The missing crafts of Sri Lankan waters

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Abstract

The artefacts were slowly removed and brought up one by one; certainly, they had been undisturbed for nearly two thousand years. The wreck and some of its cargo were analyzed and radiocarbon dated, and the results make the Godawaya wooden wreck found from the seabed of south Sri Lanka, the oldest shipwreck in the Asia-pacific region. The inscription belonging to the 1st century, found at the Godawaya temple provides evidence to the world that the Sri Lankan people had well organized ports which took tax from the vessels. But we weren't able to find the cargo or the ships that sailed through until 2008. This valuable wooden wreck was first found by two conch divers and later explored by the Maritime Archaeology Unit of Sri Lanka (henceforth MAU). Analyzing and artefact research were done not only to find the chronological order, but also to discover a hidden chapter on maritime activities and ship building techniques used in this region. The artefacts appear to be originally of the Indian subcontinent region; hence, it is possible that the origin of the ship may be traced to this region. A large number of potshards and stone quern indicate that these items may also be part of a trading commodity. The major part of the wreckage needs to be identified and that will reveal the kind of cargo ships used to carry at that time. The paper aims at bringing to light the recent discoveries and the results of analyzing the cargo. Especially the excellent copper lumps and Black & Red ware found and analyzed in 2012.

***Key words**:* Godawaya, Great Basses, Black & Red ware, Copper ingots, Port city

From the past to the future

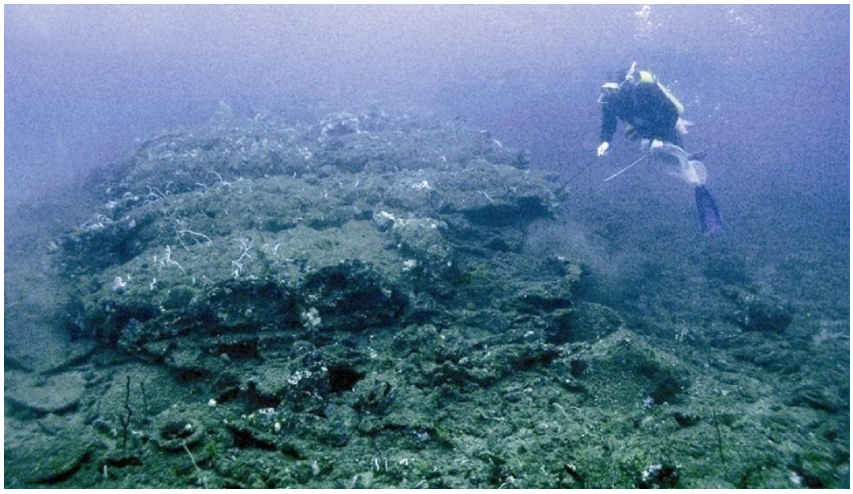

Fig. 1 Remains of the Godawaya shipwreck. (Rasika Muthucumarana)

A journey ends with terrifying suddenness, sending a majestic seagoing vessel to the ocean floor, ending the life of sailors and passengers. The wreck is now home to sea creatures, corals and sponges. Years later, detectives in the form of maritime archaeologists locate the wreck and start piecing together tiny bits of information. Like a forensic scientist who attempts to work out the cause of death, they try to unearth the story of that forgotten hulk sitting alone in its watery grave. This story is a small part of a larger one which consists of many – the cement between the bricks that make the whole tapestry of our history. But, what if there is a wreck without a story, or a wreck without any clue or evidence to trace its name, date of construction or when it sank? For the archaeologist, this is the beginning of a whole new episode, imaginary and real, the latter requiring interpretation of small clues – intense detective work. The maritime archaeologist's task takes on a greater challenge as the wreck ages. The physical evidence that identifies the wreck hides under the sand and, in time, it becomes a sealed tomb.

