and hooks, and punch-marked coins dating from the third century B.C.E. to the second century C.E. have been discovered at this site, pointing to a cultural development presumably resulting from maritime trading activity.[221] The discovery of a spearhead onboard the Godavaya shipwreck is not surprising. Given its singular presence, the weapon might have belonged to a crew member, and thus was not a trade item.

M 28 is a metal ring that is heavily encrusted with marine sediment, but has a clear ring shape, along with some sort of base (Fig 29). This artifact may have been a handle.[222] A jug from Akota, India, has a bronze handle and appears to be of Roman origin, but this is not ring-shaped.[223] **M 28** may be a part of the ship itself, but boat-building in South Asia during the early historic period consisted of wooden canoes and larger, double-ended sea-going vessels, neither of which are known to have used metal components at this time.[224]

[219] Jahan 2010, 135.
[220] infra 136.
[221] Patra and Patra 1993, 107.
[222] Caspers 1971, 22.
[223] Thapar 1992, 22.
[224] Selvakumar 2011, 6.

This artifact appears to be a part of a larger personal item that did not survive the shipwreck and subsequent centuries under the sea, possibly relating to either **M 27**'s defensive purposes, or to Godavaya's Buddhist monastery. Ancient Indians employed a variety of weapons, including a *chakram*, which is a flat circular piece of metal primarily thrown but also used in hand-to-hand combat.[225] The *chakram* is mentioned in the Indian epics *Mahabharata* and *Ramayana*, but **M 28** is unlikely to be a true *chakram*, since it is more torus-like than flat.[226] However, a variation of the *chakram*, known as a *chakri dong*, involves a bamboo staff with a *chakram* attached at one end.[227] This presumed staff attachment would account for **M 28**'s circular base.

However, a staff attachment doesn't necessarily point to a weapon. Monastic walking sticks, staffs, etc (*danda*, *kattaradanda*, or *kattarayatthi*) are mentioned throughout the Pāli Canon from the fifth century C.E.[228] Ancient Indian nomadic renunciants (*śramanas*) used a wooden staff to ward off animals - either for protection from predators like tigers and lions, or protection from smaller creatures like spiders and snakes - while begging for alms.[229] After the formation of the Buddhist Samgha, the staffs that were associated with hermits and wanderers became a central element to Buddhist followers and monks.[230] According to later traditions, the Buddha himself even used a staff of the *khakkhara* type.[231] This simple wooden staff topped with a metal ring adopted a ringed finial around the fifth century C.E., which produced a jingling sound to ward off animals

[225] Egerton 2002, 20.
[226] infra 20.
[227] infra 20.
[228] Lammert 2015, 190.
[229] Kieschnicck 2003, 113.
[230] Lammert 2015, 189.
[231] infra 189.

without having to injure them.[232] The Chinese Buddhist pilgrim Yijing traveled to India between 671 C.E. and 695 C.E., detailing the earliest description of an Indian *khakkhara*: "As I myself saw, the staff used in the West (India) has an iron circle fixed on the top of it...the stick itself is made of wood, either rough or smooth, its length reaching to a man's eyebrows...such a staff is to keep off cow or dogs while collecting alms in the village."[233] No actual archaeological example of a *khakkhara* has been uncovered in South Asia, but perhaps **M 28** is the first.[234]

Deterioration of Metal

Metal artifacts will corrode in a marine environment, with a variety of factors (metal composition, water temperature, marine growth, etc.) affecting the rate of deterioration.[235] Iron corrodes due to an electrochemical process directed by the flow of electrons between anodic and cathodic locations on the metal's surface.[236] The metal ions travel from the metallic core to the surface of the artifact, combining with surrounding sediment and minerals contained in the seawater to form an encrustation encasing the iron.[237] This process occurs even after the artifact is fully covered by corrosion products, often to the point where little to no metal actually remains inside the resulting concretion.[238] Conservation of iron has to occur as soon as an artifact is excavated and raised to the surface, and the stabilization of the item occurs by removing the chlorides

[232] Fontein 1973, 25.
[233] Takakusu 2007, 191.
[234] Fontein 1973, 25.
[235] North and MacLeod 1987, 68.
[236] DiMucci 2015, 53.
[237] infra 53.
[238] infra 53.

from the metal.[239] Electrolytic reduction is the most common conservation technique, and the process continues until the chloride content of the artifact is at a low, stable level.[240]

METAL ARTIFACTS

M 27 Metal Spearhead

Figure 28. M 27 / Lot 0060.

Courtesy of Institute of Nautical Archaeology.

