

Bone Tools Usage of Low-Land Wet Zone in Sri Lanka: Based on Cultural Phases of Rockshelters

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ABSTRACT

The low-land wet zone rockshelters in Sri Lanka, results bone tools technologies in association with Modern man/*Homo sapiens* back to c. 48,000 cal. BP. Here, I described the bone points recovered from the Low-land wet zone rockshelters during excavations. Under the analysis of bone tools, alongside detailed chronological and stratigraphical information, shows that *Homo sapiens* in Sri Lanka were utilizing with bone tool technologies as part of a contributed wet zone rainforest subsistence plan by at least 48,000 years BP.

Keywords: bone points, rainforest, Sri Lanka, *Homo sapiens*, rockshelters

INTRODUCTION

This research follows the bone tools technologies of the low-land rainforest in Sri Lanka based on three main rockshelters (Fahien-lena, Batadomba-lena and Kithulgala Beli-lena – Figure 1). Following systematic analysis bone tools technologies from the Still Bay phases of Blombos Cave dated to 78,000 cal. BP (Henshilwood et al, 2001) and Howiesons Poort strata from Sibudu Cave dated to 61,000 cal. BP (Backwell et al, 2008) in South Africa aided to force these osseous indicators modern human/*Homo sapiens* cognition more time. In conversations of early bone tools technologies have enlarged their geological range through Asia and into Sahul. Particular, the discoveries of an widespread collection of bones tools from the Niah Caves of Borneo have enthused an increasing systematic studies in Southeast Asia (Barton et al, 2009). The bone point tools from contexts dated to 38,000 cal. BP in the Niah Cave build them the oldest in Southeast Asia. This large collection is mainly measured to be illustrative of projectile points, however diverse types, comprising digging implements and piercing, are also detailed (Rabett, 2005). Fascinatingly, in divergence to earlier work focused on Eurasia and Africa, latest studies of the Niah Caves and in this the region, have been mainly focused on the environmental and ecological context of subsistence strategies and tool-use, as faced to a explore for passive signs of modernity (O'Connor et al, 2014). These settings perhaps not amazing given the various tropical forest contexts around the human populations in Southeast Asia.

The low-land wet zone tropical rainforest rockshelters in Sri Lanka also gives the earliest data for bone point tools technologies in South Asia (Deraniyagala 1992), in suggestion with the appearance of shell beads, microlithic tools and ornamentation as early as at least c.36,000 cal. BP (Perera et al, 2011). These features produce Sri Lanka an remarkably stimulating setting for examining the adaptive background of bone tools technologies.

The most archaeological investigate into the early human occupation of Sri Lanka has aimed on the Microlithic period best represented by the low-land wet zone rockshelters (Deraniyagala, 1992; Perera, 2010). Bone point tools have been found from a contexts in the low-land wet zone rockshelter sites sequences of Fahien-lena, Kitulgala Beli-lena and Batadomba-lena have been dated to early as 48,000 cal. BP, 43,000 cal. BP and, 36,000 cal. BP respectively (Deraniyagala 1992; Wijeyapala, 1997; Perera et al, 2011 and Wedage et al, 2019). They have been reported from the Microlithic of the Dry Zone in Bellanbandi-Palassa (Deraniyagala, 1992; Perera, 2010).

