

The Archaeometallurgy of Palipbothana Megalithic Burial Site and the Peripheral Region

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The Megalithic Burial Site of Palipbothana was identified in 2018 and a preliminary exploration was propagated in 2019 by Rajarata University of Sri Lanka. The research uncovered numerous of factors for the use of metal associated with burials. Among them it is important to identify a number of evidence that metal was used to create the stone slabs needed in the construction of the tomb. The slabs with chisel marks confirm that they were obtained by dividing the rock boulders at surrounding areas using metallic equipment.



Figure 11-1 A stone slab with chisel marks

In addition, several circular cup marks of various sizes were found on the capstones and metal tools may have been used to create them. The capstone of the cist burial located in the middle part of the site, consists cut-marks (chisel marks) which used to fix the capstone to the west slab. Therefore, metal tools such as steel blades might be used to prepare them and it reveals that the proto-historic people who lived in this area might be knew to make advanced metallic productions.



Figure 11-2 A capstone with chisel marks

It is also important to find an iron blade inside of a burial, dug by treasure hunters. The craftsman marks of this iron blade prove that there was an improved metal technology in Palipbothana and peripheral region. Even though it was separated into fragments, it reflects features of an iron blade of a knife with 10cm, 2cm, and 0.4cm of length, width and thickness respectively.

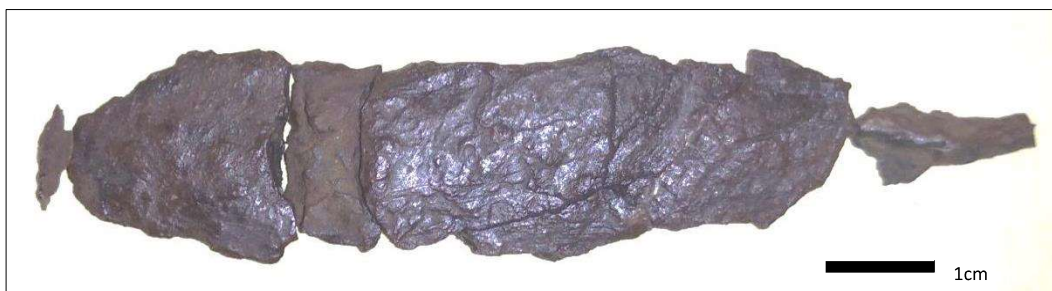
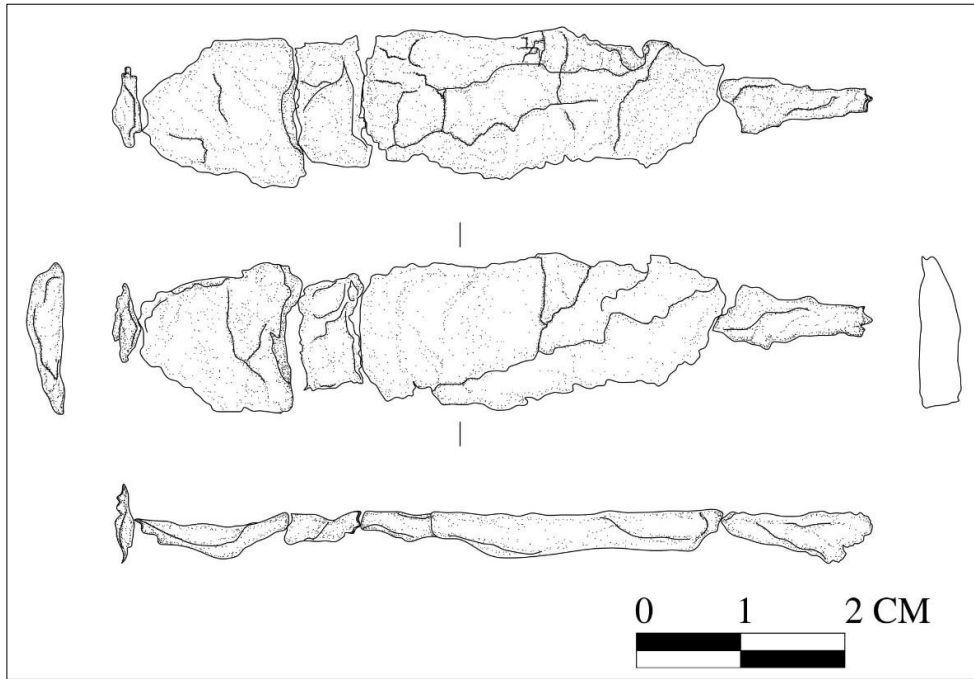


