

Research Paper

A study on prehistoric lithic-tools assemblages found in the vicinity of Batadombalena, Sri Lanka

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ABSTRACT

Kuruwita Batadombalena is a remarkable prehistoric cave-dwelling, where archeological evidence dating back 37,000 years has been found. In the years 1938, 1979-1982 and 2005, excavations were carried out to further study and extend the knowledge on prehistory. Those systematic excavations have made it possible to uncover prehistoric human remains and material remains of human activity in time and space. Lithic tools are important as a physical partial evidence to develop the technological background of prehistoric man. Present study was based on the types of lithic tools identified in Batadombalena via previous research and the lithic tool factors identified through the surface exploration of cave in 2022. Through this study, a sequence of the technology of lithic tools and microlithic tools was developed and information about new lithic tools identified by surface exploration that were not identified by previous research, discuss based on physical factors. The main research question was, is it possible to identify new tools in Batadombalena and is it possible to develop a sequence for lithic tools technology. As the research methodology, study prior research and publications, collection of samples by surface exploration method in an area fifty meters forward and on both sides from the cave and then they were analyzed. The objective was to identify materials and develop a sequence on stone tool technology. A sequence of microlithic tools made by prehistoric humans lived in Batadombalena can be identified and other stone tool factors were also found. Coarse stone may have been used in addition to the quartz.

Keywords: Batadombalena, Microlithic tools, Mesolithic period, Prehistoric period, Raw-materials, Sequence of lithic tools technology

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1. Introduction

Sedimentary deposits in the rock caves of lowland wet zone can be identified as a major source of prehistoric data in Sri Lanka. Thus, the records about the oldest prehistoric facts in Sri Lanka has been found in Horana, Bulathsinhala, Pahiyangala prehistoric cave dwellings, which date back to 47,000 years. After that, the oldest evidence comes from the prehistoric cave dwelling of Kuruwita Batadombalena, which was subjected for this study. Human remains

belonging to 24 prehistoric humans, animal remains, plant remains and tools made using animal bones and stone tools have been found in this cave, which was carbon dated to 37,000 years (Perera, 2010).

Here, Attention has been paid to the evidence presented regarding stone tools from the archaeological excavations

conducted in the years 1938, 1976 - 1982 and 2005 related to Batadomba cave.

In addition, the research activities were further expanded with the samples discovered by the surface exploration conducted in 2022 in a specific area of the Kuruwita Batadombalena vicinity. By doing so, a sequence of design techniques has been prepared based on the methods of microlithic tool technology in relation to microlithic stone tools and Balangoda points.

Evidence of other stone materials and lithic tool remains that were not identified in the previous research but could be identified by surface exploration in 2022 has been included here.

1.1 Research history

Three types of prehistoric sedimentary deposits are revealed in Sri Lanka (Manamendra-arachchi, 2014; Perera, 2015).

- Ratnapura lake and river deposits in low country wet zone (Ratnapura bed)
- Coastal deposits of Iranamadu formation in semi-arid zone (Cooray, 1984)
- Sedimentary deposits in low country wet zone caves/rock shelters and open-air habitation floors

Kuruwita Batadombalena belongs to the sedimentary deposits in low country wet zone caves (De Silva, 1945) and archeological research has taken place in several occasions and a large number of prehistoric materials have been found, including animal and plant parts, animal remains and stone tools, which are mainly related to human activities (Perera, 2010). The systematic excavations conducted from 1979 - 1982 under the supervision of Siran Deraniyagala and Nimal Perera in order to update prehistoric information in 2005, led to mainly find stone tools (Perera, 2010).

Excavations carried out in 1979 - 1982 and 2005 have found a large number of stone tools made from siliceous rocks such as quartz and chert. Specially" those are some stone tools of Mesolithic and geometric microliths (Deraniyagala, 2004).