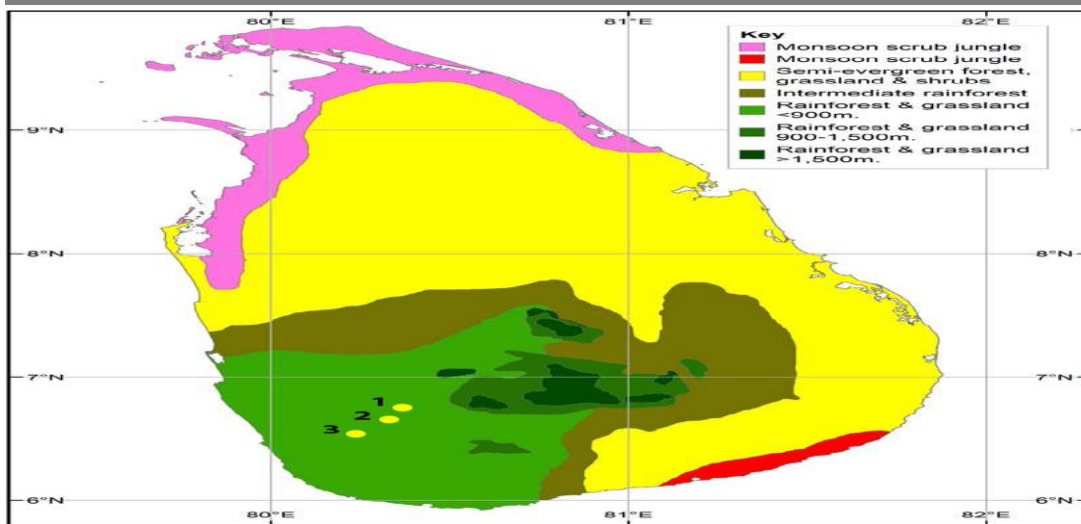


Figure 1: The location of key archaeological sites (1. Kithulgala Beli-lena, 2. Batadomba-lena, 3. Fahien-lena)

METHODS

I have referred the only research excavation reports in Batadomba-lena (1980, 2005), (Kithulgala Beli-lena (1983, 2017), Fahien-lena (1988, 2009, 2010, 2012). The reported of faunal remains from these sites, have been revealed more cut marks with bones and manmade bone point tools. All bone point tools were analyzed by scholars of related from the excavation project.

Bone tool types and chronology

The single and double bone tools mentioned, here represent in Sri Lanka Pleistocene and Holocene period. During the excavation of prehistorical sites, the whole of the bone tools collection is done up of small, strong soft bone pieces, and double or single end polished to a point. According to the Deraniyagala, the mainstream of bone point tools seem to have been produced through longitudinal cracking of long bones, shadowed by grinding in one or both ends. Then, this last procedure is revealed by longitudinal markings and transverse or edges discovered on the bulk of the bone tools. A few of the bone point tool artefacts seem to have manufacturing striations on them, namely in initial shaping and excision of long bones fragment. Percussion breaks also appear to have been worked in the preliminary parting of bone point blanks from lengthy bones (Deraniyagala, 1992). Both double- and single-point tools have been found from all excavation of rockshelters.

The bone tool points have been further classified based on two or one of five visual characteristics. In this observation, 'polished' describes slickly ground bone tool points, "split" describes bone points which keep traces of their originally split lines, "abraded" describes bone tool points and surfaces that display preliminary grinding, "rounded" signifies to specimens that grinding has left a rounded surface, 'Flattened' which describes to flattening of one part of the bone tool (Perera et al, 2011).

In 1980s excavation of Batadomba-lena, have been revealed that 147 – abrasion, 75 – rounding, 49 – polishing, 26 – split and 1 point as a flattened. 2 double and single points had been found in every strata, except strata 1; three in strata 2, 32 in strata 3, 44 in strata 4, 28 in strata 5, 24 in strata 6, 17 in strata 7a, 6 in strata 7b, and 19 in strata 7c (Perera, 2010). In 2005 of the excavation of Batadomba-lena have been revealed the 21 bone points, 19 were clearly created from monkeys's long bones - the leading prey of the inhabitants (Figure 4). Points (double) were also documented at a better rate than in the key assemblage. 4 of the points seemed burnt, that is close the relation for the faunal remains assemblage in general.

The chronological sequence of the Batadomba-lena bone point toolkits and significance to early occupation archaeological evidence in South Asia. However, given the bone remains these finds that the Batadomba-lena reporting prepares the most highly-resolved and longest Pleistocene sequence of bone point tools technologies wherever in South Asia. These bone point tools skills are represented, fairly from c. 36,000 cal. BP - 12,000 cal. BP in Batadomba-lena. As recorded from Southeast Asia, usage and manufacture of bone point tools skills at

Batadomba-lena rockshelter intensifies in the post LGM period (Last Glacial Maximum) into the Terminal-Pleistocene (Perera et al, 2017), maybe related to ecological changes seen somewhere in Sri Lanka, South and Southeast Asia most broadly, this time (Premathilake and Risberg, 2003; Rabett, 2012).

In 2017 on Kithulgala Beli-lena, total of 21 finished bone point tools produced from mammal long bones were recognized and comprising 10 completed unipoints, 4 geometrics and 7 bipoints (Wedage et al, 2020) (Figure 3). Morphological characters taken in unipoints in the assemblage suggest that were produced from ulnae and cercopithecoid fibulae. The geometrics and bipoints were most probably produced from femur fragments or cercopithecoid humerus. The utilize wear on the edge's tools discovered in Kitulgala Beli-lena look like the usage wear of flake tools reported in Fahien-lena, for example striations suggestive utilize as scrapers (Langley et al, 2020). Generally, the resemblance of the bone point tools recorded from Beli-lena to these from Fahien-lena in addition to those from Batadomba-lena propose a shared technology, facilitated foraging and hunting in the low-land rainforest settings of Sri Lanka (Wedage et al, 2020). According to the Excavations of Fahien-lena in 2009, 2010 and 2012, blanks, unfinished tools, and waste pieces were found in each cultural phases, with finished artifacts and broken fragments, with several points showing cut marks consistent with those manufactured during retooling activities. Of the artifacts prepared on terrestrial bone, 130 are consistent in weight, size, morphology and use wear with having served as projectile points (Langley et al, 2020).

