

## RESEARCH PAPER

# The Discovery and Excavation of a Human Burial from the Mini-athiliya Shell Midden in Southern Sri Lanka

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Several shell middens of coastal Sri Lanka indicate human occupation in the mid-Holocene and are recognized as being of prime importance in the archaeological narrative of the island. A salvage archaeology operation conducted at the Mini-athiliya shell midden in the Southern Province of Sri Lanka, yielded ancient human remains associated with stone implements and culturally modified faunal remains. The main objective of this rescue operation was to mitigate the destruction to this archaeological site. We report the excavation strategy and dating of this mid-Holocene shell midden, while focusing on the discovery and extraction of a complete human burial that had not been disturbed by the shell mining activity at the site. This excavation is intended to serve as a precursor to systematic investigation of the coastal shell middens of southern Sri Lanka.

## Introduction

In the southern coastal belt of Sri Lanka, amidst shallow lagoons and deltas, naturally and artificially accumulated shell deposits are encountered. Many shell accumulations of the island are attributed to natural processes, such as the intermittent lowering of the sea levels during the mid-Holocene (Katupotha, 1995). However, the deposition of several shell accumulations in Udamalala, Pallemalala, and Mini-athiliya are attributed to human activity (Somadeva and Ranasinghe, 2006; Perera, 2009). A salvage archaeology operation conducted at Mini-athiliya, Southern Province of Sri Lanka, yielded ancient human remains associated with stone tools and culturally modified faunal remains. The Mini-athiliya shell midden is situated in a paddy field, where farmers had encountered shell debris and isolated skeletal remains during ploughing activities. The upper portions of the deposit had probably been disturbed due to agricultural activities since historical times. The more recent commercial exploitation of the site for shell mining has highlighted its archaeological attributes.

Sri Lanka's coastal regions have been extensively surveyed for prehistoric habitation sites over the last 150 years (Deraniyagala, 1992). While numerous shell deposits were observed during these surveys, shell middens of archaeological significance have been rarely recognized in the past. However, shell middens in Mandakal-arua in the north, Aruakallu in the northwest, and from the south, Pathirajawela, Henagahapugala, and Ussangoda were

recognized and sampled and dated in the late 1960s and early 1970s (Deraniyagala, 1992). More recently, a brief survey was undertaken in the south, which brought to light midden complexes at Kalametiya, Arabokka and Weligatte (Adikari and Risberg, 2007) and several raised middens along the coastal belt from Hambantota to Bundala (Karunaratne, *pers.comm.*).

Sri Lanka's inland cave sites such as Batadomba-lena and FaHien-lena, located in the country's wet zone have yielded human skeletal remains dated to the terminal Pleistocene through mid-Holocene times (Kennedy and Deraniyagala, 1989; Deraniyagala, 1992; Wijeyapala, 1997; Perera, 2010; Perera et al., 2011). An appreciation of the bio-cultural adaptations of people from the mid-Holocene comes from the series of skeletal remains recovered from the open-air site of Bellan-bandi Palassa located in the Dry Zone of Sri Lanka (Deraniyagala, 1958; Deraniyagala and Kennedy 1972, Kanthilatha et al., 2012). The site of Mini-athiliya and other midden complexes in this region, present an opportunity to explore an uncharted aspect of subsistence in Sri Lanka during the Holocene. Shell middens are of significant interest to archaeologists and biological anthropologists as they offer a glimpse of the past, where humans successfully occupied and adapted to coastal environments, exploiting aquatic resources (Meehan, 1982; Ceci, 1984; Mulvaney and Kamminga, 1999; Mayer, 2009; Alvarez et al., 2011; Balbo, 2011; Biagi, 2013). Several Shell middens of coastal Sri Lanka indicate human occupation in the mid Holocene (Deraniyagala, 1992; Somadeva and Ranasinghe, 2006; Perera, 2010). As such, shell middens and associated human occupation are recognized as being of prime importance in the archaeological narrative of Sri Lanka.