The first excavations in Batadombalena was conducted by P.E.P. Deraniyagala in 1938. Following excavations were carried out under the supervision of S. U. Deraniyagala from 1979-1982. This excavation proceeded to bedrock at 2.5m below the surface (Deraniyagala, 1982). The bedrock was clearly weathered, and in 1986 a probe bored nine meters deep into the weathered bedrock of the shelter without reaching the un-weathered horizon. These excavations recovered a large collection of artifacts and faunal remains (Perera, 2010). Then in the year 2005, excavation research has been done under the supervision of Nimal Perera in order to update prehistoric information (Perera, 2018). In

particular, this excavation has led to uncover many organic materials. A number of climatic changes from early habitation to the terminal Pleistocene period may have resulted in changes in organic remains and excavations have made it clear that human's choice or their selectivity has also affected this. Certain resources themselves may relate only loosely to climate, as the result of human over-predation, human-induced vegetation change, or the greater niche breadth of certain species compared to more niche-specific species (Perera, 2010). The cultural remains of early man of this area were discovered together with the skeletal fragments and geometric microliths. Other detections include various types of fauna and flora that are thought to have formed part of human diet, also the animal bones, which was fossilized adjoining the Sabaragamuwa Basin called "Rathnapura Fauna" (Sumanarathna, 2016)

1.2 Study area

Kuruwita Batadombalena (GPS: 6° 77' N, 80° 39' E) is a gneiss rock formation at a height of about 460 m above sea level at the foothills of Adam's Peak (Fig. 01), falls within the Sabaragamuwa province, lowland wet zone of Sri Lanka (Perera, 2018) and have mean 3000 - 4000 mm heavy annual rainfall (Perera, 2010).

Quaternary climate in Ratnapura is a cool, pluvial phase marked by moderate to heavy rainfall; tropical rain forest vegetation (Cooray, 1984). Precipitation is fairly evenly distributed throughout the year, although January and February are drier months. The annual climatic pattern is dominated by the southwest monsoon (Deraniyagala, 2004). The terrain abutting the cave is covered by dense lowland equatorial rainforest distinguished by evergreen plant communities typical of the Wet Zone in Sri Lanka (ibid).

Batadombalena, a rock shelter in the rainforest of southwestern Sri Lanka, has yielded some of the earliest evidence of *Homo sapiens* in South Asia (Perera, 2011). The cave has an inverted 'V' shape with the cave entrance facing south-west. It is 15m wide and 10m high and the area of the cave floor is 20 x 10 m. The cave is illuminated by natural light streaming in from the opening. The internal floor is dry even during the heavy rains of the southwest monsoon and stream flows in front of the cave provide potable water throughout the year (Perera, 2018). The discharge runs beneath the shelter to join the stream some 30 m beneath the shelter which drops into the access path to the site (Perera, 2010). The shelter lies within the lower or first peneplain of Sri Lanka, in gneissic rock of the Highland Series of Pre-Cambrian basement crystalline. This highland series is classified as metamorphic sediments, and comprises a heavily folded complex of highly metamorphosed quartzite, granulite, schists and gneisses (ibid).

There are three protected caves in the naturally formed Batadomba rock. It is the main cave that is currently being