Figure 11-3 The metal object retrieved from the exploration

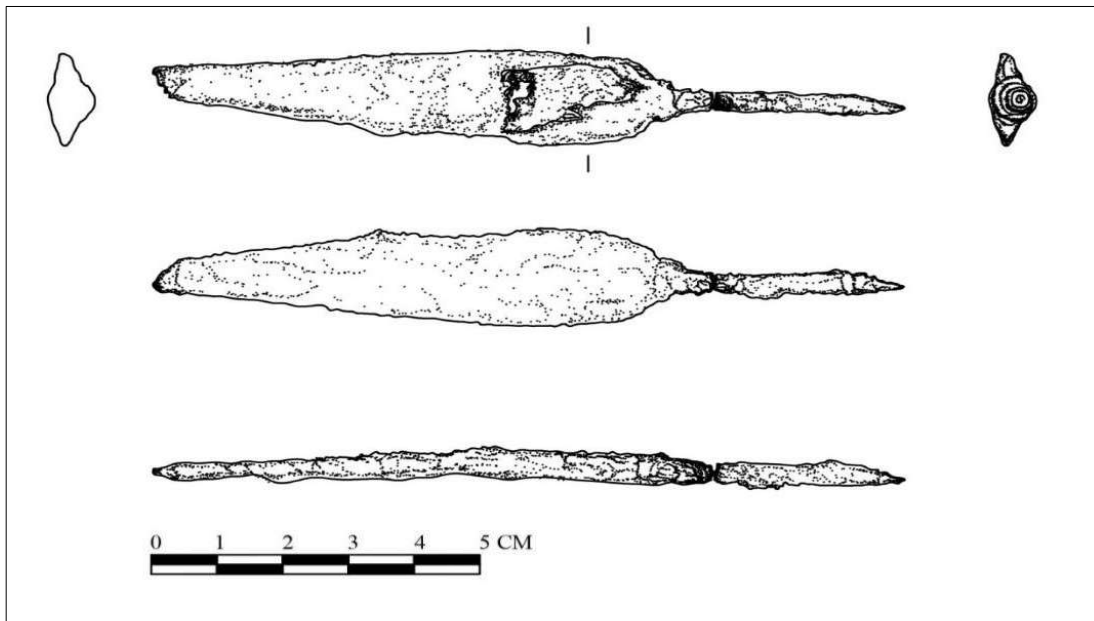


Plan 11-1 The metal object retrieved from the exploration

Besides, the excavation propagated under the site code of RUSL/PP/EX02 also uncovered number of artifacts related to iron usage. An iron blade of a knife (kinissa) retrieved from the filling of a pottery of context number 17 and it recorded 9.8cm, 1.8cm and 0.4cm in length, width and thickness respectively. Its shape was well preserved due to its advanced technology which made using advanced raw materials and its less deterioration.