Lot 0060	Fig. 28.0	D of Handle: 2	
L: 36.5	H: 2	Map P10 UL3	Catalogued by P.W. / 18 APR 2014

A metal spearhead with an overall length of 36.5 cm. Raised ridge down the middle, lengthwise, on one side. Hollow rounded end for insertion of a wooden shaft. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Metal, possibly bronze. Damaged and heavily covered in marine encrustation.

[239] Hamilton 1999, 51.
[240] infra 2.

M 28 Unidentified Metal Object

Figure 29. M 28 / Lot 0067.

Courtesy of Institute of Nautical Archaeology.

Lot 0067	Fig. 29.0	L: 17	D of Outside: 14
D of Rim: 4-8.7	D of Inside: 10	Map P11 UL1/6	Catalogued by P.W. / 18 APR 2014

Unidentified metal object consisting of a main ring connected to a smaller, sideways ring. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E.

Fabric: Metal. Heavily covered in marine encrustation.

ANALYZING STONE FROM THE GODAVAYA SITE

Grinding stones **S 30** and **S 31** were discovered on the Godavaya shipwreck (Fig 31, 32). These cylindrical stones have a smooth surface with no visible markings, and may have been used to grind grain, perhaps serving a ritual purpose as a temple offering or maybe used as both a utilitarian and sacred object.[241] Similar grinding stones were discovered on the premises of the Yatala stūpa in Tissamaharama, Sri Lanka.[242]

Stone querns have been discovered at various archaeological sites in India and Sri Lanka, dating back to even the Mesolithic period.[243] Four-legged bench-shaped querns like **S 29**, however, have been found primarily in India, dating between the fourth century B.C.E. and the fourth century C.E., with prolific use in the second century B.C.E. to first century C.E (Fig. 30).[244]

Deterioration of Stone

The deterioration of stone depends on properties such as porosity, water absorption, hardness, strength, thermal expansion and contraction, as well as composition.[245] Stone artifacts recovered from marine sites are exposed to a combination of physical and chemical deterioration processes. The softer the stone the more susceptible it is to physical damage via water and sediment movement.[246] Chemical deterioration depends on the

[241] Lawler 2014, 47.
[242] Saxcé 2017, 63.
[243] Chandraratne 2012, 484.
[244] infra 484.
[245] Pearson 1987, 103.
[246] infra 103.

specific environment of the site, as well as the composition of the stone. Seawater has slight alkalinity (buffered pH of 8.2) but a high salinity, and this high sulphate and chloride content attacks cementing media, leaving exposed mineral grains that contribute to the corrosion of the artifacts.[247] Besides mechanical damage, stone can also be damaged by stone borers.[248] Carbonate minerals (marble, limestone, e.g.) and sulphate minerals (alabaster, gypsum, e.g.) are the most susceptible to deterioration, but all stone can be affected by salt weather (when seawater penetrates deep into the pores of the stone) and conservators must be cognizant of this, even after the artifacts have been removed from their aqueous environment.[249]

[247] infra 103.
[248] infra 103.
[249] infra 103, 104.

S 29 Quern/Stone Bench

Figure 30. S 29 / Lot 0032.

Courtesy of Institute of Nautical Archaeology.

Lot 0032	Fig. 30.0	Map M10	Catalogued by A.M.A../ 9 JAN 2013

Possible quern. There are no visible markings, stamps, graffiti, or tool marks. Measurements are unknown but can be approximated based on artifact photos with cm scale. Date: second century B.C.E. - first century C.E.

Fabric: Stone. Lightly covered in marine encrustation.

S 30 Grinding Stone

Figure 31. S 30 / Lot 0028.

Courtesy of Institute of Nautical Archaeology.

Lot 0028	Fig. 31.0	Map M10	Catalogued by S.M.N./ 8 JAN 2012

Cylindrical grinding stone with a smooth surface. There are no visible markings, stamps, graffiti, or tool marks. Measurements are unknown but can be approximated based on artifact photos with cm scale. Date: second century B.C.E. - first century C.E.

Fabric: Stone. Lightly covered in marine encrustation.

S 31 Grinding Stone

Figure 32. S 31 / Lot 0068.

Courtesy of Institute of Nautical Archaeology.

Lot 0068	Fig. 32.0	L: 24	
H: 7	T: 8.2	Map P10 UR 3	Catalogued by P.W. / 18 APR 2014

Cylindrical grinding stone with a smooth surface. There are no visible markings, stamps, graffiti, or tool marks. Date: second century B.C.E. - first century C.E. Similar to **S 30**.

Fabric: Stone. Lightly covered in marine encrustation.