In 2008 archaeologists from Maritime Archaeology Unit (MAU) of Galle found an isolated wreck, actually a mound surrounded by hundreds of potshards on the seabed near the Godawaya coast, a small fishing village situated between Ambalantota and

Hambantota in southern Sri Lanka. The site was deep and undisturbed. The team located the site following an alert by two local conch divers from Godawaya area who found the site. When the team reached a dark and cold seabed at 32 m we faced coral mounds and sea plants on a sandy seabed. The artefacts were slowly removed and brought up one by one. It was certain that those had been undisturbed for hundreds of years (Fig. 1). This find was a treasure trove for a maritime archaeologist. The potshards and other artefacts found at the site can be traced up to 2nd century BCE, which make this site the oldest shipwreck found in the Asian Pacific region. While there have been reports of several shipwrecks in and around the Indian Ocean countries during the last two decades, these wrecks were dated between the 9th century CE and the early 20th century CE. Thus, there is a paucity of information about early shipwrecks, so the Godawaya shipwreck site has provided much needed import to the maritime archaeology of this region. An inscription belonging to the 1st century, found at the Godawaya temple provides evidence to the world that the Sri Lankan people had well organized ports which took tax from the vessels. The paper is aimed at bringing to light the recent discoveries and the analysis results of the cargo. Especially the excellent copper lumps and Black & Red ware found and analyzed in 2012.

Fig. 2 View of the Buddhist temple from the sea. (Rasika Muthucumarana)

Godawaya: the historical port city

Godawaya is a small fishing village, located in the Hambantota district close to Ambalantota near the old estuary of the Walawe River, the fourth longest river of the island. However, the mouth of the river near Godawaya is blocked by sand deposit and now the river is debouching into the sea at Ambalantota, 3 km west of Godawaya. A

Buddhist temple is located on a small rocky elevation on the left bank of the river mouth (Fig. 2). In ancient times, Godawaya was known as Godapavata-patanaha as is mentioned in a Brahmi inscription found in Godawaya dated to the 2nd century AD (Roth et al., 2001: 296), and in Mahavamsa the etymological identifiable term “Gotapabbata” is used (Geiger, 1912: 255). Two inscriptions found from this temple were first examined and reported by E.R. Ayortone in the early 20th century. Later, Professor Senarath Paranavithana published his findings on estampage found in this area (Paranavithana, 1983). The small and unclear inscription (No. 1) and the well-known inscription (No. 2) were carved on a natural rock north of the Stupa. The inscription No. 2 clearly describes a seaport situated at Godawaya. It consists of two lines, and the letters, which have been clearly incised, are regular in form. These writings can be clearly identified with the first or second century CE (Paranavithana, 1983). The inscription describes the collection of customs duties called Godapavatha collected at this port (Fig. 3). The text of the inscription No. 2 and its translation:

1. Siddham Godapavata patanahi Su (ka) su(ri)yi
2. Raja Gamani Abaya viharata dini

“Success! The customs duties of the port of Godapavata, King Gamani Abaya granted to the vihara (temple)”.

The name Godapavatha, Gota pabbata or Godawaya refers to a kind of mound with a rounded shape, composed of rock (gota – short and round /pabbata – rock). The small stupa built on a rocky elevation south of the temple is clearly visible from the sea and may have been used as a landmark. Most probably the name Godapawatha could have been a name attributed to those early seafarers. When the excavation team dug a new trench under the rock with the main inscription mentioned above, they found another well-preserved three-line inscription (No. 3), one meter below the old one. It also describes some of the donations to the temple. The earliest archaeological evidence from Godawaya traces the history of

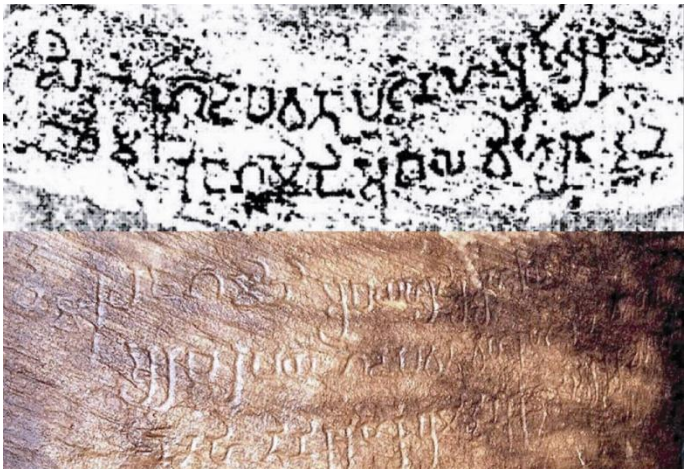

Fig. 3 Inscriptions found from Godawaya. (Upper - Inscription no 02/ Lower – Inscription No. 3). (Rasika Muthucumarana)

this region from the Mesolithic period onward. During the last two decades many explorations and excavations took place in and around the Godavaya temple. From an excavation that took place near the fishing village, part of an old maritime structure was found. It appears to be part of a jetty or a bridge built with stone pillars, which are very similar to the stone pillars seen in the shrine room of the old temple. Looking south from the temple, the river flows to the sea to the right and the Godawaya fishing village is to the left. Both of these may have been parts of the ancient seaport. This is not surprising as the bay of Godawaya with its beach with the stone pillars and fishing village is the safest landing place along the coastline of this area. The river mouth and the wide sluggish river also provide suitable access for transportation. Cargo from the vessels may have been transferred inland using boats and barges. The Walawe River flows through ancient settlements and monastic sites such as Ridiyagama, Mahanavulu Pura and the Ramba monastic complex. There are records of coins, mainly thousands of Indo-Roman, from private lands and paddy fields near the riverbanks.

