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PRELIMINARY ANALYSIS ON THE METAL AGE SHELL MOLLUSC REMAINS FROM MELANTATUTUP, SEMPORNA, SABAH

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Abstract

The archaeological site of MelantaTutup in Semporna, Sabah was excavated on 2003, 2004 and 2006 led by the Centre for Global Archaeological Research (CGAR), Universiti Sains Malaysia (USM), Penang with the help of the Sabah Museum Department. The volcanic rock shelter site was found to bear evidence of prehistoric habitation ranging from the Late Palaeolithic (10,270 BP), Neolithic (3,300-2,930 BP) and Metal Age period aged around 1,440 to 1,130 BP. Besides that, the site also revealed evidence of prehistoric burial tradition using carved log coffin aged 1,070 to 840 BP. Among cultural materials found in the Metal Age cultural layer were mollusc shell remains (bivalves and gastropods), animal bone remains, metal objects, stone tools, pottery sherds, beads and human skeletons. Based on the result of preliminary zooarchaeological analysis, the mollusc shell remains from the Metal Age cultural layer were consisted of various shell mollusc species of marine, estuarine and freshwater habitats. It shows that the prehistoric society around the area had maximally exploited the source of their surroundings as their source of diet. The various species of mollusc shell and their habitats also shows that their subsistence and strategy of shell-gathering activities are relatively moderate. This adaptation shows their prehistoric environment around the years 1,440 to 1,130 BP. Besides their diet, analysis of the shell mollusc remains also shows that it was used multi-purposely as grave goods, based on its association with the finding of human skeletons, as well as shell ornaments based on morphological and taphonomic analysis.

Keywords: shell mollusc remains, zooarchaeology, shell-gathering activity, ornaments, grave goods.

1. Introduction

MelantaTutup is a volcanic rock shelter located south-east of the Semporna town, Sabah (Figure 1). Located about 600 feet above sea level at the Tagasan Bay, archaeological research in this site has started since 2002 and three seasons of excavations were carried out at the area on the year 2003, 2004 and 2006 (Chia 2004; 2008). The site was believed to be a potential archaeological site based on evidence of in situ agate and chert sources – the rock materials that were probably used to make stone tools in the area – embedded in magma at the foothills of the site (Chia, 2008). Surface finds at the site included an ancient log coffin carved in the shape of a buffalo with many pottery sherds and faunal remains (Chia and Koon, 2003). It is determined that the Metal Age cultural layer of the site is in the depth of 0 cm to 30 cm based on the evidence of a Metal Age burial containing extended-positioned human skeletonsassociated with iron artefacts dated 1,440 to 1,130 BP (Chia, 2008; Eng, 2009;Velat and Chia, 2014). Besides that, the burial is also found to be associated with stone tools, pottery sherds, beads and faunal remains. Despite having various species of vertebrate faunal remains such as fish, mammals and reptiles, molluscan faunal remains of different habitats are also found (Chia, 2008;Velat, 2013; Velatand Chia, 2014). These shell mollusc remains have yet to be analysed intensively.This article will discuss on the prehistoric exploitation of shell molluscs, particularly of the Metal Age period of the site through zooarchaeological analysis.

Methodology of the Study of Shell Mollusc Remains

The approaches that are applied in the study of shell mollusc remains are anatomic analysis, taxonomic analysis, taphonomic analysis, morphological analysis and statistical analysis.

First, the anatomy of the shell mollusc remains from the site was observed and determined. Anatomic analysis is done to determine parts and its terminologies of the shell molluscs, thus could be used for taxonomic recognition (Claassen, 1998; Yule and Yong, 2004). Rough observation of the specimens and fragmented elements determined whether it belongs to the Class Gastropoda or Class Bivalvia. Most gastropod shells have a spiral growth pattern that forms as a cone coiled around a central axis, known as the columella, and ends in an aperture, usually with two canals at the front end and at the lower end, whereas most bivalve shells have two valves that can be either symmetrical or asymmetrical (Dance, 1992; Claassen, 1998; Harris *et al.*, 2015). Each sample will be identified to its lowest possible taxonomic level by comparing the samples with reference specimen collection from CGAR