CHAPTER IV

CONCLUSION: BUDDHISM AND MARITIME TRADE

By studying the archaeology and history of Sri Lanka, particularly regarding the Indian Ocean in ancient times, we gain a more holistic understanding of the relationships and exchanges that took place on and around the Indian Ocean. Indo-Roman trade comprises a very small segment within the much broader history of Indian Ocean activity.[250] The inspiration for Indo-Roman trade can be traced back to Alexander the Great, whose Indian campaign of 327 B.C.E., where Megathenes and Eratosthenes reported the wonders of the East, engaged the later Roman imagination.[251] The Roman appetite for goods from India was fueled by this idea of an exotic and adventurous land. This thriving and diverse global trade led to channels of trade and communication, which provided the means of expanding religious and cultural influences.[252] The true nature of the maritime Silk Road, however, is far more than a simple domination on the part of the Roman Empire. The trade connections between South Asia and the Mediterranean show, through the archaeological and literary records, a symbiotic relationship.

Sri Lanka played an important role in the ancient Indian Ocean maritime trade. The island's geographical location was advantageous for international merchants, and like India, the most important ancient cities of Sri Lanka were inland, along rivers, with corresponding sea ports.[253] The ancient ports connected to emporia along the mouths of

[250] Tomber 2008, 15.
[251] infra 15.
[252] Ray 2003, 1.
[253] Bopearachchi 2014, 162.

rivers and waterfronts, facilitating transactions with the interior regions.[254] The port of Godavaya was excavated by German archaeologists in the late 1990s. Those excavations uncovered BRW (bowls perhaps used by monks) dating to the third century B.C.E.[255] From 1993 to 1996, the Department of Archaeology and French Archaeological Mission in Sri Lanka also excavated in Ridiyagama, which is a region 12 km upstream from the mouth of the River Walawe.[256] This exploration revealed similar BRW objects, along with light slags, burnt charcoal, and more than 20 furnace structures.[257] These may have been used for forging iron.[258]

In south India, the Tamil Sangam era corresponds to the late Iron-Age-Early Historic period (c. 300 B.C.E. to 300 C.E.), which was a key stage in the development of the island's material culture.[259] Ceramic types, metal and stone artifacts, as well as inscriptions along coastal and inland settlements point to a growing overseas trade during this period.[260] The distribution, as well as the manufacturing and trading, of these items extended beyond India and into Sri Lanka as well. BRW ceramics were widely distributed chronologically and geographically, and this general uniformity shows that the settlements in India and Sri Lanka were inextricably linked.[261]

[254] infra 162.
[255] infra 179.
[256] infra 179.
[257] infra 179.
[258] infra 179.
[259] Shinu 2003, 214.
[260] infra 215.
[261] infra 215.

Beyond Indian-Sri Lankan relations, ancient South Asia also traded with the Mediterranean, China, and Southeast Asia, as evidenced by literature and archaeological remains. Stamped pottery in white, red and grey, similar to Motupalli stamped ware, has been found in Sichuan, Southwest China, from the late Neolithic period (2000 B.C.E. to 1200 B.C.E).[262] The *Periplus Maris Erythrae*, according to researcher H.P. Ray, may possibly reference Southeast Asian ships visiting the Tamil coast, and P.Y. Manguin goes as far as to identify the vessel called *kunlunpo* as a Southeast Asian ship-type.[263] Etched carnelian beads of Indian origin have been recovered from sites in Burma, Thailand, Malaysia, and Bali, dating from the early centuries C.E.[264] Ancient Tamil literature, such as the *Paṭṭiṉappālai*, written in the first or second century C.E., describes foreigners on a festival day: "It looked as though, they speaking different languages, have settled down here on a mutual friendship."[265]

THE GODAVAYA SHIPWRECK'S BUDDHIST CONNECTIONS

Material goods of early historic Sri Lanka developed in large part through indigenous artisans and merchants. This local regional control could have been maintained by the urban and monastic core (as revealed in the excavation of Anuradhapura) especially given the comparatively minimal amount of exotic goods.[266] As pilgrims and merchants passed through communities, they could potentially re-export this international merchandise.[267] Admittedly, the Indian Ocean's participation in the maritime Silk Road is

[262] Reddy 2011, 146.
[263] infra 146; Ray 1990, 10-11.
[264] Reddy 2001, 146.
[265] infra 146; *Paṭṭiṉappālai* lines 213-217.
[266] Coningham et al. 2007; Coningham and Gunawardhana 2013.
[267] Schenk 2006.