Thus, the light weight, small size, fixed hafting, presence of hunting-consistent impact fractures on distal extremities to indicate that the bow and arrow was in use at Fahien-lena from at least 48 to 34 ka cal. BP (Langley et al, 2020) (Figure 2). The usage of the bow and arrow is further supported by the fact that the zooarchaeological prey mortality profiles based on dental eruption and wear suggest that prime-aged adult monkeys were targeted, this projectile technology allowed for the deliberate targeting of specific individuals. In contrast, the use of traps in the capture of semi-arboreal taxa usually results in mortality profiles similar to those in natural populations (Stiner, 1990; Piper & Rabett, 2009).

According to our data, bone projectile points increase gradually in absolute length between Late-Pleistocene and Mid-Holocene at Fahien-lena. This toolset mirrors the quartz microlith assemblage—which may also have tipped arrows—recovered from the site, which also showed very little change in dimension and raw material during the c. 40 ka that Fahien-lena was occupied (Langley et al, 2020). Bone tools and artifacts created from big antler, teeth and ungulate bones only layers to seem during the Terminal-Pleistocene. 4 teeth — 3 monkey canines and 1 barking deer molar — exhibit signs of human modification in the form of flaking to create a razor-sharp edge and grinding and/or scraping to shape the base for the hand or haft.

Some of the bone points found from Ravana-Ella cave clearly indicate incised decorations and similar artefacts were recorded from Kithulgala Beli-lena rockshelter supporting the view that these incised marks were intended to support the binding cord. But most of the pointed tools have no incise marks and possibly may have been used to fix them in position on the mastic end of the shaft. Particularly double ended tools facilitate this process allowing easy penetration into the mastic part of the shaft. Pointed bone tops which were utilized by the Stone Age people of Africa were forever poisoned, in order to avoid damage to the hunter when the arrow was not in utilize, the full head was backed and the point fitted into the shaft.

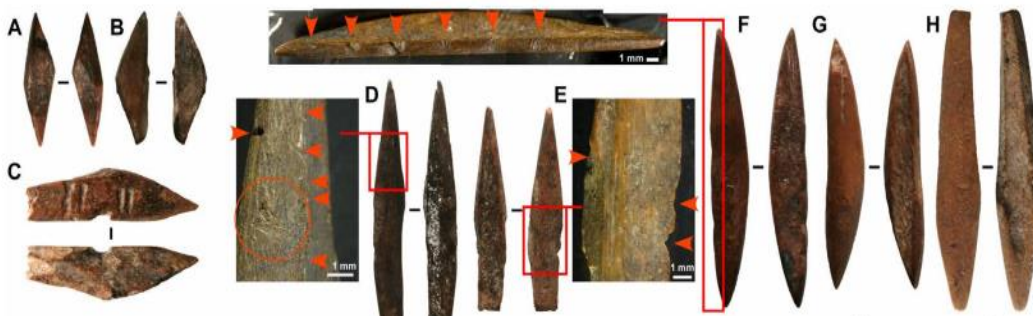


Figure. 2. Pointed bone technologies of Fahien-lena. Bone projectile points (A to H) from Fahien-lena. (A and B) Geometric bipoints; (C and F) hilted bipoint, red arrows indicate cut notches; (D and E) hilted unipoints, red

arrows and red circle indicate wear indicating fixed hafting; (G and H) symmetrical bipoints (Langley et al, 2020).

