Welcome to Issue 33 of the A+M Newsletter, my first as editor. Thank you to all who contributed, and extra special thanks to Cindy Nelson-Viljoen for her hard work as editor since September 2016. In this issue, Philip Staudigel explores the use of clumped carbonate isotope analysis to determine cooking in past shells; Sandra Gordillo updates us on recent archaeomalacological research in South America published in a special issue of *Comechingonia*, and I wonder about different states of preservation within samples of land snail shells. There are also announcements of upcoming conferences and recent publications, including our next AMWG conference, which is to be held in Pune, India in September.

I would like to remind the AMWG community that we welcome any contributions related to archaeomalacology and are especially interested in member photos/images, news and updates.

**ABOUT THE NEWSLETTER**

The Archaeo + Malacology Newsletter warmly invites contributions related to archaeomalacology in its widest sense. Please email submissions and questions to the editor. **Annual deadlines are 31st January for circulation in February and 31st July for circulation in August.** Current and previous issues of the newsletter are available at [archaeomalacology.wordpress.com](http://archaeomalacology.wordpress.com)

[Archaeomalacology Working Group](http://archaeomalacology.wordpress.com)

[@archaeomalacol](https://twitter.com/Archaeomalacol)

**Editor:** Matt Law

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### In This Issue

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CARBONATE CLUMPED ISOTOPES: A NEW PROXY FOR ANCIENT FOOD PREPARATION TECHNIQUE.

Dr. Philip Staudigel – Cardiff University, Cardiff, Wales, UK

Reconstruction of ancient preparation techniques relies upon the examination of either human records, the tools used for cooking, or discarded food waste. The techniques by which food is prepared constitute play a central role in virtually all modern cultural identities; thus, changes in these practices over time could be expected to reflect significant changes in the lifestyles of a people-group. Because of this, there is great scientific and popular interest in the ways our ancestors cooked, as food preparation, unlike many other long-gone cultural practices, is a daily ritual we all still participate in.

Many coastal archaeological “shell midden” sites consist predominantly of discarded food waste in the form of leftover shells from ancient meals, often with a complete absence of the tools (if any) used to prepare them prior to consumption. Thus, determining the culinary practices of these coastal-dwelling peoples often relies purely on the examination of the discarded waste. To this end, my colleagues and I have applied a relatively new isotopic technique called clumped isotope paleothermometry, which has, for the past decade, been refined as a tool for geologists as a means to determine the temperatures at which certain minerals formed.

The clumped isotope technique relies on the accurate measurement of rare isotope bonds within carbonate minerals, specifically between the heavier isotopes of carbon and oxygen (\(^{13}C – ^{18}O\)). These bonds, which require greater energy to break than their more common counterparts, are thermodynamically preferable; at elevated temperatures, the distribution of bonds tends towards a more randomly distributed, stochastic state. What we have found is that, in certain carbonate materials, these bonds can be re-arranged at elevated temperatures in such a way that the peak heating experienced by that mineral can be reconstructed. This requires heating in excess of \(~125^\circ C\) in order to occur over timescales of minutes\(^1\). The measurement of these bonds can, given a few assumptions, yield an estimate of the cooking temperature used to prepare the shellfish prior to consumption\(^2,3\).

This effect was originally observed while trying to reconstruct water temperatures using clams from a Mauritanian estuary\(^2\), however reconstructed water temperatures were consistently far too hot, even by Saharan standards! It was then theorized that these clams, which were recovered from an archaeological site, had been cooked prior to our analyses. To test this prediction, modern clams were cooked and subsequently analyzed (Fig. 1), which produced a calibration line for estimating ancient cooking temperatures (Fig. 2–right). This technique was recently applied to a shell midden site attributed to a Pre-Arawak Neolithic Puerto Rican native population\(^3\). The results of these analyses (Fig. 2–left) revealed that variable maximum heating temperatures were recorded in the 24 clams which were measured. These values conformed to a long-tailed distribution, where around half of samples appeared uncooked, while the other half yielded estimated heating temperatures between 125°C and 200°C. Based on these results, several possible cooking techniques are consistent with these thermal histories. For example: if half of the shells were never heated over 125°C, possibly having been discarded prior to consumption, or were cooked in a way that resulted in heating below the threshold. Alternatively, a single cooking method wherein samples are only heated through a single valve is also possible. This
would be similar to barbecuing clams today, where they are placed on the heating surface and open naturally, but are not flipped.

The technique my colleagues and I are developing is still very much in its infancy, there remain many low-hanging fruit for calibrating the method by measuring different materials which have been cooked in known ways. With additional calibration, it is hoped that this technique can be used to study the utilization of coastal food resources. Although there is much work left to be done calibrating this technique and studying its limitations, my hope is that it will nevertheless provide a useful tool for studying the rich cultural history of coastal communities around the world.