While there are challenges associated with the identification of intentional anthropogenic shell accumulations (middens), multiple lines of evidence distinguish natural

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**Fig. 1:** Sri Lanka and area enlarged with the location of Mini-athiliya (image courtesy of Google, 2013).

shell heaps from shell middens exhibiting an archaeological signature. A shell midden is “a cultural deposit of which the principal visible constituent is shell.” (Waselkov, 1987: 95). Also known as kitchen middens or *kjokkenmoddinger*, these deposits are undoubtedly the products of human activity (Alvarez et al., 2011). The Mini-athiliya shell midden is denoted as an archaeological site based on criteria outlined in investigations of early Danish scholars and other researchers (Meehan, 1982; Mulvaney and Kamminga, 1999; Alvarez et al., 2011). The concentration of predominantly edible-sized shells, stone artefacts, and faunal remains recovered, underscore the archaeological significance of the Mini-athiliya site.

**The Mini-athiliya site and shell mining**

The Mini-athiliya shell midden site, designated as HMA 2007 is located at 6° 07' 12" North, and 80° 56' 47" East, in the southern coast of the Hambantota District in the semi-arid zone of Sri Lanka (Fig. 1). The Mini-athiliya paddy field is situated approximately four kilometres inland from the present coast. Fluctuating sea levels may have placed this site closer to the shoreline during the mid-Holocene. Hungama, located on the main highway, is the town closest to Mini-athiliya. Local informants note that shells and isolated human and animal skeletal elements have often been encountered in the Hatagala Buddhist temple premises, located near the Mini-athiliya paddy field.

Shell middens have been mined, quarried, and exploited in a variety of ways around the world as a raw material for agricultural, construction, and commercial purposes (Ceci 1984: 65). From historical times in Sri Lanka, shell deposits have been quarried for lime-based fertilizer, building material, and chicken-feed. While quarrying in this particular site of Mini-athiliya, local shell miners observed among the shell debris well-preserved bone and dental remains. They informed the local authorities,

who in turn, alerted the authors and the Excavation Branch of the Archaeology Department of Sri Lanka, who immediately initiated a rescue operation, to avert further destruction to this valuable archaeological site. The Mini-athiliya shell mining operation yielded fragmented and mixed remains of five individuals (Kulatilake, 2009). These human bones, commingled with faunal remains were identified from piles of extracted shell debris and soil. Unfortunately, the mixing due to the mining activities precluded the recording of any contextual information. Provenance information for these mixed burials was only recorded as approximations through personal communication with miners. This paper focuses on the discovery and extraction of a complete human burial that had not been disturbed by the shell mining activity at Mini-athiliya.

**Excavation, stratigraphy and contextual information**

The main objective of the salvage operation at Mini-athiliya was to mitigate the destruction to this archaeological site and it also signified the launching of systematic investigations on Sri Lanka’s coastal shell middens. The second author directed the field excavation (Fig. 2), while the first author was its consulting biological anthropologist. When the excavation team reached Mini-athiliya, it was observed that a large portion of the site was exposed and subjected to destruction by shell mining (Perera, 2009). A parallel is drawn between the Mini-athiliya rescue operation and a rescue excavation in Saldanha Bay, South Africa (Orton, 2013), where the upper deposits had been destroyed prior to systematic excavation. As is customary in any rescue archaeology operation, the primary goal of this project was to salvage and record as much information as possible before further damage accrued. The following information is a summary based on the excavation project report (Perera, 2009).



**Fig. 2:** Mini-athiliya excavation.



**Fig. 3:** Mini-athiliya site plan.

In order to recognize the stratigraphic sequence of the Mini-athiliya site, the excavation team cleaned the profile of an existing mining pit. Using the profile sections, already exposed by shell mining, a site stratigraphy was established. The excavation team also conducted a reconnaissance survey of the area, and a test pit measuring 2m x 2m was probed down to the sterile lagoon bed. This test pit yielded fragmented skeletal remains, stone tools, and large quantities of shells. Subsequently, this pit was extended to encompass a total excavation area of 3m x 3.5m (**Fig. 3**).