In 2003, an old stone anchor was found in the sea near the Godawaya fishing village. It was a granite triangle with a hole in the middle, resembling the stone anchors excavated from Galle harbour. These types of stone anchors are thought to have been used during the pre-colonial period, especially by Indo-Arabian and Chinese vessels (www.mausrilanka.lk). In the following year two local well experienced conch divers (Sunil and Peminda) from Godavaya village found other valuable artefact. On one of their regular deep shell dives they found the area rich with potshards and a small stone object which bore a resemblance to a small bench. They brought it with them and marked the location on their GPS. The bench was handed over to the excavation project and was stored at the Tissamaharama storeroom at the Department of Archaeology. But the incident and bench were forgotten over time (Fig. 4).

Fig. 4 Single hole stone anchor and stone bench like object found from shipwreck site. (Rasika Muthucumarana)

A new beginning

In October 2008 the MAU started an exploration along the south coast with some funds from the UNESCO Bangkok office. The Godawaya site was at a depth of 30 meters and three kilometres from the shore. The presence of potsherds and artefacts like the stone bench strongly suggested the presence of a shipwreck, which warranted further investigation. The seabed near the site is composed of coralline rocky formations whereas a wide area is covered with thick grained coralline sand towards the north-eastern part of the site. Under some mounds, which initially appeared to be a reef, we found some timber sections. Those very fragile wooden parts were covered with a thick layer of corals and plants (Fig. 5). Between and around two large mounds there were lots of potsherds. These were scattered over about a 100 square meter area. Other than the potsherds, we found some complete and near complete jars. Some of these jars were huge and encrusted and embedded with corals. This was a clear sign that the site was undisturbed. But it was not easy to understand the site formation, and we were not able to identify any parts of the ship's construction. Many ships have been wrecked around Sri Lanka but Godawaya is a very unique shipwreck and no parallel has been reported in publications. We did some exploratory studies from which a site plan was derived and artefacts were brought up and studied. Most of the potshards were identified as black and red ware (BRW), a particular type of clay-ware unique to the South Asian region. This type of potteries goes back to the 13th century BCE. According to the comparative typological evaluation (with the typologies of the early scientific excavations in Sri Lanka and India) the shapes and the types found at the Godawaya site, the wreck has been tentatively dated at between the 2nd century BCE and the 2nd century CE. The symbols carved on the stone bench also belonged to the same era. Many shipwrecks have the potshards

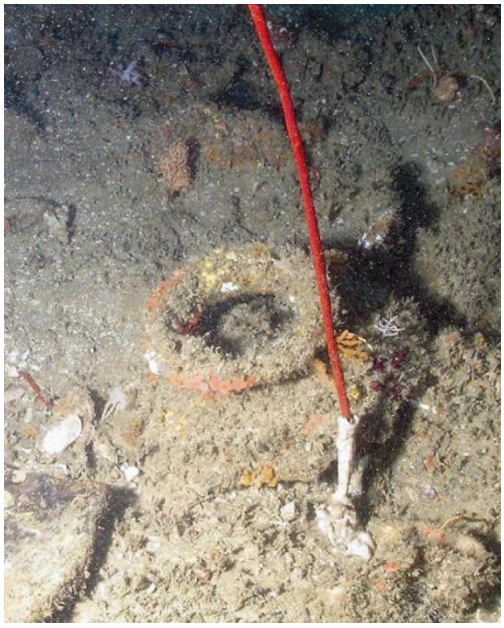

Fig. 5 Rim of jar and potsherds at Godawaya shipwreck site. (Rasika Muthucumarana)

as cooking ware but the high density of the potsherds at this site indicated that this vessel carried pottery as cargo. Further, six glazed blue bun-shaped ingots at site 2 were retrieved for further analysis. These were widely used in the pottery industry. The stone bench was identified as a quern and thought to be used for the preparation of food or medicine onboard. This assumption was discarded when we found another three similar objects in 2010. These items may also be part of a trading commodity.