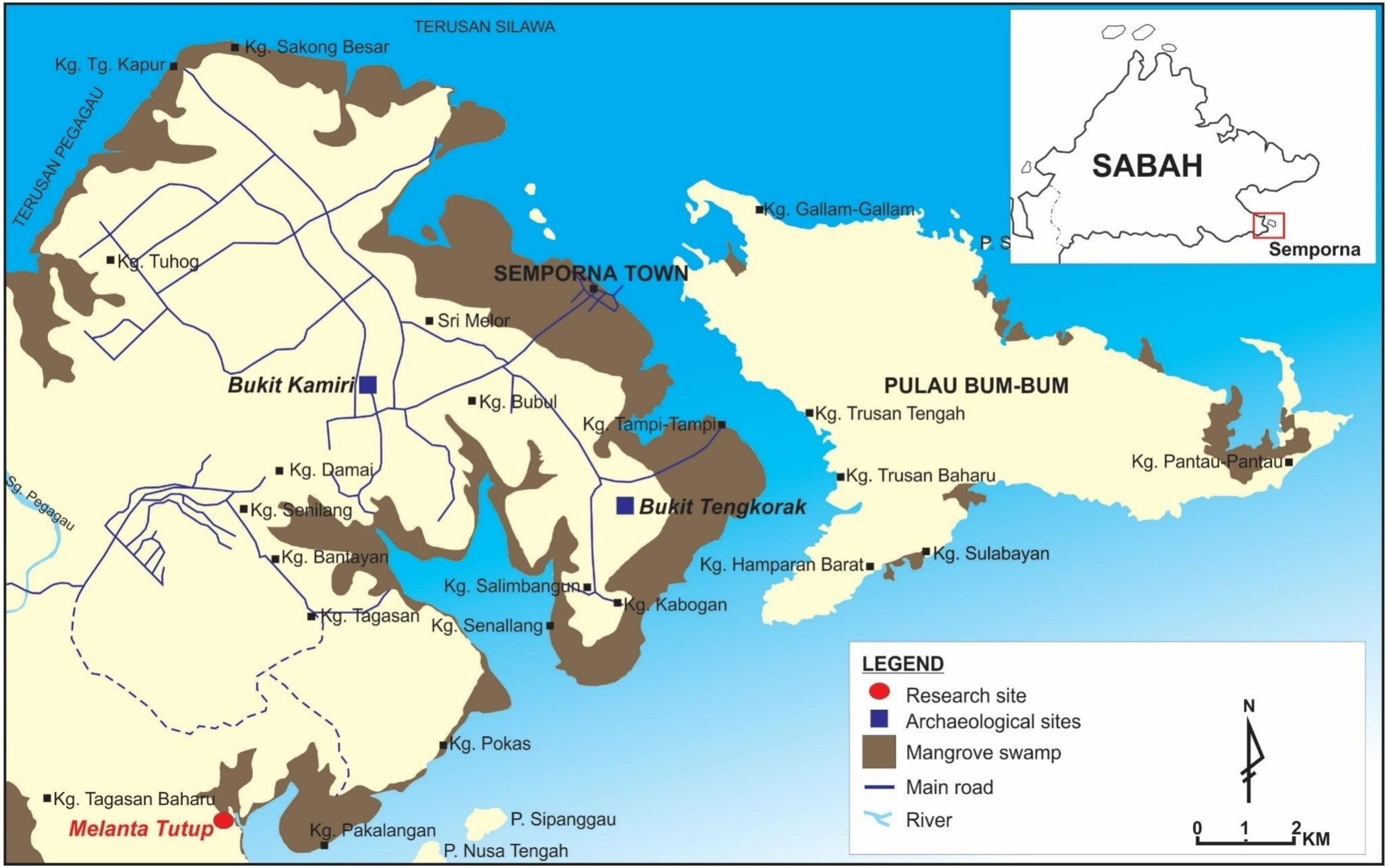

Figure 1: The location of MelantaTutup site at Semporna, Sabah, Malaysia.

However, to avoid over-identify and ensure a more accurate identification, samples that could not be confidently identified to its species were only identified to genus or family, especially fragmented samples (Szabo, 2009; Harris *et al*., 2015).

Taphonomic analysis is an approach to identify the activity of the prehistoric societies to exploit their source of diet (Lupo and O'Connell, 2002; PeckeringandEgeland, 2006; Gamble, 2008). Each sample is observed one by one to determine taphonomic attributes. This approach is important to identify the factors that change the shape of the samples either by natural formation transition or by the cultural formation process either by humans or animals (Dominguez-Rodrigo *et al*., 2005; Dominguez-Rodrigo and Yravedra, 2009; Layman, 2010; Mareno-Arroyo *et al*., 2012). Hence, the phases of analysis involve micro analysis using the stereomicroscope Leica MZ16 (100x magnification) and scanning electron microscopy (SEM). Next, samples are classified according to its morphological attributes and the result of micro analysis. Morphological attributes are based on its shapes, sizes, and anatomical parts of the shell mollusc; while the result of micro analysis includes use-wear marks, polish marks, micro-flaking and grinding marks.

Whereas, statistical analysis that was applied includes three-dimensional measurement, weight, number of identified specimens (NISP) and minimum number of individuals (MNI). NISP is a fragment count of all identifiable pieces of the samples, whereas MNI counts the number of individuals of specimens that are in complete shape. Although, since all bivalve samples present with one side of the valve only, the total count is divided into two, since a single individual of a bivalve exists with two valves intact. The interpretation of the quantification method of the research is influenced by the work of Szabo (2009), Alvarez-Fernandez and Castro (2010).

2. Results of Shell Mollusc Remains Analysis

There are a total of 6,143 shell mollusc remains samples that was excavated from the Metal Age cultural layer in complete state as well as fragmented state. The total weight of the remains is 23528.8 grams with a total MNI calculated is 1,660. The samples are consisted of various species of bivalves and gastropods, with 44 species that are identifiable and calculable for NISP and 38 for MNI.

The total of MNI of both gastropods and bivalves are almost equally even, with 51.3% of the total MNI are the bivalves and 48.7% are gastropods. The most abundant species from the gastropod shell is*Nerita chameleon* (family: Neritidae) with a total of 509 MNI, followed by *Balanocochlisglandiformis* with a total of 68 MNI and *Chicoreus*sp. with 51 MNI (Figure 2, 3 and 5). Whereas for the bivalves are both from the family Arcidae, *Anadaragranosa* and *Anadaraantiquata* with a total of 362 and 297 MNI respectively, followed by *Gafrariumpectinatum* with a total of 95 MNI and *Hemidonaxdonaciformis* with 51 MNI (Figure 2 and 4).