An alphanumeric site grid was established over the site. A nail set in a nearby power pole served as an elevation datum. The site grid was set out over the established 3m x 3.5m unit and labeled alphabetically from south to north. Topographic site maps were drawn using scales of 1: 20 and 1: 100. The excavation employed the stratigraphic excavation method by using context-based recording and the Sri Lanka Archaeological Department's standard context cards for recording soil layers and archaeological features.

The lowermost shell deposit representing human habitation was designated as Context 3. This context was associated with the complete human burial discussed below. Context 3 had a thickness of 76cm. The soil colour was

yellowish brown (Munsell 2.5YR 4/7), reflecting the hues of a waterlogged shell deposit. Its texture was characterized by the presence of highly concentrated and well-packed dense shell debris, within yellowish brown, grey sandy silt. Stone implements, faunal remains, and charred shells were found in this context. The composition of Context 3 can be summarized as follows: shells: 75%, faunal remains: 8%, stone artefacts: 10%, sand: 7%. Context 7 is part of the human burial pit including the cultural remains and soil within it, which is the artificially filled component of the burial pit. The complete human skeleton designated as Context 8 was taken within its matrix as a block for careful exposure and further analysis (**Fig. 4**).

While the scope of this paper does not encompass the analysis of the Mini-athiliya faunal and lithic assemblages, it is clear that the people of Mini-athiliya were a skilled group of aquatic foragers. Large quantities of molluscs were excavated from the Mini-athiliya site. They represent land, brine (estuarine), and marine habitats. The genera represented were *Acavus*, *Oligospira*, *Cyclophorus*, *Pila*, *Paludomus*, *Anadara*, *Turbinella*, and *Cerithidea*, with estuarine and marine forms predominating markedly. As observed among the shell middens of Eritrea described by Mayer and Beyin (2009), at Mini-athiliya too it is apparent that the shells were collected from a variety of habitats. Also bones of crabs, fish, reptiles, birds, and mammals were recovered from these well-sealed archaeological contexts. The lithic assemblage recovered from Mini-athiliya consisted of flakes and cores, geometric microliths, hammerstones and grinders. The faunal evidence and lithic assemblage from the Mini-athiliya excavation demonstrate a society using a suite of varied subsistence strategies for their survival.

### Dating Results for the Mini-athiliya shell midden

Previous researchers have obtained dates on shell middens of southern Sri Lanka utilizing shells (Katupotha, 1988; Deraniyagala, 1992). A date of 4440 ± 60 BP was obtained by liquid scintillation counting of methanol for



**Fig. 4:** Excavation profile from the excavation pits at Mini-athiliya.

Sample and Analysis	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	2 Sigma Calibration
Beta - 256149 (Charred Material) HMA Context 2 LOWER AMS-Standard delivery	3680 +/- 40 BP	-24.7 o/oo	Cal BC 2190 to 2170 (Cal BP 4140 to 4120) AND Cal BC 2150 to 1950 (Cal BP 4100 to 3900)
Beta - 256151 (Charred Material) HMA Context 3 LOWER AMS-Standard delivery	3610 +/- 40 BP	-24.8 o/oo	Cal BC 2120 to 2090 (Cal BP 4070 to 4040) AND Cal BC 2040 to 1880 (Cal BP 3990 to 3830)

**Table 1:** Radiocarbon dates from the Mini-athiliya site: HMA (Hungama Mini-athiliya 2007) compiled by Perera and Kulatilake after M.A. Tamers and D.G. Hood, Beta Analytic Inc., Miami Florida 2009, *pers.comm.*)

shell samples on shell (*Veneridae*) from an exposed deposit in Hatagala (6° 06' 35" North, 80° 56' 50" East), situated close to Mini-athiliya (Katupotha, 1988: 341–345). An objective of the Mini-athiliya rescue archaeology project was to obtain charcoal samples from secure archaeological contexts to date this shell midden.