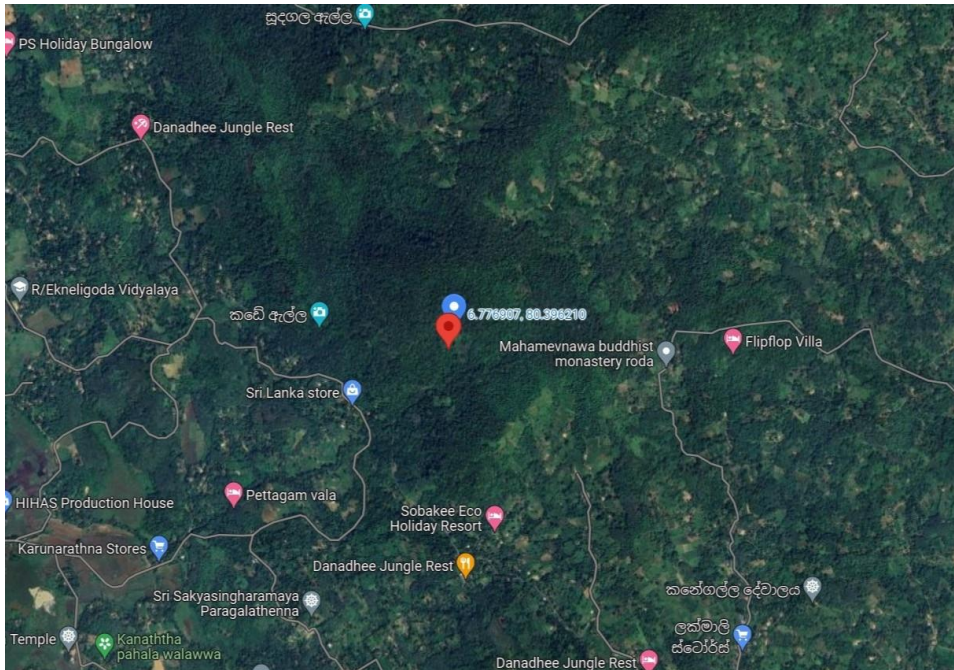


Fig. 01. location of the Kuruwita Batadombalena Cave (Source: Google Earth)

excavated, the later walled cave and the other adjacent cave'

Research has made it clear that the climate has directly affected the composition and abundance of snails living here today. Thus, it is clear from the remains of plants, vertebrate and invertebrate animals that have been identified through the excavations; (Perera, 2010) the plant and animal community of the area and favorable climatic characteristics have led to the territorial selection of the past human being in the area including the Batadombalena.

Scattered data of prehistoric human activities were identified in the area around the cave. As land is constantly eroding, data related to human activity is exposed. Accordingly, it is important to identify that lithic tools are widespread in a specific area around the cave, to find out technical qualities and type of lithic tools.

2. Research Methodology

The study was carried out by studying the stone tools collected from the surface exploration method. In the year 2022, field exploration activities were carried out in an area of 50m from the center, in front of Batadombalena and 50m from the both sides of the cave. Throughout that, the conclusions were reached through the collection of samples, classification and analysis.

3. Results and Discussion

3.1 Kuruwita Batadombalena and associated stone tools

In the year 2022, during the field sampling, materials associated with the creation of lithic tools were observed on

ground surface near the cave. Furthermore, observed divided and used clear quartz and milky quartz stone blocks which have been brought to the site vicinity. These have been exposed to the surface by washing near the point where the water falls from above in front of the cave (Fig. 02 A-B).



Fig. 02 (A - B). The quartz fragments explored due to the surface erosion in front of the cave

Making micro-lithic tools, first the external parts of the quartz stone are removed and it is prepared in the required manner. Evidence suggests that round stones (pebbles) and stone blocks may have been used for this purpose. The

ventral surface has created signs of the impact, while the dorsal surface remains in its natural form (Fig. 03 A - D). With the aid of a Hammer stone, the outer layers were removed using hard hammer percussion and Free-hand direct percussion methods.



Fig. 03 (A - D). Outer flakes collected from the vicinity of Batadombalena

Some of the stone tools belonging to the Middle Stone Age (Mesolithic) have been found during the excavation work in Batadombalena are currently exhibited in The Ratnapura National Museum, and most of them are microliths including scraper tools, flakes (inner and outer flakes) can be identified separately (Fig. 04).

A cobble stone was found which was prepared by removing flakes from a block of quartz stone (Fig. 05). It appears that an attempt was made to prepare a prominent platform on the stone. It allows the production of tools to be carried out effectively. From the shape of this, it appears that a suitable platform has been skillfully prepared by removing the flakes and shaping them in such a way as to require natural round stones. And the quartz blocks in the surrounding area are

not like the natural rounded stones, but lack the same inherent shape.

It can be inferred that these quartz blocks were deliberately shaped in a rounded manner before undergoing the tool manufacturing process. This shaping process is carried out to ensure suitability, ease and efficiency of quartz blocks for tool making purposes.

Observations indicate that naturally occurring rounded stones and deliberately shaped quartz blocks were used to make tools at this site. This highlights the intentionality and skill involved in tool making in prehistoric man.

In order to remove the stone flakes, it is seen that the stones have been removed by direct percussion method, striking to the corners and edges with the help of a stone hammer.