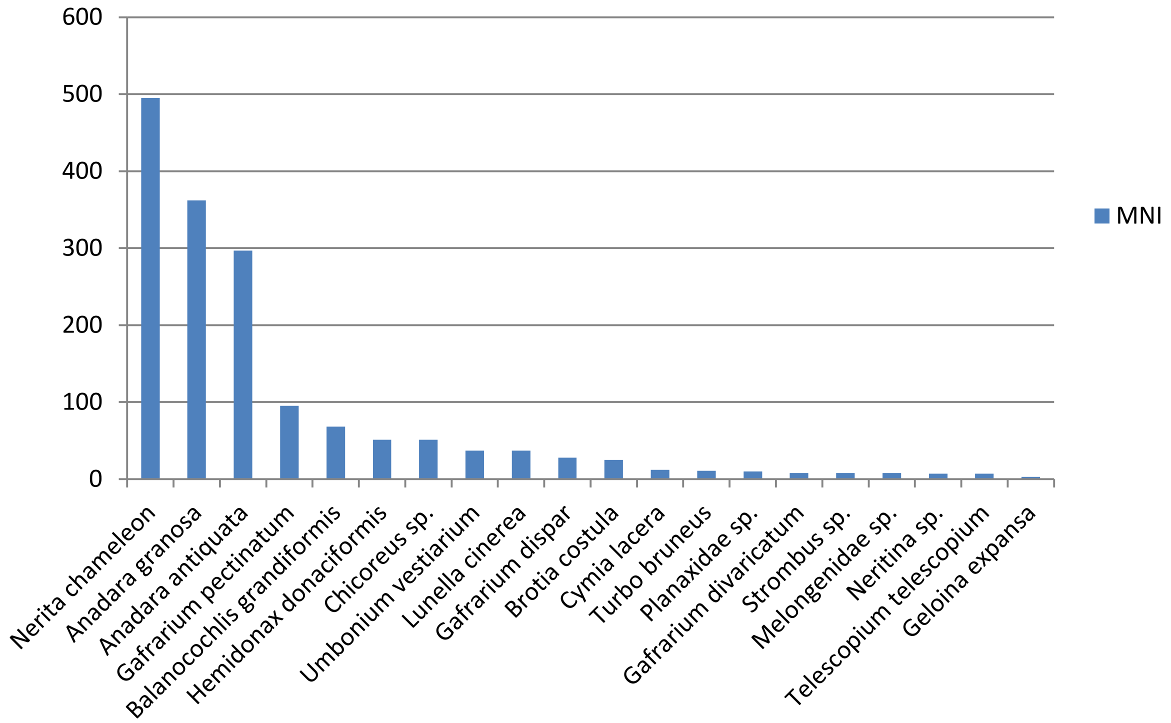

Figure 2: Diversity of shell mollusc species in MelantaTutup

The result shows variability in the selectivity of species that is targeted by the prehistoric societies in the area during shell-fishing or shell-gathering activity. The abundance of *Neritacameleon* and *Anadaraantiquata* shows that the most common site for shell-gathering activity is along the seashore, whether it be rocky or sandy intertidal zones. Whereas, the high number of *Anadaragranosa* with the presence of *Gafrariumdispar*, *Neritina* sp. And *Telescopium telescopium*indicates that the gathering activity is also done in estuary and mangrove swamp areas. The abundance of freshwater species *Balanocochlisgrandiformis,* as well as, the presence of *Brotiacostula* shows that the gathering activity at freshwater niche such as rivers also took place (Figure 5). This indicates the high level of subsistence and strategy in their gathering activities, though marine species is still the most dominant to be collected. The prehistoric environment in the Metal Age period of the surrounding area of the site would include rivers or streams, estuarine, mangrove swamps and coastal areas.

Various other species found in small quantity shows that there was a slightly low selectivity in the gathering activity. This interpretation is based on the high quantity of certain species in different habitats shows that the gathering activity can be interpreted using the framework of ‘target species’, where there are primary species being the main focus of interest during the activity and secondary species that are collected if encountered in the search of the primary species (Szabo, 2009). The interpretation of the primary species and secondary species assumed based on the statistic of the shell mollusc remains from the site is shown in Table 1.

Table 1: Target species and the habitatsof the shell mollusc at Melanta Tutup

Environment/Habitat	Primary species	Secondary species
Rocky intertidal zone	*Nerita chameleon*	*Chicoreus*sp., *Lunellacinerea, Cymialacera*
Sandy intertidal zone	*Anadaraantiquata*	*Gafrariumpectinatum, Hemidonaxdonaciformis, Umboniumvestiarium*
Estuary or mangrove	*Anadaragranosa*	*Gafrariumdispar, Neritina* sp., *Telescopium telescopium*
Freshwater river	*Balanocochlisglandiformis*	*Brotiacostula*

Almost all of the molluscs found in the site are edible. The most abundant molluscs *Nerita chameleon*, *Anadaragranosa* and *Anadaraantiquata*are collected and marketed for food in Southeast Asia (Dance, 1992; Poutiers, 1998a; 1998b). Most of the specimens are nicely conserved, indicated that most of the mollusc were gathered alive, since dead specimens collected in the beaches are usually eroded and not in tact (Alvarez-Fernandez and Castro 2010). It is also interesting to note that some long-spired gastropods such as *Brotiacostula* and *Telescopiumtelescopium* have missing apices, probably cut for the consumption of their flesh (Zuraina, 1994). Since there are a variety of species of different environment, it can be interpreted that the prehistoric society has maximally exploited their surrounding for their diet consumption.