The Mini-athiliya excavation yielded charcoal from a hearth and other sealed stratigraphic contexts. The dates for Mini-athiliya have been secured using several charcoal samples from contexts denoted as the lower level within Context 2 and Context 3, the main habitation levels of the site. The charcoal in the lower part of context 3 is dated to 3610 +/- 40 BP and a sample from the lower levels of context 2 is dated to 3680 +/- 40 BP. These dates overlap considerably and are essentially identical. The radiocarbon dating summarised in **Table 1** suggests that these contexts represent a single, continuous occupation deposit during the mid-Holocene with dates clustered around 4000 BP. Large-scale molluscan consumption and shell disposal is considered to result in a rapid rate of midden accumulation (Waselkov, 1987). Accordingly, at Mini-athiliya, the thickness of the shell deposit, which also included discarded lithic debris and charred faunal remains, ranged from 50–120cm. This suggests rapid and heavy accumulation of refuse. Stratigraphic information indicates that these early aquatic foragers had not re-occupied Mini-athiliya. The historic and more recent use of this site has been primarily for agricultural (rice paddy cultivation) and commercial purposes (shell mining).

### The discovery and extraction of the complete human burial from Mini-athiliya

The complete human burial at Mini-athiliya was encountered entirely by accident. At the end of the salvage operation, when the excavation team had decided to close the excavation pits at Mini-athiliya, a worker's implement hit a solid surface. Excavating around this surface it was clear to the team that it was a human skull. It turned out to be the skull of the skeleton to be named HMA 6 (**Fig. 5**). A bone-by-bone recovery was not feasible on site, due to the onset of the rainy season and the urgency associated with this rescue operation. It was decided that the complete human burial would be removed from Mini-athiliya as a block within its matrix (Contexts 7 and 8), to be followed



**Fig. 5:** Encountering the human burial.

by the implementation of a meticulous extraction strategy, off site, within laboratory conditions.

The strategy decided upon to recover the complete skeleton for detailed analysis, while losing as little contextual information as possible, is described below. Digging narrow trenches around the burial in a rectangular shape and exposing the burial as a block, it was placed in a plaster cast with the surrounding matrix. A layer of soil was artificially placed, covering the surface of this block. A wooden crate was constructed to surround the plaster cast containing the complete burial within its matrix. The dimensions of the box were: 118cm x 75cm x 70cm. This crate containing the burial was unearthed from the site (**Fig. 6**) and was transported to the Head Office of the Sri Lanka Department of Archaeology in Colombo (**Fig. 7**).

It was noted previously that five individuals were identified from the fragmentary skeletal material from the shell miners' pits. These individuals were labeled as HMA 1 through 5 (Kulatilake, 2009). Therefore, this skeleton was labelled HMA 6. The meticulous excavation, extraction and exposure of this burial were undertaken in 2009 by the authors, a team of excavators, and laboratory personnel (**Fig. 8**). Careful excavation allowed the identification of many details about this individual. Skilled excavators, laboratory personnel, draughts persons, and photographers were deployed. Once the crate containing the skeleton was pried open, the top plaster sheet was removed.



**Fig. 6:** Removal of the burial within a plaster cast with its matrix reinforced by a wooden crate.



**Fig. 7:** Wooden crate encasing the skeleton of HMA 6 prior to extraction, at Sri Lanka Department of Archaeology, Colombo.



**Fig. 8:** Extraction and recording of HMA 6.

The layer of soil placed artificially on the skeleton was slowly brushed away in 2cm increments. This layer was approximately 16cm in thickness. The skull, which had been elevated during the original burial process, was first

encountered in this levelling process. The damage that occurred during the initial discovery of the skeleton had fragmented the temporo-parietal region of the cranium. Compacted soil filled the cranial cavity keeping most cranial bones intact.