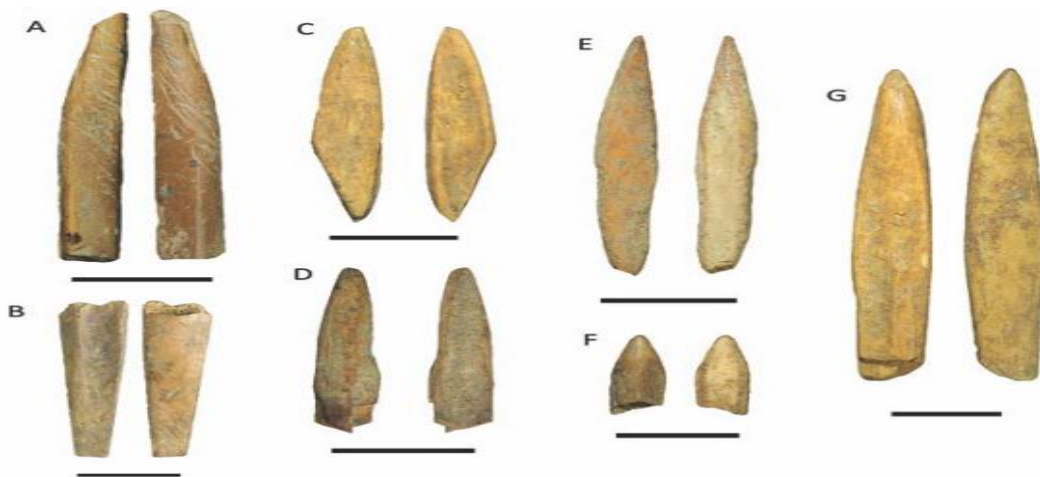


Figure 3. Bone tools manufactured from Kitulgala Beli-lena (A-B unipoints C-G bipoints) (Wedage et al, 2020).



Figure 4. Bone tool artefacts from Batadomba-lena. (Perera et al, 2011)

Environmental Context of the low-land rockshelters

According to excavations in the low-land wet zone, Deraniyagala (1992) proposed the bone point tools could have been utilized for a widespread range of dissimilar roles consisting: fishing spearheads, blowpipe darts, points, winkle to extract the rich molluscan remains too found at the rockshelter, large picks. Though specific utilizes of the bone point tools may endure indefinable for now, a conversation of floral, faunal and ecological analysis at rockshelters of wet zone gives an extra context to use and manufacture. Perera with team (2011) describe that molluscan faunal remains from the rockshelter sites comprise large quantities of land snails and freshwater snails from earliest cultural phases. This collection is revealing of a forested landscape, liberally flowing freshwater settings throughout rockshelter sites occupation. Snails happen in middens related with habitation debris and hearths. The body curl of many *Acavus* snail shells have been fed up which may to reflect the removal of edible shares of the perhaps symbolic uses or snails. Given the enhance in bone point tools presence at that time, it is feasible that bone point tools may have engaged an important part in the utilization of rainforest molluscs. An operation association may debatably too be finished with mammalian faunal remains assemblage. The classified faunal collection is conquered by medium-bodied and small taxa (c. <20 kg) of mixed terrestrial arboreal and arboreal habitat. The faunal remains of monkeys prepare the common of the faunal collection, followed by civets, mongoose and squirrel. Ground-dwelling mammals are lots rarer; largely represented by wild boar and mouse deer. Non-mammalian vertebrate faunal remains mainly include monitor lizards, snakes and jungle fowl. Plentiful butchery marks, and association by hearths, data for exposure towards fire is plentiful through the assemblage (Perera et al, 2011).

Remarkably, though the taxonomic structure of the mammalian collection varies only finely through the Belilena and Batadomba-lena sequence, Terminal-Pleistocene phase reveal a reduce of monkeys on prefer of civets, squirrels and mongoose. The utilization of bone points tools in the use of molluscan collection, fishing, projectile tool hunting has been good documented elsewhere, ethnographically and both archaeologically (Henshilwood et al, 2001; Rabett, 2005; Backwell et al, 2008). Alike, bone tools technologies uncovered in association, *Homo sapiens*/modern man in the Late-Pleistocene phase of the Niah Cave have been deduced as projectile bone points (Piper and Rabett, 2009). Nevertheless, association of bone point tools at wet zone rockshelters with adjustments in the percentage of ground-dwelling mammals, small in the faunal collection which would be tough to catch utilizing projectile technologies, can indicate that those bone point tools could have shaped trapping technologies or snare rather more than projectile tool tips.