Figure 11-4 The iron blade retrieved from context no.17



Plan 11-2 The iron blade retrieved from context no.17



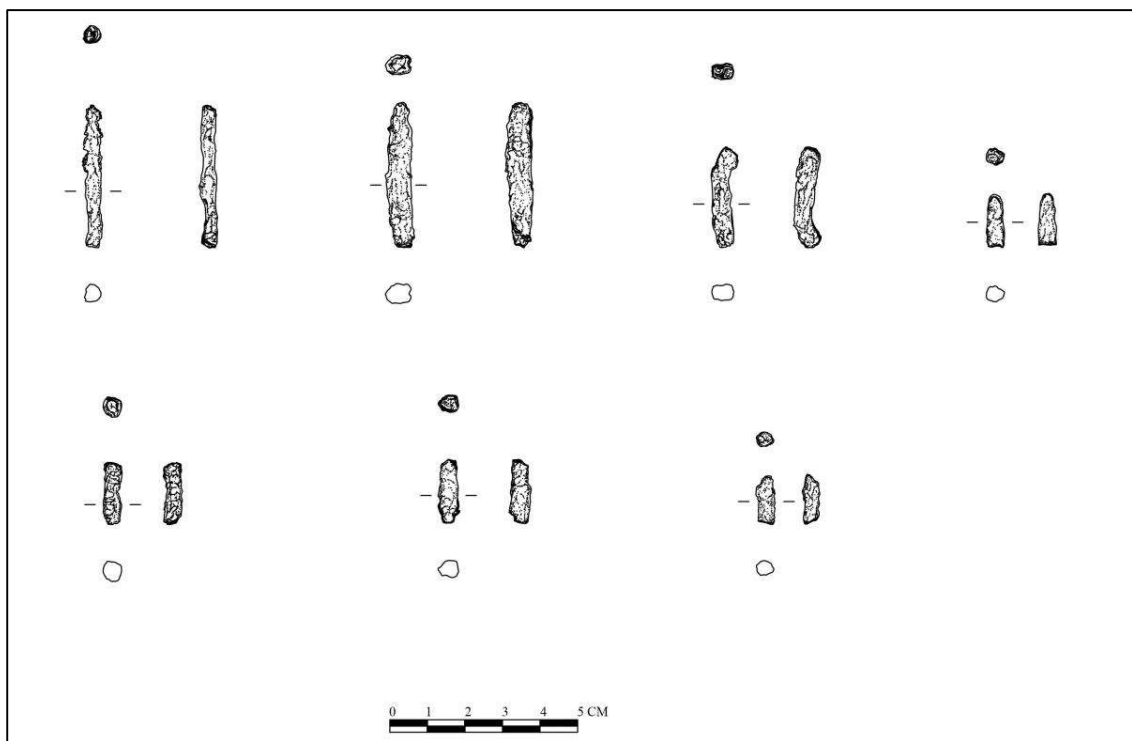
Figure 11-5 The iron blade retrieved from context no.17 and a modern knife with a handle

This blade was created as a way to fix for a handle. It is a prominent feature that the form of the blade is similar for the modern type. Accordingly the ancient and modern craftsman identified the size and the form with reference to the tool's utility. The evolution of the metal tools occurred from ten thousand years up to today as it is evidently shown via the form of the knife blade since proto-historic period. The craftsman's marks and the form of the knife blade were remained as the same at present without subjecting even into minor changes whereas transmitted from generation to generation.

The excavation of RUSL/PP/EX 02 yielded few iron rods and according to the nature of the fragments the remains belong to two iron rods. Due to the causes of deterioration such fragments observed and the photographs portray how these facts were revealed at the excavation.



