Mollusc Shells Findings from the Red House Excavation, Trinidad

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ABSTRACT

Excavation of units to assess the structural integrity of the Red House's foundation yielded pre-Columbian and pre-Colonial artefacts, including several species of bivalves and gastropods. Identification of these remains using several identification keys and plates produced a checklist of 38 species of which 14 were bivalves belonging to nine families and 24 were gastropods, representing 20 families. Whilst most of the identified molluscs occupy marine environments, species from terrestrial, fresh and brackish water environments were also present. Several of the shells, in particular those belonging to *Crassostrea rhizophorae* as well as *Melongena melongena* bore harvesting holes, implying their possible use as food in nearby settlements. The diversity of species collected from the test units alludes to the rich biodiversity present prior to the infrastructural development of Port of Spain and the construction of the Red House.

Key words:

INTRODUCTION

Shell middens have been studied worldwide, providing insights into the diet and activities of societies in the past (Álvarez *et al*. 2011). They were once sites of processing exploited marine molluscs, particularly gastropods as well as finfish for food (Waselkov 1987, Schapira *et al.* 2009). Molluscs were ideal, opportunistic sources of protein for small settlements since they are either sessile or slow-moving, making them easy pickings. With as many as 300 registered archaeological sites in Trinidad and Tobago, many of which were located in proximity to coastal environments, several have yielded shell middens including the well-known Banwari Trace (Kenny 2008, Boomert 2016). Shell middens have also been recorded at St. John, Ortoire, Palo Seco, Erin and Guayaguayare to name a few (Sued-Badillo 2003, Saunders 2005, Ali 2012, Boomert 2016). In addition to providing data on anthropogenic activities, shell middens are also an archive of past environments and their molluscan biodiversity since it is believed that harvested molluscs were processed from their shells in close proximity to their source, decreasing the burden of transporting heavy shells (Waselkov 1987, Álvarez *et al*. 2011).

One of the most recent sites is the Red House, the House of Parliament for the Republic of Trinidad and Tobago, located in the capital city of Port of Spain which currently stands on reclaimed land which in pre-Columbian and pre-Colonial times, would have been a coastal region. The Red House has been under structural renovations since 2009. During April 2013, test units dug to determine the structural integrity of the building's foundation yielded several Amerindian artefacts and animal remains from approximately the 12th Century (Bharath 2013). The spoils from the test units revealed a high concentration of mollusc shells. This article provides a checklist of mollusc species found at the most recent archaeological site for Trinidad and Tobago.

METHODOLOGY

The sediment spoils from the 14 test units were sifted and various artefacts sorted. Shells were washed and dried, then further sorted. They were identified to species level using picture documentation in Kaplan (1988), Sutty (1990), Tucker Abbott and Morris (1995) and Jones and Jones (2005) with verification of scientific names using MolluscaBase (2016) and the World Register of Marine Species (WoRMS) Editorial Board (2016). The malacology collection of the University of the West Indies Zoology Museum, Department of Life Sciences, St. Augustine Campus, was consulted to identify species not found in the reference text. Shell Diversity Richness was noted and also, the potential habitat where specimens would exist were determined based on current findings of live specimens using references in Palomares and Pauly (2016) and the WoRMS Editorial Board (2016).

RESULTS

From the Red House test units we documented 14 species of bivalves spanning across nine families (Table 1). All bivalves with the exception of the Mangrove oyster *C. rhizophorae,* were inhabitants of marine environments. The oysters were documented as inhabitants of brackish water environments. Whilst most of the marine bivalves were typically benthic species, Thick lucine *Phacoides pectinatus* was the only demersal bivalve.