Since the site have evidence of a Metal Age burial, all the shell mollusc remains was probably served as burial item for the dead. Since some long-spired gastropods have missing apices, this indicates that the entire shell mollusc was processed first before being buried along together with the human skeletons. It is also probable that the shell mollusc were first boiled then buried as grave goods based on findings of pottery sherds in the area. Association of pottery sherds with the shell mollusc remains would indicate that the pottery was probably used to cooking or boil the mollusc gathered (Zulkifli*et al.*, 1992). Other than shell molluscs, the presence of faunal vertebrate remains associated with the human skeletal remains also indicated that vertebrate food resources functions as burial goods as well (Velatand Chia, 2014). This can further explain that the Metal Age prehistoric society of MelantaTutupprobably believes in life after death.

3. Evidence of Shell Ornamentation

The site also revealed evidence of human modification of shell mollusc for ornamentation purpose. There are eight samples analysed that are classified as shell bangles and are classified as body ornaments. Four of the bangles are morphologically complete, while the rest of them are broken or incomplete (Figure 6a-d and Figure 7a-d). Statistic is made on the measurement of the diameter of the bangles, with an average of 45.50 mm for the exterior diameter and an average of 39.50 mm for the interior diameter (Figure 8). The biggest among the shell bangle have an exterior diameter of 70.60 mm and an interior diameter of 60.00 mm, whereas the smallest among the bangles have an exterior diameter of 30.70 mm and an interior diameter of 30.10 mm. The four incomplete shell bangles are reconstructed back, thus, it was found that the percentage of the overall complete shape of the bangles that are still left is less than 31.4 percent.

Each shell bangles analysed is found to have traces of modification on the outer surface area, which is grinding marks or parallel lines (Figure 9a-b and Figure 10a-b). Taphonomic analysis shows that grinding technique was applied by the prehistoric society of the site. The main reason of the grinding process activity is to produce the shape and flattening the apex of the shell mollusc. Although the apex of the shell mollusc was grinded, the shape of the apex spire could still be identified as *Conus* sp. (family: Conidae) (Figure 9a and 10a). Shell molluscs from the family Conidae are dominantly used by most prehistoric societies to produce shell bangles (Szabo, 2013). Statistical data on the diameter of all the shell bangles indicated that the *Conus* sp. shells exploited are of various sizes. The spire part of the shellwas most probably being separated first from the body whorl, and then the apex part of the spire was bashed to produce a hole in the middle.

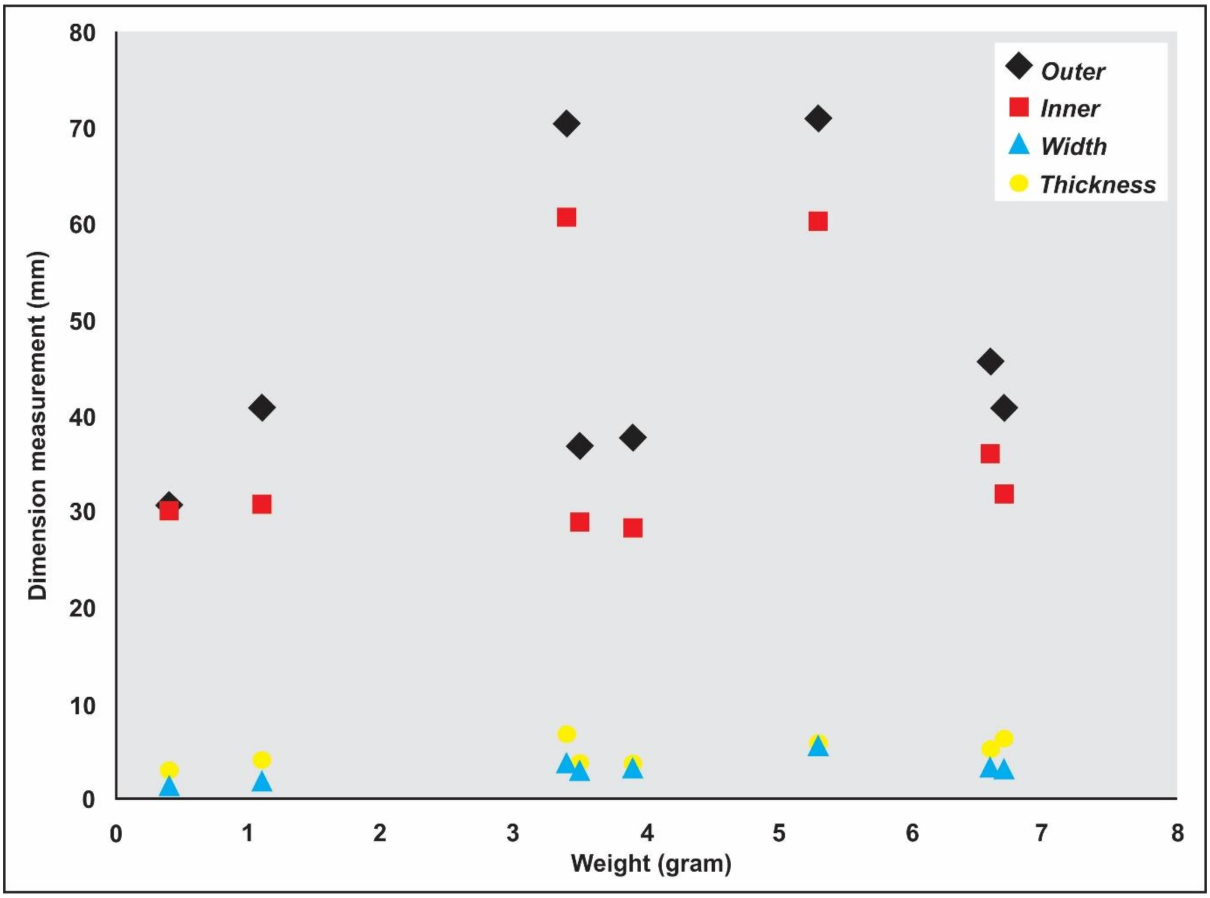

Figure 8: Concentration of 3 Dimensional measurements of shell bangles at MelantaTutup