Figure 11-6 The iron objects retrieved from RUSL/PP/EX02



Plan 11-3 The iron objects retrieved from RUSL/PP/EX02

Reg:No	Pit N				Context No	Length	Width	Height	Weight	Remarks
		X	Y	Z						
PP/EX2/Me/01	C2	140cm	160cm	150.272m	06	3.7cm	0.43cm	0.43cm	2g	Fragment s of the Same object
PP/EX2/Me/02	C2	140cm	160cm	150.272m	06	1.7cm	0.49cm	0.49cm	1g	
PP/EX2/Me/03	C2	140cm	160cm	150.272m	06	1.6cm	0.53cm	0.53cm	1g	
PP/EX2/Me/04	C2	140cm	160cm	150.272m	06	1.3cm	0.46cm	0.46cm	<1g	
PP/EX2/Me/05	C2	140cm	160cm	150.272m	06	1.3cm	0.49cm	0.49cm	<1g	
PP/EX2/Me/06	B3	140cm	147cm	150.287m	06	3.4cm	0.5cm	0.5cm	2g	Fragment s of the Same object
PP/EX2/Me/07	B3	140cm	147cm	150.287m	06	2.4cm	0.43cm	0.4cm	1g	
PP/EX2/Me/08	B2	266cm	175cm	450.13m	07	2.3cm	0.4cm	0.4cm	1g	

Table 11-1 The details of iron objects retrieved from EX 02



Figure 11-7 The details of iron objects retrieved from EX 02

With reference to the excavation of RUSL/PP/EX 01, a copper rod was found from interior filling of a pottery ware with faunal remains in the cist burial of context number 17. The rod was found as two fragments since it was heavily deteriorated and it recorded 12.9cm and 0.35 cm as length and thickness respectively. According to the dimensions this artifact can be hypothesized as a kohl stick or hair rod.

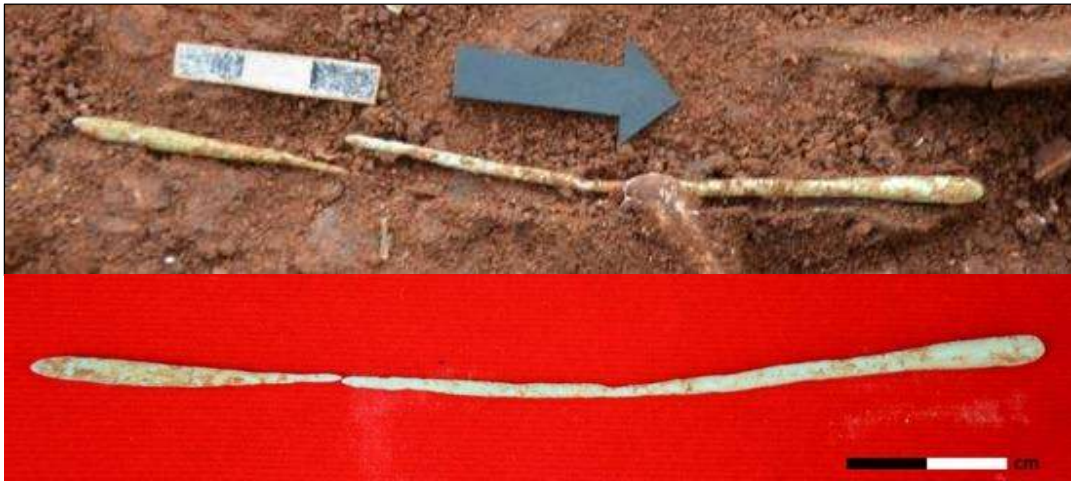
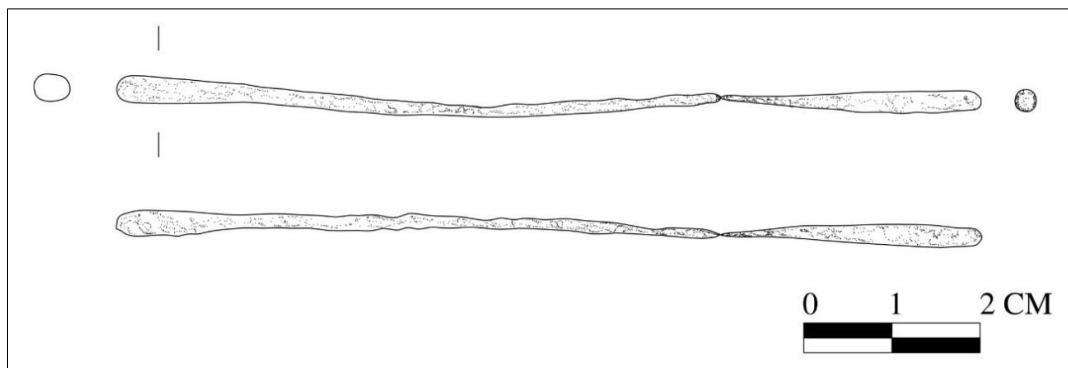