A larger diversity of gastropods (Table 2) was identified within the test units with 24 species from 20 families, representing various environments. One land snail species, Giant South American snail, *Megalobulimus oblongus*

Table 1. Checklist of bivalves at the Red House excavation site

Family	Scientific Name	Common Name	Environment*
Arcidae (ark clams)	*Anadara notabilis*	Incongruous ark/ Eared ark	Marine; benthic
	Anadara ovalis	Blood ark	Marine; benthic
	Arca imbricata	Mossy arc	Marine; benthic
Cardiidae (cockles)	*Trachycardium muricatum*	American yellow cockle	Marine; benthic
Donacidae (donax clams)	*Donax* sp.	Chip-chip	Marine
Lucinidae (lucina clams)	*Lucinisca muricata*	Spinose lucine	Marine; benthic
	Phacoides pectinatus	Thick lucine	Marine; demersal
Ostreidae (oysters)	*Crassostrea rhizophorae*	Mangrove oyster	Brackish
Solemyidae (awning clams)	*Solemya velum*	Atlantic awning clam	Marine; benthic
Tellinidae (tellins)	*Tellina* sp.	Tellin	Marine
Veneridae (venus clams)	*Chione cancellata*	Beaded venus/ Cross-barred venus	Marine; benthic
	Chionopsis intapurpurea	Lady-in-waiting	Marine; benthic
	Periglypta listeri	Princess Venus	Marine; benthic
Yoldiidae (yoldias)	*Yoldia myalis*	Comb yoldia/ Oval yoldia	Marine; benthic

*Source: Palomares and Pauly 2016; WoRMS Editorial Board 2016

was among the shell remains. Whilst freshwater snails were represented by two species of Ampullariidae snails and Channelled whelk, *Busycotypus canaliculatus* was the lone gastropod exclusively inhabiting brackish water environments; Virgin nerite, *Neritina virginea* is typically an inhabitant of both freshwater and brackish environments. The remaining 18 gastropod species were typically found in marine environments. Knobby keyhole limpet, *Fissurella nodosa* and West Indian chank, *Turbinella angulata* were considered reef-associated species. Nine of the gastropod shells were typically demersal inhabitants, found on the surface of the sea floor whilst four marine gastropods were considered to be benthic in nature.

It should be noted that the depths where shells were found varied in the excavation units but generally they appeared at deeper depths on the southern side of the archaeological site along a gradient.

DISCUSSION

The excavation process is a relatively destructive extraction method, often destroying the brittle shells, making accurate abundance estimations difficult. However, in all the test units, *Crassostraea rhizophorae* was observed as the most abundant molluscan species, possibly contributing to the highest biomass. *Melongena melongena* was the largest mollusc specimen obtained as seen in Figure 1. They were found in large numbers, contributing to the heaviest overall weight among all shell species. In present times, both species are found in similar habitats, usually mud flats and mangrove breakwaters. *C. rhizophorae* is a typical prop-root fauna for mangrove swamps (Kaplan 1988, Carpenter 2002). The high abundance of these two edible species and the presence of muscle-detaching harvest holes in the majority of specimens are evidence towards their possible exploitation as food. No specimens of *C. rhizophorae* were found with both valves intact which could be an effect of the excavation, washing and sorting process or decomposition.

All of the other identified bivalves and gastropods, though in significantly lower numbers were potentially edible. *Neritina virginea* is typically found in a freshwater system in close proximity to brackish water interfaces with an estuary (Kaplan 1988, Palomares and Pauly 2016). The low abundance of this shell species is perhaps a result of the shells being flushed into the estuary or being disposed of in that area. *N. virginea* were possibly collected from an

