A Microlithic Assemblage from the Terminal Pleistocene: Alawala Pothgul-lena Rock Shelter in the Wet Zone of Sri Lanka

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Abstract

Stone artifact assemblages have long been used for the identification ancient cultural connections and trends through space and time. In this endeavor, archaeologists have focused on variations in lithic morphology. Sri Lankan sites dated from 47ka onwards, yield stone tools of the microlithic technological tradition. These complex tools are characterized by an expanding range of geometric tools, non-geometric tools, and the novel exploitation and sourcing of raw materials. From the Wet Zone of western Sri Lanka's Gampaha District, the rock shelter-cave site of Pothgul-lena (PGL) was excavated in 2008-2009. Stone artifacts recovered from PGL belong to the microlithic tool tradition, an enduring technological tradition that has been in use in Lanka from approximately 50,000 years to early historic times. According to C^{14} dating, the PGL site has been occupied from the terminal Pleistocene (*ca*. 14ka) into the mid-Holocene (*ca*. 6ka). Preliminary analysis of artifacts revealed that they were fashioned using the freehand percussion (soft hammer) technique as well as the bipolar technique. The raw material used to produce microliths was quartz of both the clear and milky variety. A high number of cutters, one-edge cutters, scrapers and non-descript flake tools recovered from the excavation are described in this report.

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Introduction

The main objective of this report is to provide a summary of evidence from lithic artifacts from the rock shelter-cave site of Alawala Pothgul-lena (PGL) in the Gampaha District, western Sri Lanka ("lena" = cave). Regionally, archaeological data characterizing the Sri Lankan microlithic period stems from a series of cave site excavations in the lowland Wet Zone. These include Fa Hien Lena near Bulathsinhala, Batadomba-lena near Kuruwita, Beli-lena at Kitulgala, Attanagoda Alu-lena near Kegalle and Dorawaka-lena near Warakapola. The excavation at Pothgul-lena (PGL) revealed reliable evidence of prehistoric cultural trends in Sri Lanka.

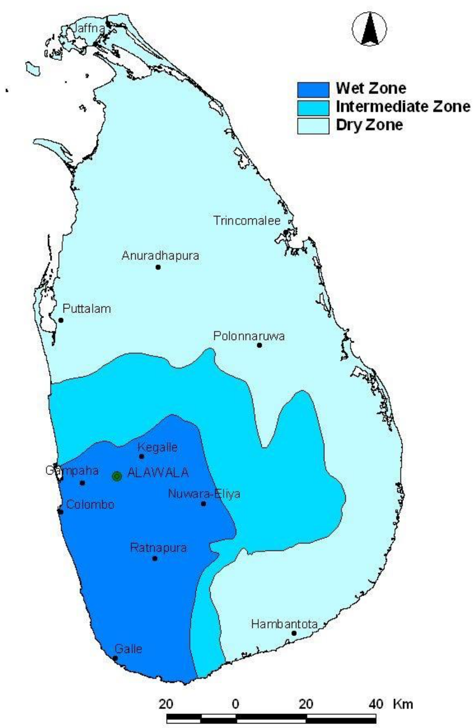

Figure 1. Map showing the site of Alawala Pothgul-lena

The earliest evidence of human habitation in Lanka has been recorded from 47000 years BP onwards along with the microlith tradition that has been firmly established in the island. Recent investigations reveal that Fa Hien cave represents the earliest microlithic tools recorded from South Asia (47000- 45000 BP) (Wedage et al., 2019). Human habitation and microlithic stone tool usage appears to have continued for most of the late Pleistocene and extends well into the mid-Holocene at 4000 BP (Blinkhorn, et al., 2014, Boivin, et al., 2013, Clarkson, et al., 2009; Deraniyagala, 1992; Perera, 2010; Petraglia, et al., 2009; Roberts, et al., 2015; Wedage, et al., 2019; Wijepala, 1997).

According to radiocarbon (C 14) dating, the PGL human occupation spans the terminal Pleistocene (14ka to 12ka) into the mid-Holocene 7-6ka BP. Stone artifacts found in PGL cave have similar technological attributes to those that were recorded in other cave sites in the Wet Zone (e.g., Fa Hien-lena and Batadomba-lena).