The entire skeleton had been covered with debris including large quantities of shells during the original internment. A demarcation of a shallow grave was barely identified during the excavation. It would be pertinent to note that the extraction process in the laboratory progressed “shell by shell”, where the excavators painstakingly removed vast quantities of shells to expose the skeletal elements. Dental picks, scalpels, and brushes were used and levelling was conducted at 2cm intervals. The process was documented throughout, using written records, drawings, and photographs. The matrix surrounding the burial yielded burnt and fragmented animal bones and fragmented lithic material. Laboratory personnel who were present throughout the extraction process initiated the consolidation of bone that was prone to crumbling. Paraloid B72 in acetone (2%) solution was injected to areas such as the femoral head and iliac spine of the pelvis. Observations and measurements were made, where possible, on exposed skeletal elements.

#### **The skeleton of a mid-Holocene inhabitant from Mini-athiliya: HMA 6**

It was clear that the complete human burial from Mini-athiliya, HMA 6, was a primary internment (**Fig. 9**). Methods and techniques discussed in Brothwell (1981), Ubelaker (1999) and Bass (2005) were followed during the extraction process. The burial appeared to have been compressed vertically, crushing and fragmenting many skeletal elements. The following description of orientation and flexure of the skeleton draws from terminology and descriptive commentary proposed by Sprague (1968). HMA 6 had been buried in a tightly flexed foetal position, resting on the right side, with the head placed to the north. This mortuary practice of placing the deceased in flexed positions, parallels burial patterns recorded from other Sri Lankan mid-Holocene sites, such as Bellan-bandi Palassa (Deraniyagala, 1958; Deraniyagala and Kennedy, 1972; Kennedy, 2000), Pallemalala (Somadeva and Ranasinghe, 2006), and Godawaya (Weisshaar, *pers.comm.*). The fore-arms of HMA 6 were flexed at the elbows and positioned in front of the thorax, with the right facial regions resting on the hands. The skeleton was tightly flexed at the pelvic-acetabular joint and at the knees. The legs had been folded and tucked in, where the femora and tibiae were presented at acute angles to each other. The spinal column appeared to have been curved to accommodate this tight flexion of the entire skeleton. The abnormal presentation of bones at the talocrural joint and the position of tarsals and metatarsals suggested post mortem deformation to that region.

Overall, HMA 6 presented a high degree of skeletal robusticity, with heavily developed muscle markings on cranial and facial bones. When skeletal features were exposed through excavation, HMA 6 was identified as a



**Fig. 9:** The skeleton of HMA 6 after excavation and exposure.

male, based on pelvic and cranial structures (Bass, 2005; Ubelaker, 1999). A heavily developed mastoid process, a strongly demarcated nuchal crest and the shape and features of the pelvis, were central in the identification of sex. Dentition from the maxilla and mandible of HMA 6 clearly indicated that he was a mature adult. A high degree of attrition to the molar teeth suggested an extremely abrasive diet. Cranial sutures (though highly distorted) and the knowledge of the abrasive nature of the diet among early and mid-Holocene South Asians (Kennedy, 2000), allowed the estimation of age of this individual to be approximately 45 years. The age range among the other excavated individuals from commingled human remains from Mini-athiliya was 12 – 45 years (Kulatilake, 2009), placing HMA 6 among the oldest from this sample of people. The standard femoral measurements (Bass, 2005) recorded on the left femur of HMA 6 were as follows: length - 445mm, maximum head diameter - 42 mm, and the estimated epicondylar breadth - 70mm. Standard formulae (Byers, 2002) were applied to the reconstructed left femur to estimate the stature of HMA 6. The height estimation obtained was 167.32cm +/- 3.27. This can be expressed as a height of between 5'5" and 5'7". Further analyses are required to ascertain the adaptations and affinities of this individual.