Then, the fragmented shell is grinded repeatedly on both ventral and dorsal side to flatten and smoothen it. The majority of the shell bangles have angular sides and the surfaces of the interior part are smoother. The smooth surfaces maybe connected with polishing process, which is done to produce nicely smoothen surfaces on the interior as well as the interior of the shell bangles (Gaur *et al*., 2005:945). This indicates an overview of the thoroughness, quality and creativity of the prehistoric societies of MelantaTutup in producing ornament products. The production of a shell mollusc ornament can be related as a prized and high-value product (Pookarjorn, 1994). Thus, the production of grinded and polished shell bangles of various sizes in the area shows a perspective of the modification skill of the prehistoric societies in the area.

The practice and technology of shell modification at the site is based on selection technique because the prehistoric societies are proven to have the knowledge and ability to select the right shell as well as the right size to be used as raw materials.The societies' knowledge, skills, artistic value and mental template can be depicted from their production technique, which involves controlled fragmentation to make sure that the spire part of the *Conus* sp. shell is separated from its body whorl, the apex is bashed to make a hole in the middle and the whole side of the fragmented shell is grinded to make a nice shell bangle. The grinding process was probably done on the surface of a stone anvil. The creativity and smooth workmanship of the *Conus* sp. shell bangle shows a high mental template of the prehistoric societies in MelantaTutup in making ornament crafts.

The shell bangles made from *Conus* sp. clearly function as body ornaments, worn on the wrist, which could also function as a status symbol (Chin,1990; Claassen, 1998; Baradas, 2010). Since the Metal Age cultural layer of the site have evidence of a prehistoric burial, the shell bangles could also function as mediums for a ritual for burial. The shell bangles are clearly associated with the human skeletal remains; hence the bangles in this context are burial items for the dead.

Conclusion

The analysis of shell mollusc remains from the Metal Age cultural layer of the MelantaTutup have proven a highly intelligent prehistoric society which utilised their natural resources in the surrounding area maximally. Although marine mollusc species are found to be the dominant species targeted in the shell-gathering activity, the prehistoric society also gathered species from freshwater rivers and mangrove swamp areas. A large number of a particular species from a particular niche shows that the prehistoric society have a targeted species of mollusc to be gathered, but the variety of other species in small quantity shows that some shell molluscs were also gathered when encountered in the search for the targeted species. Although, since evidence of shell bangles of various sizes are found, the selectivity in the shell-gathering activity could be of moderate level. The prehistoric society of the site has target species in their shell-gathering activity, but still gathers other shell mollusc encountered along the way. Besides that, the evidence of shell bangles also demonstrated their craftsmanship in producing bodily ornaments, through systematic fragmentation, grinding and polishing techniques. Since there is evidence of a Metal Age human burial found with various artefacts such as stone tools, pottery sherds, beads and faunal vertebrate remains along with the shell mollusc remains, it can be interpreted that the shell mollusc remains in the Metal Age cultural layer functions as grave goods offered to the dead. The presence of shell bangles in the burial could also symbolise the status of the dead man. Shell molluscs are clearly significant among the prehistoric society of the site for their diet consumption, bodily ornaments and burial items.