Research Context and the Alawala Potgul-lena Site

We briefly outline our investigation strategy within the context of the current understanding and interpretation of lithic assemblages recorded from Lankan prehistoric contexts. The vast majority of evidence on early human occupation in Sri Lanka comes from rock shelters and cave sites of the Wet Zone in the west and southwest of Sri Lanka (e.g., Fa Hien-lena, Batadomba-lena, Beli-lena). The History of research on prehistoric technology in Sri Lanka dates to the 19th century. For instance, Sarasin (1907), Hartley (1914), Pole (1907), and Seligmann & Seligmann (1911) led investigations to inspire interest on the prehistory of Lanka. Deraniyagala's research (1992), which encompassed the first scientific and theoretical approach to reconstruct prehistoric cultures of the island, introduced a methodology to identify and classify prehistoric stone artifacts from Lanka. Accordingly, we investigate the diversification and affinities in lithic function and morphology found in the Wet and Dry zones and clues to technological adaptation and social organization.

The Alawala area is in the wet lowland of the island, at 300-400 feet above mean sea level (Figure 1). The cave is located in the Udagaha Pattuwa of the Siyane Korale in the Gampaha District. This area belongs to the second peneplain of the island and consists of rocks of the Precambrian series (Cooray, 1984). The Pothgul lena (PGL) is morphologically defined as a rock shelter (Figure 2). It is located in a higher elevated area, in the middle of a small mountain covered in secondary rainforest. This area receives rain from the southwest monsoon, a mean annual rainfall of 2500-3000mm. The PGL cave was linked to the prehistoric cave sites such as Dorawaka and Varana located along the Attanagalu Oya and Maha Oya (rivers) respectively.

Figure 2. General view of the Alawala Pothgul-lena site

Methods

The excavation of the rock shelter of PGL yielded a well-sealed and major cultural sequence covering the terminal Pleistocene of Sri Lanka. The excavation was conducted in two phases in late 2008 and early 2009 respectively. Seven layers were determined in the profile of the excavation pit, which included nine major contexts (Figure 3). Excavation was recorded in vertical and horizontal dimension using the Harris Matrix system. Accordingly, 42 contexts were identified.

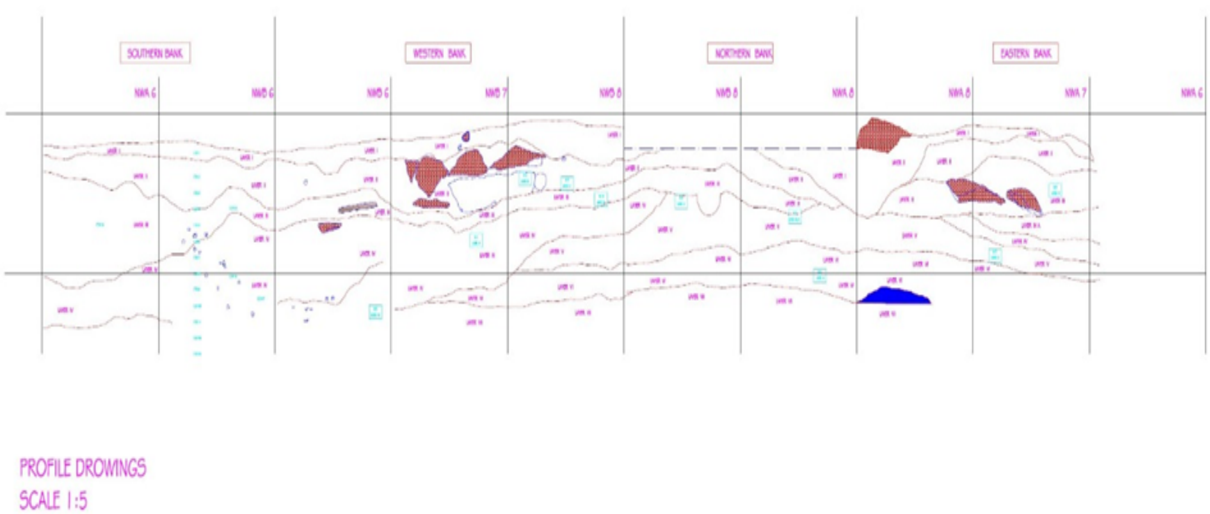

Figure 3. Alawala Pothgul-lena excavation profile (2009)