The flakes that are removed often change depending on the characteristics of the rock and the intensity of the blow. The Bubble and the Ripple marks which used in the lithic tool studied can be recognized during the separation of the stone parts from the core. But the materials show how it has also changed depending on the nature of the stone. For example, due to the inclusion of clear quartz mineral in rocks such as clear quartz and smoky quartz the above mentioned features are created during the separation, but it is clear from the specimens found that those features are not created in the flakes during the manufacturing of lithic tools from milky quartz. Also when the stone is damaged, those characteristics have not been formed because the applied pressure does not move uniformly. The flakes from the round stones are often removed obliquely from the core making a Conchoidal fracture (Fig. 06 A-D).

After removing the flakes, the core shape is created by Soft hammer percussion method with a stone hammer. The bubble and the ripple marks are clearly identifiable there. Removed flakes are often sharp and the outer surface bears the traces of previously removed flakes (Fig. 07 A-B).

Materials suggests, small pieces were removed using the pressure flaking technique and sharpened delicately (Perera, 2020) (Fig. 08 A-B).

Fig. 04. Mesolithic stone tools collected from Batadombalena excavations displayed at the Ratnapura National Museum





Fig. 05. The round core with striking platform after removing the outer flakes

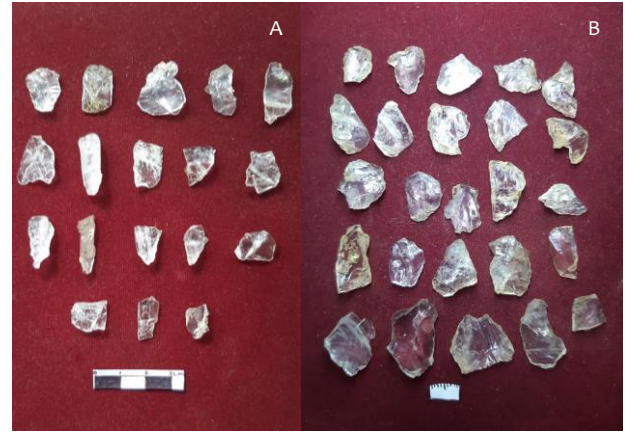


Fig. 07 (A - B). Small flakes removed from the core using the Soft hammer percussion method



Fig. 06 (A - D). Conchoidal flakes removed from the prepared core

It appears that the stone tools created by removing the flakes from the core or the core tools (Fig. 10) belonging to the Balangoda culture such as Balangoda points, small core tools, different shapes of micro-lithic tools, micro blade tools have been created using milky quartz and clear quartz (Fig. 09 A-B).

Thus, it is possible to build a sequence related to the microliths, blade tools and Balangoda pointed tools from Batadombalena.



Fig. 08 (A - B). Small flakes removed using the Pressure flaking technique

A small flake of a chert found on the surface in front of the main cave (Fig. 11 A-B). It is remarkable since there's no chert found around Batadombalena area. Furthermore, it is evident from the characteristics of the separation, that this small flake has been created by some human intervention.



Fig. 09 (A - B). Small core tools, removed flakes, different shapes of Microliths and Micro blade tools



Fig. 10. Core remains after flake removal



Fig. 11 (A - B). Dorsal and ventral aspects of the small chert flake found in front of the cave

Furthermore, where the ground has been degraded and exposed due to the stream that falls from above in front of the main cave (Fig. 14), there are large pieces of quartz stones as mentioned earlier (Fig. 12 A-C). Stone fragments used for human activities are also found here. In particular, stones with fracture features and ripple marks can be seen. Among them, a stone with a cutting edge, which was not shaped, which could have been used by humans and a stone piece which could be considered to have shaped the edge by humans identified. Small flakes have been removed and ripple marks can be seen on its blade (Fig. 13 A-D). Both are fractured clear quartz.



Fig. 12. (A) A non-man-made tool and (B - C) man-made lithic tool of similar shape

Through observation of the surface of what appears to be a mound in this unexcavated cave revealed a stone tool that identified as a Stone Cleaver (Fig. 15 A-B). Formed from the gneiss rock, this appears to be a naturally separated rock piece and seemed to have use for human activities. In

particular, the thin surface of one side has worn away, while the other side has been designed to be gipped well. The place where the thumb is placed has been damaged on two or three occasions. In addition, the palm part of the hand and the finger touching part has been worn. It is best diagnosed by the worn-out of where the distal phalanx of the thumb and the metacarpal bone is placed (Fig. 16).