Materials and methods

Different types of artefacts and samples have been collected from the site during the field works till 2010 for study and analysis. Some of the samples were analyzed and studied at CSIR-National Institute of Oceanography, Goa; Physical Research Laboratory, Ahmedabad, India and PGIAR (Post Graduate Institute of Archaeology and Atomic Energy Authority), Sri Lanka. These studies were very helpful to date and understand the shipwreck, cargo and its origin.

SEM-EDS analysis Clear specimens (size 2-4 mm) of these artefacts are placed on a carbon conductive tape stuck on a nylon stub. Each specimen is mounted on a separate stub in such a way that the surface to be analyzed faces upwards. These specimens are then sputter coated with about 20-nanometer thick gold coating using a Gold sputter coater. Each coated specimen image was analyzed by SEM (model JSM 5600) with an EDS attachment (model JOEL 5800 LV).

Radiocarbon dating In order to remove the extraneous material such as carbonate specks within its pores, the wood sample was treated with dilute hydrochloric acid repeatedly and washed thoroughly with de-ionized water. The powdered and dried wood sample was combusted in presence of O2 to yield CO2. The CO2 obtained was converted to benzene for 14C measurement. The 14C activities were assayed using a low background liquid scintillation counter. The calculated 14C ages were calibrated using INTCAL09.

Results

Copper slag - A small lump of copper was also found from the wreck site; however, the identification of the object is difficult. EDS analysis at nine spots in the copper show that major elemental oxides present in abundance are CuO, SO_3 and FeO. The average

weight (%) of CuO, SO_3 and FeO in the copper slag is 97.92, 1.95 and 0.293 respectively (Table 4). Interestingly, CuO wt (%) values range with minimum and maximum values of 97.00 – 98.59 while FeO is present only in four spots with an average wt % of 0.293. This shows that the copper sample is not from a slag as we described earlier. The 97% of CuO and the condition of the lump shows it is not a slag. It is almost in a pure combination which is melted and purified (unless it was found from a mine in a pure state). This could be a part of a lump/chunk or an ingot which was used in the ship or transport. We found this copper lump on 15th November 2010 while we were diving at the site for a monitoring purpose. We noticed several lumps of copper on the wooden parts of the main block at the place where we took the sample.

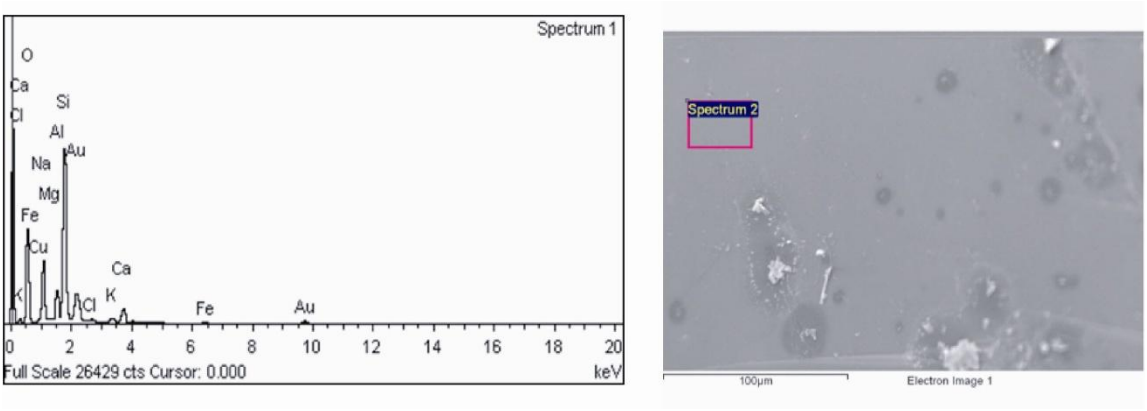

Fig. 6 Representative EDS spectrum and SEM photograph of the glass ingot. (CSIR-NIO)

Glass ingots -The SEM-EDS results of five spots in glass ingot show (Fig. 6) that major elemental oxides present by the abundance are SiO2, Na2O, Al2O3, CaO, FeO, K2O, CuO, TiO2, MgO in the average weight % 62.67, 12.85, 8.10, 8.07, 3.33, 1.76, 1.37, 0.63 and 0.42. Silica Oxide (SiO2) is the major component 62.67% with a narrow range of minimum and maximum values of 60.61 – 64.17 %. Titanium Oxide is present in three spots with an average value 0.63%. These glass ingots weigh about 2-3 kg and having a diameter of about 20 cm (Table 2)