Acknowledgements

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Appendices

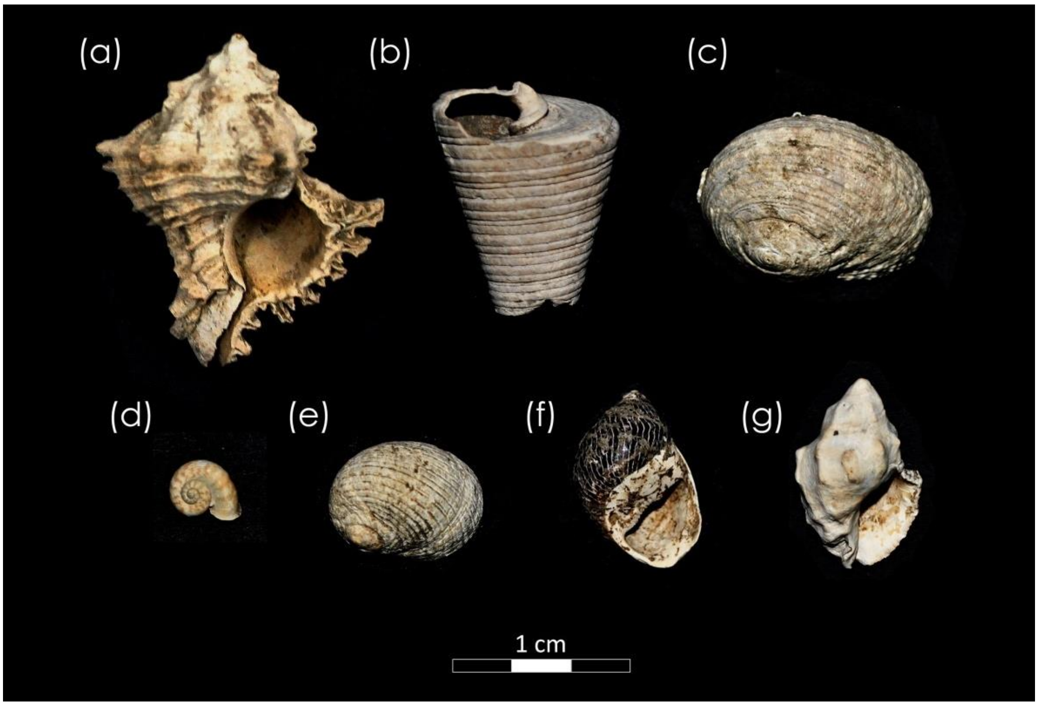

Figure 3: Some of the Gastropods specimens (a) *Chicoreus* sp., (b) *Telescopium telescopium*, (c) *Lunellacinerea*, (d) *Umboniumvestiarium*, (e) *Nerita chameleon*, (f) *Neritina* sp., and (g) *Cymialacera*.

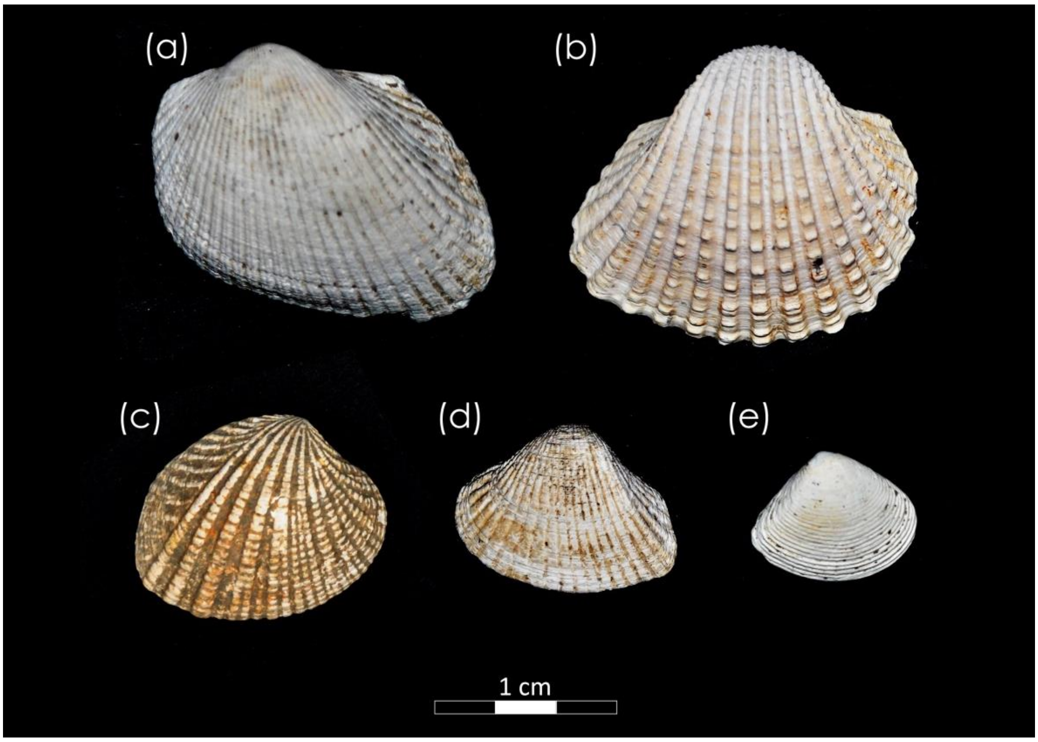

Figure 4: Some of the Bivalves specimens (a) *Anadaraantiquata*, (b) *Anadaragranosa*, (c) *Gafrariumpectinatum*, (d) *Hemidonaxdonaciformis*, (e) *Gafrariumdispar*.

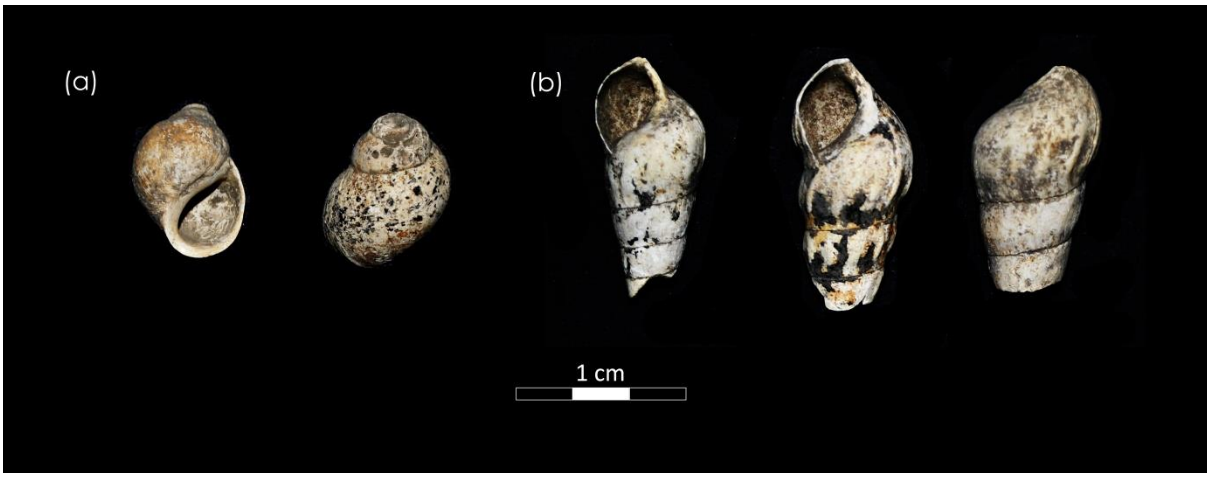

Figure 5: Specimens from the freshwater habitat (a) *Balanocochlisglandiformis* and (b) *Brotiacostula*.