The classification of lithic types was based largely on macroscopic characteristics (Table 1). The assemblage of flake tools have been classified as semi-geometric, retouched flakes, complete flakes and flake fragments, freehand cores, blades, bladelets and bipolar cores (Crombe et al., 2009; Deraniyagala, 1992; Hiscock, 2002; Misra & Nagar 2009; Perera, 2010). The technological analysis considered the following attributes: raw material, overall shapes, ventral and dorsal surface, fracture initiation points, fracture directionality (unidirectional vs. bidirectional), ventral surface morphology (bulb of percussion, compression rings), condition (breakage and weathering), presence or absence of retouch or edge damage, and presence or absence of cortex. The attributes analyzed were metric measurements (length, breadth, thickness and weight of the artifacts), dorsal face characteristics: (number of previous flake scars and their orientation), metric measurements of the platform of the flakes and blades, Flake termination type and amount of cortex available on the dorsal surface of blades, flakes. The Andrefsky morphological index was used for the analysis of chipped tools (Andrefsky, 2005). The first dichotomy in the classification is between objective pieces that have been intentionally modified or modified by use, versus objective pieces removed from a parent object during the shaping process (debitage analysis). The study of debitage is important because it analyses formal and informal tools to identify the characteristics of the product and to understand the knapping technology in prehistoric contexts. Debitage attributes are an important background for understanding the attributes of informal tools selected for the tasks at hand, they illustrate the reduction sequence employed at a particular time and place, for both formal and informal tools, and the extent of reduction of cores and other flaked pieces, and their implications for stone provisioning hold important information for range, mobility and many other aspects of forager organization (Andrefsky, 2005; Hiscock, 2002; Clarkson, 2012; Kamminga 1982).

Category	**Definitions**
Microlith	A range axis length of less than 40mm, delicate implements with backing retouch
Geometric microlith	Microlith with symmetry around the transverse axis
Asymmetric microlith	Microlith with a pointed morphology and asymmetry around the longitudinal axis
Flake	A recognizable knapped lithic with single ventral and dorsal surface.
Bipolar flake	A flake retaining evidence of bipolar fracture damage on at least one end.
Micro blade	A small, elongated stone flake with at least one ridge along the length of its outside surface.
Complete flake	A flake with a point of impact and striking platform, intact margins and a recognizable termination.
Flake fragment	A flake lacking a point of impact and intact margins, with or without a recognizable termination.
Rotated core	Core with two or more striking platforms oriented obliquely towards each other.

Table 1. Definitions used to analyze the lithic artifacts from Alawala PGL (after Andrefsky, 2005; Perera, 2010).

Results

More than 133,000 stone artifacts were classified from the excavation, with over 90,000 stone artifacts from Phase 1 and over 40,000 recorded from Phase 2. The stone artifacts recorded from Phase 1, include complete flakes, flake fragments, core, non-flake artifacts and small debris. A few examples of bipolar cores and blades, one possible semi-geometric tool was also recovered (Figures 4 and 5). The material analysis of the artifacts showed 21% Hertzian, 69% Wedging, and 10% Bending. The quantity of cores in this Phase was higher compared to other layers with examples of core opening flakes, blades and a few examples of other possible semi-geometric microliths such as triangles, trapezes and points. Pit 4 predominantly contained flakes/flake fragments. Quartz was the primary raw material used. A few specimens of unidirectional blade cores were recovered from context 8 while many specimens of bipolar cores were present. From both Phase 1 and 2, a high number of split flakes, crushed platforms on flakes, flake fragments, and shattered debris were recovered.

About 43,000 lithic artifacts were recovered and identified from Phase 2 of the excavation. The assemblage was classified as flake and non-flake artifacts based on morphological attributes. These observations also provided valuable detail on the apparent function and used edges. Over 9000 lithic artifacts were recorded from context 3, 14, 20, 41, and 42. All are very small flakes and flake fragments.

Context 20 predominantly contained flakes, flake fragments, retouched flakes, blades and bipolar cores. Non-flake artifacts from the assemblage included grindstones, discoidal cores and multiple function hammers (Figure 6). The complete flakes from Phase 2 included the highest ratio of wedging initiation. Only a few microliths were recorded in Phase 2. Non-descript artifacts were the most commonly observed in all contexts. Retouched flakes and chert artifacts were very rare in the assemblage.