Iron concretion

The SEM-EDS results of four spots in Iron concretion show that major elemental oxides present in abundance are FeO, SO3, SiO2, Al2O3, MgO, CaO, and K2O with the

average weight (%) of 77.54, 16.48, 7.06, 2.43, 1.39, 0.93 and 0,37 respectively. Iron oxide (FeO) is the major component (Av. 77.54%) with a range of minimum and maximum values of 66.58 – 83.96 %.

Conclusion

Relative dating and radiocarbon dating from the wood samples shows the site is approximately 1900 years old, which means it belongs to the era in which the inscription was written. There are several questions that remain unanswered: what kind of vessel was it? What was its destination and from where was it sailing? How did it sink and how was it preserved for so long? Until we find answers to these questions we need plausible stories to fill the gaps. The main mound containing the wooden remains can be the best way to find answers. The surface observation indicates that a large part of the wreck is buried in the sediment and the extension of the site can only be determined after a more complete investigation. With the archaeological information so far investigated it has not been possible yet to determine whether this wreckage is belonging to an inbound or outbound vessel to the country. By looking at the cargo the ship was transporting would be an efficient method to get an idea in this regard. Raw ingots of copper and glaze found along with the other findings could possibly be successful indicators in solving the question raised above. Here we are trying to compare the composition of raw copper ingot found from the shipwreck with the already known characteristic composition of locally produced copper in order to determine the destination of this cargo, if possible.

Identification of locally produced copper

Historical records and chronicles had indicated that Sri Lanka used its own source of copper during the historical period. It is also suggested that the Seruwila is the place which produced the copper (Seneviratne, 1995: 125). The Anuradhapura Gedige excavation had proved that the copper smelting was practiced here as early as 6th – 5th Century BC (Deraniyagala, 1972: 145; Seneviratne, 1995: 123). The use of Seruwila copper for the production of bronze Buddha images during the latter part of the Anuradhapura period has been proven through scientific means which will be described later (Thantilage, 2008: 41-44, 71-76). It has been suggested that the occurrence in metal artefacts of a particular element at an unusually high concentrations may be

characteristic of a particular geographic or mineralogical origin (Reedy, 1997: 83-85; Craddock and Meeks 1987: 132). The compositional characteristics of the local Seruwila copper magnetite ore source had been determined by the Geological Survey Department of Sri Lanka by analyzing the copper ore samples obtained by deep coring and had shown the copper ore from Seruwila, the only known copper deposit in Sri Lanka, contained characteristic high nickel content and cobalt, nickel elemental ratio has been calculated as between 0.43 – 0.55 (Jayawardhana and Padmasiri, 1977). The same cobalt, nickel ratio values has been successfully utilized to identify the possible ore source for some South Indian bronze images (Sirinivasan, 1999 (a) and bronze images of Sri Lanka made out of copper from the Seruwila ore source (Thantilage, 2008: 41-44, 71-76). Because of the high nickel content and consistent copper, nickel ratio the copper artefacts found from the Anuradhapura Gedige excavation are attributed as has been made from ore from the Seruwila deposit (Maliyasena, 1987).

Analysis of copper Ingot from Godawaya ship

In this backdrop it was decided to analyze the bronze ingot from Godawaya ship wreck for trace elements qualitatively by XRF method using the facilities at the Atomic Energy Authority, Sri Lanka. The analysis proved that nickel, the characteristic indicator of the copper from the Seruwila copper source, is not present in the copper ingot. The absence of nickel in the copper ingot from the ship wreck would be a powerful indicator to exclude the possibility of origin of the copper ingot could be Sri Lankan. If this is the case, the ingot could have been on the way to the region. It has been shown through scientific means the existence of two schools of bronze Buddha image productions during the Anuradhapura period in Sri Lanka in which one school had not used the local copper for its production (Thantilage, 2008: 96-99). The copper ingots suggest that the ship was sailing to Sri Lanka. The wreck was probably a coastal trader that sailed around the country. It may have been making for the Godawaya port aiming to travel further inland towards settlements along the river. One possibility is that cargo was loaded from Godawaya and the vessel may have been heading for the east side or the far south to the Magampura settlements or this vessel may have been involved in international trade. It may have been travelling to the east coast of India or coming from India, or leaving for Southeast Asia or a vessel of foreign origin. To find these answers