Table 2. Checklist of gastropods at the Red House excavation site

Family	Scientific Name	Common Name	Environment*
Ampullariidae (apple snails)	*Marisa cornuarietis*	Giant Ramshorn snail	Freshwater
	Pomacea glauca	Apple snail	Freshwater
Buccinidae (true whelks)	*Gemophos tinctus*	Granada's cantharus Tinted cantharus	Marine; demersal
Bullidae (bubble snails)	*Bulla striata*	Striate bubble	Marine; demersal
Busyconidae (busycon whelks)	*Busycotypus canaliculatus*	Channelled whelk	Brackish; benthic
Conidae (cone snails)	*Conus* sp.	Cone shell	Marine
Cypraeidae (cowries)	*Cypraea* sp.	Cowrie	Marine
Fissurellidae (keyhole limpets)	*Fissurella nodosa*	Knobby keyhole limpet	Marine; reef-associate
Haminoeidae (haminoeid bubble snails)	*Haminoea succinea*	Amber glassy bubble	Marine; demersal
Littorinidae (periwinkles)	*Nodilittorina* sp.	Periwinkle	Marine
Megalobulimidae	*Megalobulimus oblongus*	Giant South American snail	Terrestrial
Melongenidae (crown and melon conchs)	*Pugilina morio*	Giant Hairy melongena	Marine, demersal
	Melongena melongena	West Indian crown conch	Marine; demersal
Muricidae (rock snails)	*Chicoreus brevifrons*	West Indian murex	Marine; demersal
	Stramonita floridana	Florida rock shell Red-mouthed rock shell	Marine; benthic
Nacticidae (moon snails)	*Natica marochien*	Morocco moon snail	Marine; demersal
Neritidae (nerites)	*Neritina virginea*	Virgin nerite	Freshwater, brackish; benthic
Olividae (olive snails)	*Americoliva reticularis*	Netted olive	Marine; demersal
	Americoliva sayana	Lettered olive	Marine; benthic
Orthalicidae (orthalicid land snails)	*Orthalicus undatus*	Wavy orthalicus	Terrestrial
Ranellidae (tritons)	*Cymatium* sp.	Triton	Marine
Strombidae (true conchs)	*Lobatus gigas*	Caribbean queen conch	Marine; benthic
Tegulidae (tegulas)	*Cittarium pica*	West Indian top shell/ whelk	Marine; demersal
Turbinellidae (chanks)	*Turbinella angulata*	West Indian chank	Marine; reef-associate

*Source: Palomares and Pauly 2016; WoRMS Editorial Board 2016

independent site, cracked open and the shell disposed of. At several other middens [eg.Caparo site (personal observations)], these small shells were found, implying inland transportation for food and nearby disposal by resident communities (Boomert 2016).

Of the two terrestrial gastropods found, the Giant South American snail, *Megalobulimus. oblongus* bore harvesting holes similar to *M. melongena* suggesting

Fig. 1. The Large West Indian Crown Conch, *Melongena melongena* with harvest holes.

their potential use as food. Interestingly *M. oblongus* is not typically found near estuaries (Agudo-Padrón 2012). Similarly, the Knobby keyhole limpet *Fissurella nodosa,* a rocky shore and reef-associated species, is a unique find to the site since it was the lone identified marine species that is not typically estuarine (Kaplan 1988, Rodríguez-Sevilla, Vargas and Cortés 2009).

The excavated species suggest that the Red House site was likely once in very close proximity to a natural estuarine habitat such as a mud flat with mangrove forest. The presence of reef-associated species such as *F. nodosa* and *Turbinella angulata* could be indicators of a nearby reef or rocky shore, with individual shells being washed ashore, or incidentally collected and transported to the Red House site. However, it is not unlikely for *T. angulata* to be present in mudflats (Olsson and McGinty 1958; Garcia, Olsson and McGinty 2004). The varying depths of shell deposition observed on the walls of the test units also give an inclination of the landscape's southward sloping topography. The molluscan remains bearing harvest holes may imply that a settlement of sort was present in the vicinity of the shells' location.