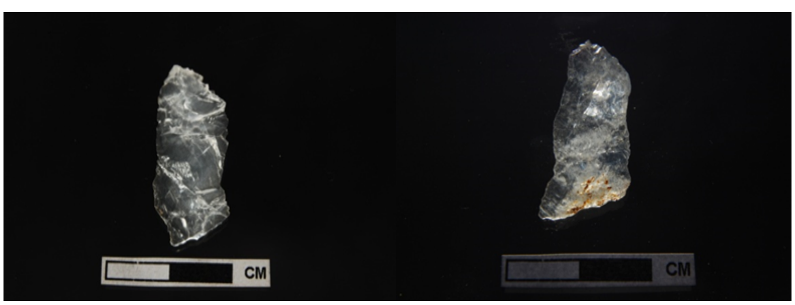

Figure 4. Microblade with possible signs of retouch

Figure 5. Microliths and microblades from PGL

Figure 6. Grindstone and non-descript artifacts.

Discussion

The microscopic observation of the Alawala PGL lithics provided important information on the cultural practices among the people of the terminal Pleistocene in Sri Lanka. Preliminary analysis of some artifacts revealed that they were predominantly made from freehand percussion or the soft-hammer technique as well as the bipolar technique. The very high percentage of debitage in the lithic assemblage from PGL can be attributed to the nature of the raw material. The raw material used to produce the microliths was clear and milky quartz. The source of this raw material was probably the quartz veins in the granite rocks present in the region around Alawala. Quartz, though being a very unsuitable material for stone tool manufacture due to its unpredictable fracture mechanics, was probably used because of its easy availability in the vicinity of the PGL cave. Chert, a more desirable material is rarer than quartz in Sri Lanka, which accounts for its proportion of less than 1% in Lankan assemblages (Deraniyagala, 1992). While blade cores were recovered from Phase 1, many specimens of bipolar cores were recovered from Phase 2. The presence of high numbers of split flakes, crushed platforms on flakes, flake fragments, and shattered debris in the assemblage recovered from phases one and two reveal the usage of a greater amount of force while producing the artifacts. It can also be attributed to the unpredictable fracture pattern of quartz as a raw material, impurities in the quartz and a low amount of control over flaking when using the bipolar method. One quartz hammer stone was uncovered from the excavation with batter marks all around its edges, which implies that the free-hand soft hammer percussion technique would have been in use. No anvils were found from the excavation phases. Only a few possible examples of semi geometric microlith types (such as triangles, trapezes are present in the assemblage). However, these geometric microliths types can be considered as unintentional byproducts of the flaking due to their very low quantity. It is possible that retouching in the flakes was used for backing purposes, while retouching on the sharp edges can be attributed to use–wear or it could be due to post-depositional edge damage, particularly in context 20. Natural nodules of quartz and fragments are also present in the excavation. Thus, while sorting, specimens bearing signs of free-hand percussion or bipolar percussion were put in the category of natural breakage since flakes taken out through bipolar percussion might also resemble natural breakage.

The excavation at PGL was limited but provided quantitative data to understand the technological behavior within the terminal Pleistocene contexts in the Wet Zone of Sri Lanka. The people of PGL had focused on the production of small blades and flakes using the locally available raw material, attributes that are in accordance with the lithic assemblages found at sites like Batadomba-lena, Kitulgala Beli-lena and Fa Hien-lena. While cutters and scrapers are predominant in the PGL assemblage, points and awls constitute a distinct minority. Grindstones frequently bear traces of red ochre (Figure 6) indicating possible symbolic behaviours. Bones and teeth of small animals such as rodents, monkeys, along with shells were found among the lithics. Some possible bone tools were also recovered.

We report that the Alawala Pothgul-lena (PGL) lithic assemblage is relatively similar to assemblages from other Wet Zone caves and rock shelters in Sri Lanka. The analysis of the stone artifacts recovered from PGL indicates that the technology, material and functions were comparable to those found in other ecozones of the island. A comprehensive analysis of the Alawala Pothgul-lena finds would offer further insights into the lifeways and cultural practices of the people, while future research in this region is likely to reveal distinctive technological behaviour in the terminal Pleistocene and early Holocene of Sri Lanka.

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