we need to inspect the hull remains through the remaining wooden parts. This part needs a detailed investigation not only underwater but also by taking a few samples for analysis. Gaining insights about the shape and size of the hull planking and fastening will provide details about the construction methods and its origins and reveal information about the ships used during ancient trade. If we compare this site with other underwater archaeological sites found so far in Sri Lanka, this is a site of high significance. The wreck is a unique example of this early period from this part of the world. Our conclusions are still a work-in-progress, so dating and cargo are still under investigation. This is an initial attempt and the story of this wreck is still being written and may change as more data comes to light – this is the story of maritime archaeology.

Registration No.	Height (cms)	Diameter (cms)	Weight (in Kgs)
2008/SL/S/GODA/M/2/01	9	19	3.9876
2008/SL/S/GODA/M/2/09	9	18	2.7224

Table 1. Detailed dimension and weight of glass ingots retrieved from the wreck site.

Elemental Oxide	Spot 1	Spot 2	Spot 3	Spot 4	Spot 5	No of spots	Average	Min	Max
Na2O	21.12	21.49	5.17	10.53	5.96	n=5	**12.85**	**5.17**	**21.49**
MgO	0.57	0.92	0.00	0.63	0.00	n=3	**0.42**	**0.00**	**0.92**
Al2O3	9.27	9.29	7.08	7.74	7.10	n=5	**8.10**	**7.08**	**9.29**
SiO2	60.61	61.21	64.17	63.52	63.82	n=5	**62.67**	**60.61**	**64.17**
K2O	1.23	1.22	2.26	1.87	2.24	n=5	**1.76**	**1.22**	**2.26**
CaO	4.74	4.61	11.91	8.06	11.02	n=5	**8.07**	**4.61**	**11.91**
TiO2	0.00	0.00	1.53	0.56	1.06	n=3	**0.63**	**0.00**	**1.53**
FeO	1.34	1.26	5.53	2.64	5.87	n=5	**3.33**	**1.26**	**5.87**
CuO	0.65	0.00	2.35	0.94	2.92	n=4	**1.37**	**0.00**	**2.92**
Ag2O				3.51		n=1			

Table 2. EDS results of elemental oxide abundance (wt %) of glass ingot.

Elemental Oxides (%)	Spot 1	Spot 2	Spot 3	Spot 4	No of spots	Average	Min	Max
MgO	1.79	0	1.11	1.26	n=3	1.39	1.11	1.26
Al2O3	4.25	0.60	0.00	0.00	n=2	2.43	0.6	4.25
SiO2	8.42	17.76	1.18	0.88	n=4	7.06	0.88	17.76
SO3	17.45	0.00	13.74	18.25	n=3	16.48	13.74	18.25
2O	0.37	0.00	0.00	0.00	n=1	0.37	0.37	0.37
CaO	1.14	1.19	0.00	0.45	n=3	0.93	0.45	1.19
FeO	66.58	80.45	83.96	79.15	n=4	77.54	66.58	83.96

Table 3. EDS results of elemental oxide abundance (wt %) of Iron concretion.

SEM EDS	spot 1	spot 2	spot 3	spot 4	spot 5	spot 6	spot 7	spot 8	spot 9	Av	Min	Max	No. of spots
SO3	2.18	1.6	2.15	1.93	2.04	1.59	1.68	3	1.41	1.95	1.41	3	N=9
FeO	0.24	0.27	0	0.36	0	0.3	0	0	0	0.29	0.24	0.36	N=4
CuO	97.58	98.13	97.85	97.71	97.96	98.11	98.32	97	98.59	97.91	97	98.59	N=9

Table 4. EDS results of elemental oxide abundance (wt %) of copper slag.

Acknowledgements

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Biography

Rasika Muthucumarana *is a maritime archaeologist working at Maritime Archaeology Unit, of the Central Cultural Fund, the custodian agency for the UNESCO world heritage sites in Sri Lanka. He has obtained special Degree in archaeology at the University of Peradeniya, then joined the Avondster Project, which was the first field operation of the MAU. Since then he has been conducting most of the underwater archaeological projects of Sri Lanka and some of the UNESCO field school projects. Apart from underwater explorations, excavations and conservation, he is devoted to developing field archaeology and human resources of the MAU. Rasika is also a professional photographer and a landscape artist who loves to travel and stay close to nature.*

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