largely invisible in the archaeological record and appears only rarely in historical documents.[268] We do know, however, that the Godavaya shipwreck was part of this prosperous trade network, and, critically, it does not appear to have much connection to the Mediterranean. Although no one knows whether the ship was leaving Godavaya or sailing towards it, the glass ingots and iron recovered from the wreck were likely made in the region. The iron may have even been smelted in the immediate vicinity of Godavaya.[269] These discoveries point to large-scale export. In fact, the presence of both domestic (the ceramic artifacts) and foreign goods (the glass ingots from India) on a single ship indicates a complex trading system was in place even before Roman, Greek, and Egyptian merchants began to sail the Indian Ocean, which refutes earlier scholarship that Westerners catalyzed the South Asian economy.[270]

Sri Lanka may be perceived as a microcosm of the international Indian Ocean network, and the Godavaya shipwreck is an important node in this network. Trade is not simply the exchange of commodities. Cultures, belief systems, and iconographies travel alongside merchants, and local traditions are thus integrated with foreign philosophies. Communication between ports, inland capitals, and religious centers meant that Hinduism and Buddhism became intertwined in the maritime trade within Sri Lanka. An inscription found at a monastic site in the Ratubaka plateaux of Java dates to 792 C.E., commemorating the founding of a branch of the Abhayagiri Vihāra of Sri Lanka.[271] Even communication with Southeast Asia is linked with Buddhism. Sri Lanka is not a uniquely

[268] Lawler 2014b, 1442.
[269] Lawler 2014b, 1443; Lawler 2014a, 46.
[270] infra 1443, infra 46.
[271] Gunawardana 1979, 17.

Buddhist island (it has strong Hindu influences as well as more localized traditions), but Buddhism's support of merchants means that the religion shares a history with Sri Lanka's maritime trade. The curious items from the Godavaya shipwreck, from the glass object that is a potential ear reel, the stone querns for which there are parallels with inscriptions at the stupa in Tissamaharama, and the metal ring that may be part of a staff, may be further proof of the important role Buddhism played in ancient maritime trade.

SUPPORTING EVIDENCE FOR BUDDHIST INVOLVEMENT IN MARITIME TRADE

Sri Lanka's maritime trade was encouraged by Buddhism, which looked favorably upon commerce. Epigraphic and literary evidence shows that second century B.C.E. donors and patrons of Buddhist establishments in South Asia were, in fact, caravan merchants and wealthy seafaring traders.[272] *Gandhārī* scrolls, presumably from Hadda Afghanistan, were recently discovered, and a *pūrvayoga* text among them narrates how the Buddha was a sea merchant in a previous life.[273] Donors of Guddhist monasteries were called *nāvikas* (mariners) and *vanijas* (traders).[274]

Later in South Asia history, the *bodhisattva* Avalokiteśvara became known as the protector of mariners, especially in the tradition of Mahāyāna Buddhism.[275] The Saddharmapundarīka sūtra states: "If one happens to fall into the dreadful ocean, the abode

[272] infra 162.
[273] Lenz 2003, 150.
[274] infra 163.
[275] infra 164.

of nāgas, marine monsters, and demons, he has but to think of Avalokiteśvara, and he shall never sink down in the king of waters."[276]

Avalokiteśvara's reputation as a savior of mariners gained much popularity in Indian art during the early centuries C.E., such as the fifth century C.E. painting of the Western Deccan and the Ajanta cave paintings dating from the second century B.C.E. to the fifth century C.E.[277] Ajanta Cave 1 specifically depicts Avalokiteśvara saving a group of merchants.[278] In Sri Lanka, there are two major clusters of Avalokiteśvara images, one being on the east coast around Trincomalee and the other at the southern coast around the ancient sea ports of Kirinda and Godavaya.[279] Godavaya was clearly an important port site when the ancient ship under discussion here was wrecked, with clear ties to Buddhism, and this connection continued on through the creation and depiction of Avalokiteśvara images.

CONCLUSIONS

There are still many questions left unanswered regarding the context of the Godavaya shipwreck. Were international merchants and traders residing in the port of Godavaya, frequently interacting with the monks residing in the community? Were Sri Lankan traders traveling to India to procure exotic goods for local markets? What were the identities of the sailors? Despite archaeological and literary evidence of early historic active commerce and global trade, information regarding early indigenous ships and boats is relatively poors,

[276] *Saddharmapundarīka* sūtra 24.6
[277] Bopearachchi 2014, 164.
[278] infra 164.
[279] infra 164.

and shipwreck archaeology in South Asia is, in general, in its infancy.[280] The Godavaya shipwreck could answer meaningful questions about the role that Sri Lanka played in the transfer of both commodities and technology within the Indian Ocean.[281] With a complete excavation of this site, we can significantly contribute to Indian Ocean and South Asian archaeology.

[280] Muthucumarana et al 2014, 42.
[281] Carlson and Trethewey 2013, 9.

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