Figure 11-8 The copper rod retrieved from RUSL/PP/EX01

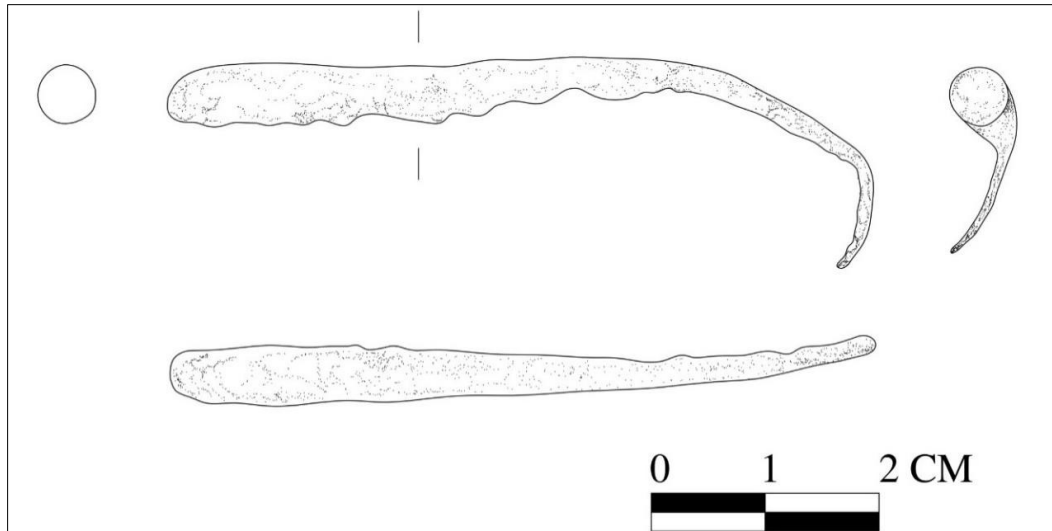


Plan 11-4 The copper rod retrieved from RUSL/PP/EX01

A copper rod uncovered inside a cist burial without a capstone at the filling of the context number 06 at Palipbothana megalithic site, during the excavation of RUSL/PP/EX 03. This rod was shorter than the copper rod found at RUSL/PP/EX01 which recorded as 5.7 cm and 0.46 cm in length and thickness. Though it was heavily deteriorated, this artifact can be suggested as a kohl stick.



Figure 11-9 The copper rod retrieved from RUSL/PP/EX03



Plan 11-5 The copper rod retrieved from RUSL/PP/EX03

It is significant to find out that most of the metal objects were yielded from the interior burial deposits and the burial urns. Factors with reference to copper were revealed from the two cist burials of EX01 and EX03. The excavation with two orthostats called EX02, revealed iron tools like small knife blade and an iron rod. According to the requirements of the tools like knife, mostly the male would be utilized and the kohl sticks would be utilized by the female. Accordingly, it can be suggested that EX01 and EX03 burials were females and whereas burials of EX02 would be recognized as male ones.