Fig. 13 (A - D). Close-up of the prepared lithic tool



Fig. 14. The Batadombalena main cave and the front vicinity in 2023



Fig. 15 (A - B). The Stone Cleaver

Through this, it is explained that modern man has used any type of rock that can be used to fulfill his needs while using stone tools to accomplish those tasks, but the basic characteristics of the stone tool must have been contained in the stone.



Fig. 16. The way how stone tools have been used

The tools both selected man made and naturally formed rock fragments appear to have used.

Furthermore, identified by materials, the prehistoric humans who lived in the Batadombalena vicinity have used a stone tool that was pierced on both sides of the rock (Fig. 17 A - B).

Evidence are common for the prehistoric man have burned the animal and plant materials prior to consume. Burnt bones, wild nuts, fruits and Pitted Pebbles have been found in almost everywhere they lived. According to Siran Deraniyagala, the Pitted Pebbles, about the size of a palm and found from the river beds have been used to make fire (Adhikari and Manamendra-Arachchi, 2014). In addition to these stones with wholes on both sides, stones with a whole on one side are found in Sri Lankan prehistoric fields. This tool remains as a broken part which was found in a recently stockpiled site in the unexcavated cave of Batadombalena. This tool can be found in a broken form in other fields as well. That makes it possible to think it may have used to crush something other than making fire. In this way it can be explained the prehistoric humans may have used whatever was easily available that they found suitable to carry out their requirements.

In addition to this, a rough stone like an Anvil Stone (Fig. 18 A-B), with a curved side and a broken other side was found

close to the point where the water falls in the stream, close to the Batadombalena entrance way. But due to the lack of a scientific excavation, the depth of the whole which is deeper than a common Pitted Pebbles and the fragile nature around the mouth of the whole, it is not possible to access the age. This type of structure has not been reported from the prehistoric settlements in Ratnapura area. But this is important as a material residue that has been subjected to human processes in the environment of a prehistoric cave site.

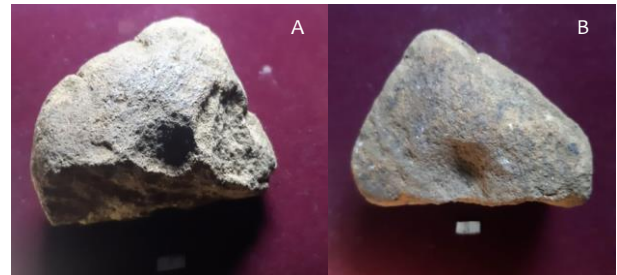


Fig. 17 (A - B). The Pitted Pebble



Fig. 18 (A - B). The Anvil like stone

Several pieces of gneiss stone flakes (Fig. 19) made of rough stones identified in front of the Batadombalena but it is impossible to state that these were definitely created through human activities. But flakes have been removed from the dorsal side of some, the striking stage of some can be recognized and a form is seen in an orderly manner.



Fig. 19. Gneiss stone flakes

4. Conclusion

Nowadays, human beings produce equipment and tools using various raw materials and in different forms in order to fulfill their requirements. It can be thought a similar process may have existed simultaneously in the past.

It appears that the ability to easily find, use and manipulate suitable raw materials for their tasks, and their experience in using raw materials for those uses, has been important in the selection of raw materials and in the production of tools.

It can be recognized that, the use of stones such as Quartz, Gneiss, Chert in the production of lithic tools and the use of quartz in the production of microliths / micro-lithic blade

tools and Balangoda pointed tools, a certain technical sequence has been used.

Accordingly, it can be recognized that the modern man belonging to the Balangoda culture, who based at the Kuruwita Batadombalena has created a set of stone tools suitable for their modern use in order to maintain their life in the Stone Age.

In archaeological research on human settlements, especially in prehistoric cave related research, by exploring the surroundings of human habitation caves, remains of past human activities can be discovered. It is important to explore the area around the caves as it has the potential to get archaeological data.

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