Figure 6a-d: The completed shell bangles at MelantaTutup, Semporna. (Photograph: VelatBujeng)

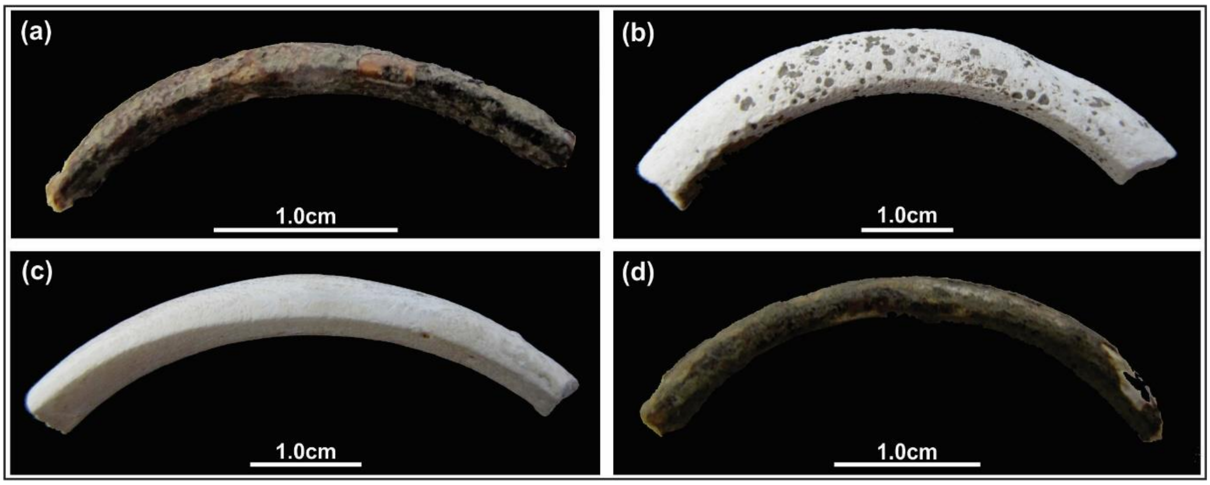

Figure 7a-d: The broken of shell bangles at MelantaTutup, Semporna.
(Photographs: VelatBujeng)