When investigate the above mentioned physical cultural features it is important to examine the metal usage of the peripheral region. Palipothana burial complex which is located at Malwatu Oya, Yan Oya and Ma Oya basins had been a cause to build up the

resource consumption pattern, inter relationships and to create the metal consumption pattern. The consumption of metals in Anuradhapura and its peripheral region plays an important role when examine the metal consumption and artifacts at Palipbothana. Anuradhapaura inner citadel, Gedige excavation AG69 yielded copper nails, iron nails from the 3A layer (Deraniyagala,1972,143,152). The evidences dated 800 BC and it proves that the metal technology was in advanced level during the contemporary period. The metal technology can be recognized as a medium of technology introduced by Indian peninsular during the period of 1000 BC – 800 BC and it was revealed that inner citadel in Anuradhapura, Yan Oya basin had used this technology (Seneviratne,1984, 273,1995.19). Hematite (Fe_2O_3), Limonite ($\text{Fe}_2\text{O}_2\text{H}_2\text{O}$) and Magnetite (Fe_2O_4) were prominent during the Proto-historic period in Sri Lanka (Senaviratne,1990,03). Researches showed that these raw materials were easily found from the surface of the land in North Central province (Senaviratne,1984,272). Accordingly, based on the raw materials and their easy access with advanced technology would made the platform to produce the metal tools.

The Proto-historic era is considered as the first period which used iron and copper basically in Sri Lanka and this was preceded over Sri Lanka during different phases which go back 4000 years, in means of before 2000 BC as proven from the archaeological facts. It was archeologically proven that the utilizing of iron and copper minerals were started before 1350 BC (Somadeva, 2006; Somadeva, 2018). Seruwawila, which located in Trincomalee district can be recognized as an area where copper ore deposited naturally and the Department of Geological Survey conducted a scientific study on the minerals which deposited at Seruwawila in 1971 (Senaviratne,1984; Senaviratne, 1995, Senaviratne,2007). However, in 1821 a British nationalist, called Davy recorded Magnatite Ore and Tenant studied about Mercury in this area (ibid). According to the modern geological researches, the origin of Seruwawila Copper Magnetite Ore was recognized as the intermediate zone of the Eastern Vijayan Complex and Uplands (Cooray,1984; Senaviratne, 1992). Seruwawila mineral deposit which located at a tip of the geological zone which extends at a breadth of 10 miles and a length of 250 miles from Trincomalee to Ambalanthota coastal strip had emerged Copper Magnetite to the surface. It is a metamorphic rock boulder which consisted with valuable minerals like Copper, Magnetite, Silver, Bismuth, Zinc, Mica, Chromium, Nickel and gold at depth. Among the rocks in the area Charnokite gneisses, Quartz and Iron Ore can be recognized (Cooray, 1984; Seneviratne 1995). It was revealed that 7 million of tons of Copper Magnetite deposited at 200 feet depth from the surface level of Seruwawila, as

revealed by the Department of Geological Survey in Sri Lanka (Seneviratne, 1995). The metal resources were an essential component of the subsistence pattern of the Proto-historic people during the Early Iron Age period as portrayed from the Kadiraweli and Mahindapura Early Iron Age burials in Trincomalee district (Seneviratne, 1984; Thantilage, 2016). It can be hypothesized that the proto-historic people established their settlements here in order to exploit the ore in the deposit.

The copper deposited at Seruwawila is easy to access due to its geomorphological features. As mentioned by Sudarshan Seneviratne, Mahavamsa described this area as “Thamba Pitta” in means of the copper which exposed to surface (ibid). With reference to the archaeological evidences yielded from Seruwawila, the settlements go back before 8th century BC (Seneviratne, 1992). Siran Deraniyagala identified that metal was used at the settlements of Anuradhapura citadel even before 8th century BC (Deraniyagala, 1972). The Seruwawila copper deposit which located 40km from Anuradhapura city (Thantilage & Vithanage, 2016) can be suggested as an area where the ancient people fulfilled their necessities of copper as a raw medium (Seneviratne, 1994). The metal objects discovered from Anuradhapura citadel, in 1987 were showing resemblance to the metal composition of Seruwawila copper deposit according to its chemical and element analysis (Seneviratne, 1995).