Taphonomic processes had played a role in the condition, preservation and deterioration of the skeletal remains of HMA 6. The bones of HMA 6 were extremely brittle for the most part. Numerous cracks and crevices were present in the long bones indicating post-mortem deformation. The exposed fragmented parts of the left scapula, the left ilium, and the left femoral head had cancellous bone visible and appeared extremely fragile. The left temporal, parietal and occipital bones were fragmented, and some reconstruction was possible during the extraction and cleaning process.

The pronounced degree of skeletal robusticity is a pattern observed among early Holocene hunter-gatherer populations of the Gangetic Plain, north India (Kennedy, 2008; Lukacs and Pal, 2003; Kulatilake, 2000) and among the mid-Holocene people of Pallemalala, Sri Lanka (Ranaweera, 2002; Kulatilake, 2012). The aquatic foragers of Mini-athiliya and other shell midden complexes of Sri Lanka represent people whose musculoskeletal robusticity

may be used to infer a life way that was active and physically stressful. A preliminary comparison was conducted on the human cranial and dental remains recovered from the mid-Holocene coastal shell midden sites of Mini-athiliya and Pallemalala in southern Sri Lanka (Kulatilake, 2012). The archaeological evidence from the excavation at Mini-athiliya indicates shared cultural affinities between the people of Mini-athiliya and Pallemalala (Somadeva and Ranasinghe, 2006). Due to the striking similarities in their morphological traits, it is hypothesized that these two groups living in geographic and temporal proximity may have shared close biological affinities as well.

## Discussion

Shell middens of Sri Lanka have long been recognized as a class of archaeological sites of considerable scientific importance (Deraniyagala, 1992). Such sites normally contain well-preserved cultural remains within stratigraphically stable deposits, and consist primarily of kitchen refuse from past populations. The midden deposits representing the refuse or rubbish of the Mini-athiliya people indicate that they have exploited a variety of terrestrial and aquatic resources, with the latter predominating. Paleoenvironmental reconstruction indicates an abrupt increase in aridity during the mid-Holocene between 5400 and 3600 BP, which was associated with a significant reduction of agricultural land use in central Sri Lanka (Premathilake, 2006). However, several coastal shell midden sites including Mini-athiliya provide an opportunity to explore the adaptations that may have allowed people to thrive during the mid-Holocene. The Kalametiya lagoon forms the southern boundary of Mini-athiliya and further south is the ocean. By virtue of the biologically rich estuarine and mud-flat associated mangrove areas seen even today, we can assume that there had been a high carrying capacity in the Mini-athiliya region. It is suggested that the Mini-athiliya people successfully adapted to changing environmental conditions of their times by following hunter-gatherer and aquatic forager life ways as viable alternative or complementary subsistence patterns.

Future multidisciplinary research would be able to illuminate the adaptations and affinities of the people who inhabited Sri Lanka's coastal regions during the mid-Holocene. The Mini-athiliya human skeletal assemblage including the complete skeleton described in this paper would offer new evidence on the biological adaptations of the mid-Holocene people who roved the landscapes of southern coastal Sri Lanka.

Recovering a complete skeleton of an ancient human is of major significance to biological anthropology and archaeology. Moreover, the Sri Lankan mid-Holocene human skeletal record is not extensive, and therefore, this find enhances it. Throughout the extraction process conducted in Colombo, HMA 6 attracted much public attention. For the modern day people of Mini-athiliya and nearby areas, this mid-Holocene aquatic forager represents a relatively recent ancestor with a unique identity and has been referred to as "*Menik-Hāmy*", a name derived from the site name. Considering its archaeological and

anthropological significance, this exposed burial has been placed on display at the Matara Star Fort Museum in the Southern Province of Sri Lanka, where it is a central attraction for the public.

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