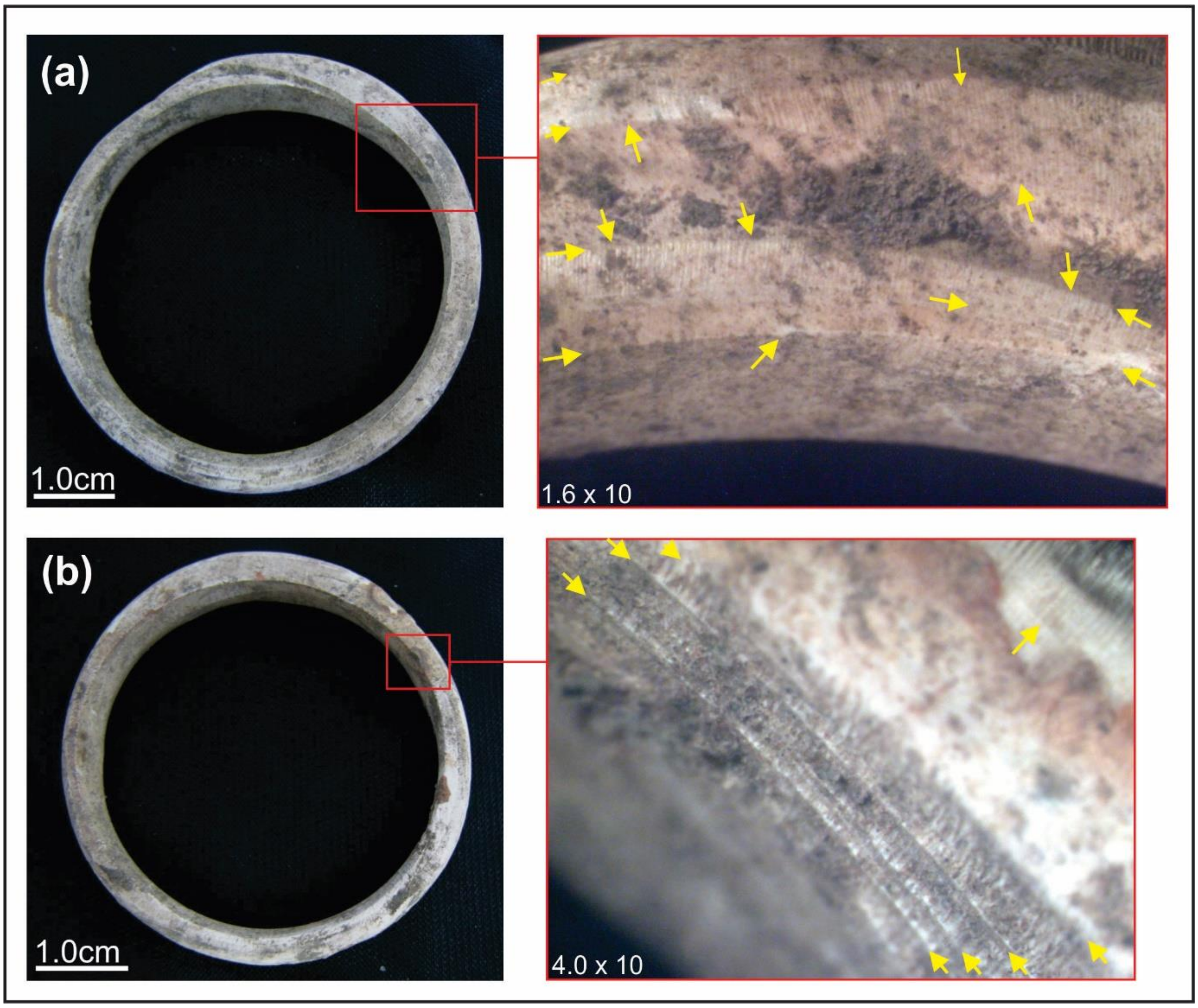

Figure 9a-b: Shell bangles with grind marks (under stereomicroscope).

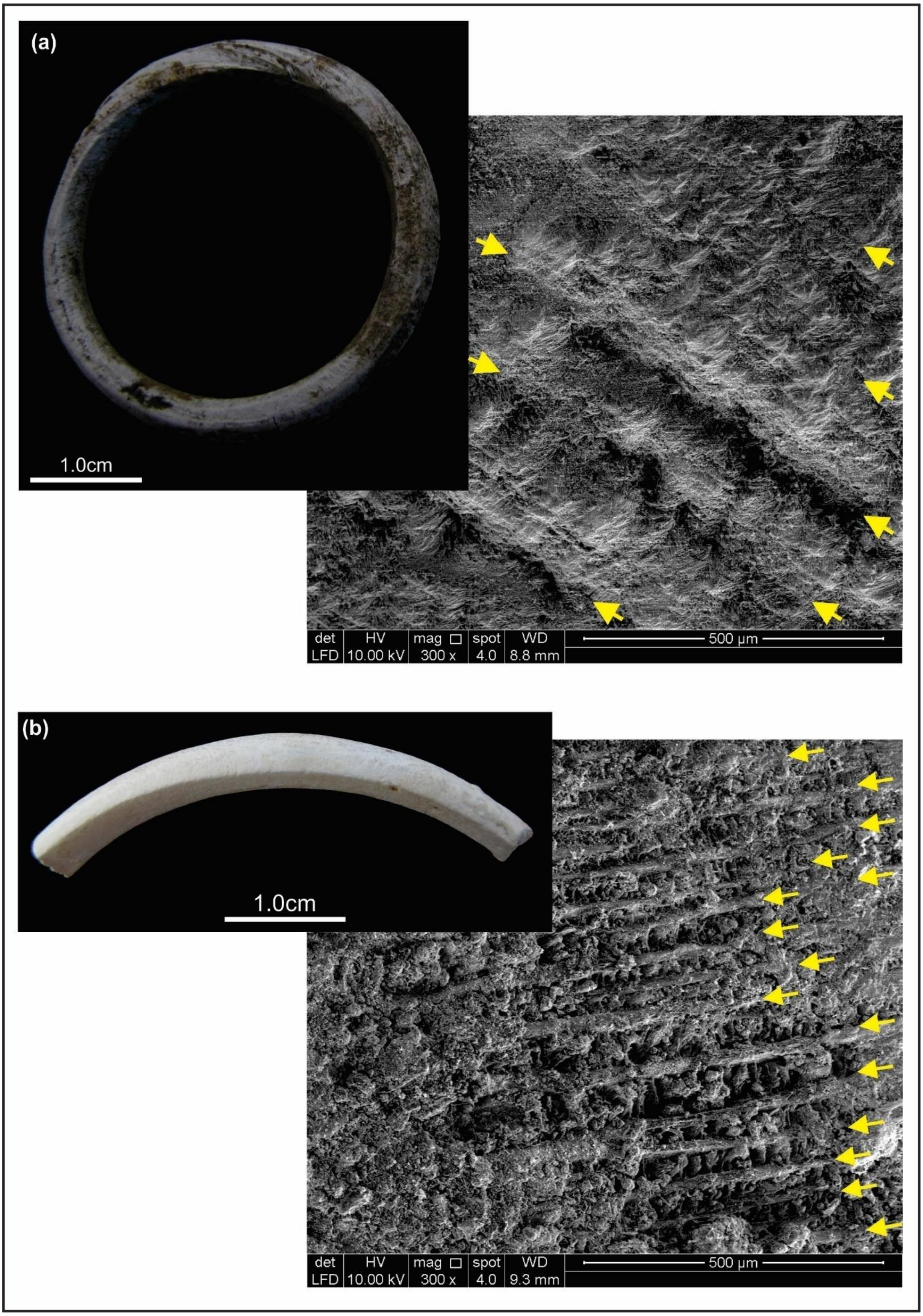

Figure 10a-b: Shell bangles with grind marks (under scanning electron microscopy)