Whilst the excavation's initial objective was to investigate the structural integrity of the Red House and therefore lacked the systematic removal of earth layers, resulting in the mixing of contexts and its associated artefacts, the abundance and high biomass of molluscan remains, particularly *C. rhizophorae* and *M. melongena* with harvest holes lends credence to the site's use as a disposal ground for the shellfish remains. It would have been illogical for settlers to walk far distances with large, collected shellfish such as *M. melongena* or for disposal of the shells with limited transport technology (Waselkov 1987). It was more energy efficient to either locate the settlement close to the wetland or, to process the meat by removing it from the shells and returning to the village, leaving behind the discarded remains (Waselkov 1987).

Often easily identified by the uniform dark-coloured layer with contrasting white shells, other features that are sometimes used to characterise a shell midden in contrast to a natural shell bed includes the presence of charcoal, burnt or blackened shells, non-molluscan terrestrial fauna with tool markings, fragments of tools as well as pottery sherds (Attenbrow 1992, Boomert 2016). However, the absence of these does not imply the absence of a midden, nor does their presence rule out the occurrence of a natural shell bed (Attenbrow 1992). In this case, the proportion of edible species bearing signs of meat extraction is the most reliable diagnostic feature (Attenbrow 1992). A Lettered Olive, *Americoliva sayana* shell with evidence of human workings (Figure 2) was recovered, indicating that shell deposits may not have been natural but were impacted by humans.

The earth layers present a timeline which makes it possible to date the shells based on the presence of various artefacts such as tools, metals and pottery sherds as well as the use of carbon dating, provided that there was little natural or anthropogenic disturbance to the contexts (Attenbrow 1992, Álvarez *et al.* 2011, Boomert 2016). This can provide insight into the possible habitants responsible for the creation of the middens. The excavation operation at the time of sample processing unfortunately mixed the various contexts, making deductions of the possible users of the middens difficult. However, the presence of both pre-Columbian and pre-Colonial artefacts verifies the use of the Red House site by both indigenous and European habitants.

Not all shells gathered had harvest holes or tool markings to suggest their use as a food source. The mixing of the contexts due to the excavation made it difficult to determine if several unmarked molluscan fauna may have been a part of the shell midden. Natural environmental and geological events such as flooding, or environmental alterations due to European settlement as well as disturbance of the earth due to development and eventual construction of the Red House may also contribute to the diversity found in various units.

Identification of the shell species were based on sev-

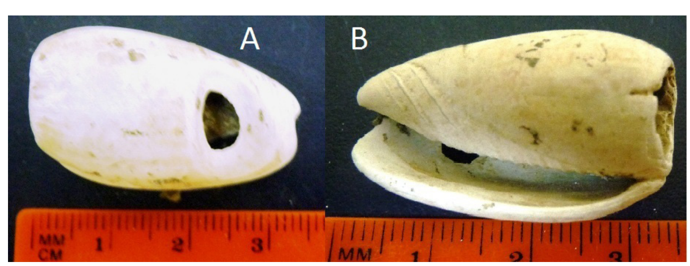

Fig. 2. The Lettered olive, *Americoliva sayana* shell with evidence of human workings, (A) on dorsal shell whorl and (B) spire removed.

eral features such as shell shape, sculpture patterns, hinge teeth, spire lengths and aperture size. The excavated shells would have been heavily weathered over time and damaged due to the excavation, washing and sorting process. The loss of the periostracum, damage to spires, and weathering away of other key diagnostic features would have made identification of some shells to species level difficult.

In conclusion, the diversity of molluscan fauna identified, alludes to the site formerly being a natural wetland prior to European settlement. The presence of several shells bearing harvest holes indicates the opportunistic harvesting of molluscs, theirutilisation as food and deposition of their remains in close proximity to both their natural habitats and possibly a human settlement. The high frequency of large shells alludes to the possibility that the aquatic faunal population particularly the molluscan fauna was high, which requires a very productive ecosystem such as that provided by estuarine conditions to facilitate such a large number of large gastropods and several species of bivalves. These findings further add to the knowledge pool of the potential food sources of Trinidad's indigenous peoples and perhaps pre-Colonial settlers.

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