It was an important fact that pure copper was available at the surface level of Seruwawila for the ancient people. Accordingly, archaeologists believe that people who lived in Anuradhapura, North Central province and Jaffna Peninsula were utilized this metal resources before 8th century BC. The deposit at Seruwawila was the base for establishing of settlements at Eastern area and Middle Yan Oya basin, in the Proto-historic period especially before 8th and 7th century BC as it is clearly shown through the burials and settlements expanded over Middle Yan Oya basin. Especially proto-historic settlements with regarding to Middle Yan Oya basin recognized at Kahatagasdigiliya and Horowpatana divisional secretarial zones as Vdigawewa, Gurugalhinna, Kokebe, Tammennagodalla, Diwulwewa, Maradanmaduwa, Parangiyawadiya (Nikawewa), Dikwewa, Ethabendiwewa, Panketiyawa, Paluketiwewa, Galendakatuwa, Nelugollakadawala, Elapathwewa, Mahapotana, Berawayagala, Panwatta, Padarellawa(Rabewa), Malporuwala, Kirimetiyyawa, Oluwewa, Walasmulla, Palipothana (Mendis, 2017; Dissanayake, 2018) and the copper made tools yielded at Tammennagodalla, Palipothana and Gurugalhinna are significant here. Accordingly, the utilizing of metal resources was a continual process which occurred from

proto-historic period to early historic period as proven from literary sources and epigraphical evidences.

Seruwawila copper deposit which located at the eastern peripheral of the ancient Anuradhapura city started its consumption during proto-historic period, it was extensively processed during the early historic period which commenced from 3rd century BC Parumakas were the powerful state in the society who had the ability to achieve these metal resources as mentioned in the Pre-Brahmin inscription of Kurunekallu area (Ic.Vol.I,1970: No.319). As described by Sudarshan Seneviratne, the word “Parumaka tabara” in the inscription of Kurunekallu explained the Parumaks who involved as coppersmiths and the administration of the Seruwawila copper deposit was handled by the Parumakas during early historic period (Seneviratne, 1989). The power guided by the Parumakas over the ploughshares is an example for showing up the power enrolled around Parumakas in utilizing metal. The inscriptional evidences revealed as Parumaka Naguli, Parumaka Naguliya portray how the ploughshares were monitored during the metal related agricultural activities (ibid: No. 260” 869). The early Brahmi inscriptions show that the searching, transporting and the process up to a finished product of metal resources which located at the Eastern periphery of Anuradhapura were conducted by the professional craftsmen. Especially as mentioned in Datuwansa, “Mahacharika Magga” which identified as the main road which distributed products from Serunuwara to Anuradhapura and the ford which distributed copper via sea was known as “Tambatittha” as described in Mahavamsa (Seneviratne, 1995 ; Seneviratne, 1996). Inscriptions reveal information about community groups like Gamika and Gahapathi who contributed for the distribution of products. Among them, Muthugala inscription mentioned “Gahapati kabara” (ironsmith) and “Gamika Thodika” (fordsman) (Ic.Vol. I, 1970: No. 301,309) in means of those who manufactured and distributed these metal resources.

Anuradhapura became a well-developed city due to the power administered over the metal resources which handled by Parumaka, Gahapati and Gamika during the 3rd century BC The administrative power of Parumaka can be read from the road of product distribution which extended from Seruwawila to Anuradhapura and the craftsmen who had a significant training would recognized at the middle Yan Oya basin including the early Brahmi inscriptions which identified at Periyapuliyankulama, Kebitigollawa, Brahmanayagama, Nettukanda and Kahatagasdigiliya (ibid: No. 350, No. 351, No. 370). Accordingly it is clear that the people who engaged in commercial activities (Vanija) in Periyapuliyankulama would

continue the process of copper distribution up to Anuradhapura. The ancient road which linked the eastern periphery from Seruwawila to Anuradhapura known as “Mahacharika Magga” and a great contribution was done by the early historic community (3-1century BC) who were skilled at iron industry with a vast training as revealed from the areas ; Brahmanayagama **Kabara** (ironsmith)(ibid :No.161), Nettukanda **Kabaragama** (village of ironsmiths) (Nicholas Vol. ii 80. No. 6), Kahatagasdigiliya (**Kabara Vavi**) (Uduwara, 1991: 211), Kebitigollawa **Acariyagama** (village of the manufacturer).