Though evidence for snaring and trapping in the Late-Pleistocene record is frequently limited to in-direct clarification based on the collection of faunal remains assemblages, it has been debated to have happened in Europe, the coming of *Homo sapiens*/ modern man, in Africa during the Stone Age (Middle) (Wadley, 2010). The weight and shape of the low-land wet zone rockshelters bone point tools would create them proper for utility within as part of a trigger or gorge - traps method in a possible trap system. If this is certainly the case, data to delayed-return hunting technologies within Sri Lanka from c. 48,000 years cal. BP would have important suggestions for understanding of human subsistence patterns strategies in low-land rainforest context. Microscopic, residue analyses and detailed experimental of the low-land wet zone rockshelters bone point tools collection in the nearby future will help a more particular insight into the specific functions of these bone point tools. But it is now clear that the low-land wet zone rockshelters bone point tools technology was part of a devoted rainforest subsistence patterns strategy. The outcomes display that Sri Lankan human/*Homo sapiens* foragers relied mostly on low-land rainforest resources at least c. 20,000–17,000 (BP) years ago, however ongoing work is looking for extend this procedure more back in plan or time. The association of the wet zone rockshelters bone point tools with collected and exploitation of low-land rainforest faunal and flora resources, from c. 48,000–4,000 cal (BP) years BP, propose they played a significant role in subsistence patterns strategies, some of the rainforest hunter gatherers.

DISCUSSION

In this discussion, past few decades few major rockshelter sites were excavated and investigated intensively down to their sterial bed-rock levels but nothing beyond Mesolithic context was found. These sites are namely Batadomba-lena, Kithulgala Beli-lena, Fahien-lena and all cave from low-land wet zone. The Sri Lankan bone assemblages add to the evidence from the Niah Caves, Borneo and, more recently, Matja Kuru 2, Timor-Leste (O'Connor et al, 2014) in demonstrating that complex bone tool technologies accompanied early humans into the novel rainforest environments of Asia. Even from primary analyses, it is clear that these technologies are different in making methods and morphology when compared to the Upper Paleolithic bone toolkits of Europe (Deraniyagala 1992). Bone tools skills were evidently able to simplify a number of diverse practices, be they figurative or part of maintenance strategies, in a scope of novel environments and climate met by *Homo sapiens* throughout expansion outside of Africa.

A visible face is, from all rockshelter excavation sites in which removal debris of faunal artifacts were associated, bone remains were secured in connection with them. These remnants of the fauna suggest that animals were employed as food sources and that animal bones were used to make artefacts. Analysis of faunal artifacts secured from Fahien-lena, Batadomba-lena, and Kithulgala Beli-lena reveal, the topmost percentage of faunal remains included bones of monkeys. It has been determined that the majority of the extremely tiny and small size items made of bones belonged to smaller animals in relation to the artefacts made of bones. There are faunal bones selected for creation artefacts from bigger animals such as deer, civet, cat, elephant, buffalo, and so on. The overall picture is one of non-specialized wide selection of animal bone being used for manufacture artefacts, with the concentration on appropriateness of the functional aspect.

Analysis of faunal artifacts collected from cave sites of Batadomba-lena, Fahien-lena, Kithulgala Beli-lena and Alulena exposes the fact, closely about 80% of the gatherings were of small animal such as porcupine, monkey, fowls, pangolin, star tortoise, squirrels, muntjac, hare, civet cat and cherrotain. Other finds contain bones of land-monitor, lizard, python soft and hard shelled, terrapins and various species of little fish and kinds of birds and

molluscs. This demonstrates the propensity to use smaller animal bones when creating bone artefacts. This feature has been confirmed by the analysis of assemblage of bones artefact from the rockshelter sites stated, which revealed, more than 90% are either very small or small artefacts. This suggests that they either utilized only little bones to create objects or made little artefacts for kill little animals. Wherever more artefacts were recovered, they were typically made of antler, seldom of bone, such collection of larger bone artefacts have been reported from Bellanbandi-Palassa, contained of excavating implement of antler, sambhur antler, elephant bones and boring tools fashioned from spur and shank of jungle fowls.

CONCLUSION

I have given data from the rockshelters of low-land wet zone, Sri Lanka that signifies the early appearance of bone tool points technologies with our species in Sri Lanka by at minimum c. 48,046 cal. BP. The Sri Lankan data offers both the longest and oldest sequence of bone point toolkits in South Asia. Photographic description presentation of the bone point tools indicates constancy of bone point tools technologies to the sites through time. Appropriated analysis of associated subsistence changes and environmental indicate that may have been significant in the use of molluscan resources (freshwater), potentially the diversification of the diet for slight prey species, in the Late-Pleistocene period. Generally, it is perfect that the rockshelter's bone tool points were strongly bound up within a specialized wet zone rainforest exploitation plan, was adopted by the earliest-Microlithic *Homo sapiens* populations in Sri Lanka (Perera et al, 2017). As with the data from Southeast Asia, this indicates that bone point tools analysis is more profitable when located within the social context of human expansion and broad ranging ecological new varied environments.

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