This process is a totally connected process with Anuradhapura, which proved from Labuetabandigala inscription in Kebitigollawa. Moreover the inscription mentioned the eastern market of Anuradhapura city as “Mahatabaka nigama” (market of the coppersmiths) (Ez. Vol. iii : 33 ; 247 - 253) As a result of the existence of an important market at the eastern part of Anuradhapura city the consumption and the manufacturing of the Seruwawila copper deposit would be very exalted. The utility of this specific market can be revealed from the excavation of inner citadel in Anuradhapura. In order to produce the dark blue transparent beads which yielded from the **4B** soil layer of Gedige excavation **AG 69** the availability of the mineral called Cobalt should be there. As described by Siran Deraniyagala Seruwawila copper constitute Cobalt in high amounts (Deraniyagala, 1986: Deraniyagala, 1972). Similarly, Seruwawila copper was significant in extracting Copper Oxide for manufacturing Glazed tiles. It is clear that Seruwawila played an important role in the linkage of Middle Yan Oya basin and Anuradhapura grown up as a market during the middle historic period in means of 1st to 6th century AD.

The social formation was an important fact for the development of Anuradhapura city as manufacturing of metal objects recognized not only from the Inner citadel of Anuradhapura, but also from Jetavanaya and Vessagiriya. The archaeological excavation yielded at Jetavanaya complex recorded copper slag, iron slag, crucibles and furnaces used for smelting metal from the Pre-Jetavana settlement layers (Mendis, 2009). Similarly, Vessagiriya revealed metal slag and fragments of crucibles from the soil layers representing the early historic period (Mendis, 2007). A cave offering of a person related with gold industry described as **Taladara** mentioned in an early Brahmi inscription of Vessagiriya (Ic. Vol. I, 1970: No. 80). Senarat Paranawitana, who interpreted the word **Taladara** translated it into Sanskrit as **Tuladhara** and Sinhala as **Tarahal** with a meaning of a craftman who involed in gold work. As Sudarshan Seneviratne mentioned, the person called **Taladara** was engaged in measuring gold or exchanging gold coins. Accordingly, the person named

Taladara would be engaged in gold industry or weighted the gold. In fact, the utility of natural metals at the eastern periphery of the Anuradhapura city during the period of proto-historic and early-historic eras was highly occurred inside the areas of Anuradhapura city and its periphery. Consequently, the epigraphical and literary evidences show that the market existed to sell the copper objects and the commercial process which ran through coppersmiths, ironsmiths and goldsmiths from Seruwawila to Anuradhapura were prominent factors during the middle history with reference to a well urbanized city.

As mentioned by Seneviratne, the route which joined Anuradhapura and Seruwawila identified as, “**Mahacharika Magga**”, which linked **Maha Tabaka Nigama** in Anuradhapura (Ez. Vol. iii: 247, 253) to a copper manufactured village **Ganadwara Grama** in Seruwawila (Seneviratne, 1995). Some archaeological evidences yielded as stone bridges which connected this route from Malwatu Oya, Kanadara Oya and Yan Oya even at present. Accordingly, the distribution of resources in this route was influenced for the preparation of landscape in Anuradhapura. Therefore, it can be imagined that the proto-historic site called Palipbothana which located at the Middle Yan Oya would use the copper which were available at Seruwawila. The copper rods uncovered from Palipbothana megalithic site moreover prove the fact. However, this fact will be cleared in near future using a scientific chemical analysis and it can be concluded that the metal consumption of the Palipbothana and its periphery was fulfilled by the Seruwawila copper deposit.

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