REFERENCES CITED:

ABOUT THE AUTHOR: Philip Staudigel is a postdoctoral research associate in the School of Earth and Ocean Sciences at Cardiff University, he received his Doctorate in Marine Geology and Geophysics from the University of Miami Rosenstiel School for Marine and Atmospheric Science in 2018.

<table>
<thead>
<tr>
<th>EXPERIMENTAL HEATING TEMPERATURE (MÜLLER ET AL., 2017)</th>
<th>550°C</th>
<th>174°C</th>
<th>100°C</th>
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<tbody>
<tr>
<td>Δ47 modeled Δ47 equilibration times TΔ47(100°C) ~ 100 hours</td>
<td>0.118 ± 0.028</td>
<td>0.118 ± 0.028</td>
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<tr>
<td>TΔ47(175°C) ~ 15 minutes</td>
<td>0.118 ± 0.028</td>
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<tr>
<td>TΔ47(200°C) ~ 3 minutes</td>
<td>0.118 ± 0.028</td>
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**Figure 2:** Measured clumped isotope (Δ47) values for uncooked Puerto Rican shells (control group), Puerto Rican Shell Midden bivalves, and cooked bivalves from experimental study. Figure from Staudigel et al.3.

![Diagram showing measured clumped isotope (Δ47) values for uncooked Puerto Rican shells (control group), Puerto Rican Shell Midden bivalves, and cooked bivalves from experimental study. Figure from Staudigel et al.3.](image-url)
A dossier dedicated to archaeomalacology that integrates volume 23 (number 1) of *Comechingonia* (a Journal of Archaeology in Argentina), is presented here. It arises from the First Latin American Symposium on Archaeomalacology, co-ordinated together with Andrés Gascue from Uruguay, held in in October 2017 in Piriápolis (Uruguay) within the framework of the X Latin American Congress of Malacology (X CLAMA).

This Symposium provided a great opportunity for the exchange of ideas and experiences between different groups of researchers, mainly from Argentina and Uruguay, also counting for this dossier with the contribution of colleagues from Brazil. It is reflected, through the 10 works in Spanish or Portuguese (abstracts in English) that make up this volume, an updated panorama with extensive information on the advances and approaches to address archaeomalacological problems in the aforementioned countries.

**Ortiz et al. (2019)** analyze the remains of gastropod molluscs that appear frequently at sites in northwestern Argentina, assigned to the Early Formative period (500 BC-600 AD). The different indicators provided information on the taphonomic and anthropic agents involved in their distribution, also allowing recognition of the prevalence of the Ampullariidae family, which tends to be concentrated in specific sectors linked to processing areas.

**Tissera et al. (2019)** perform the analysis of a set of malacological fragments of land snails from an excavation in Cerro Colorado (province of Córdoba) with a chronology compatible with the late Pre-Hispanic period (ca. 1500-400 BP) and interpret that they have an anthropic origin, suggesting this site as a *locus* of production that records different moments of an operational chain.

In relation to the Pampean hunter – gatherers, **Berón (2019)** addresses the malacological materials from both residential and mortuary sites and recognizes their economic, social and symbolic importance, also highlighting the relationship of these devices with the mobility and interaction networks.

**Buc et al. (2019)** analyze shell beads and tembetás of the pre-Hispanic hunter-gatherer groups of the Lower Paraná wetland and propose their functionality as social demarcators based on their spatial distribution and morphological and morphometric patterns.
From Uruguay, Gascue et al. (2019) present a synthesis of the differential use of malacological materials carried out by the pre-Hispanic hunter-gatherer populations that occupied the different regions of the country, and conclude that the molluscs were mainly associated with symbolic (ornamental and funerary) aspects of these cultures, being also represented economic activities linked to food consumption and production of utilitarian artifacts.

Loponte et al. (2019) discuss the role of freshwater molluscs in the subsistence of hunter-gatherer groups of the lower Paraná wetland, analyzing the environmental availability of the bivalve Diplodon (Rhipidodonta) variabilis as part of a regional process of diversification and intensification of subsistence during the late Holocene, also analyzing the isotopic signals of its consumption.

Prous and Pessoa (2019) highlight the importance that molluscs had in prehistoric periods in Brazil. Within this vast region, several uses are recognized, including the consumption of coastal molluscs and the use of their shells as a construction material in coastal sambaquis. Also as instruments (for cutting, scraping, sawing, drilling and flattening), as containers, as ornaments (necklaces, bracelets, lip ornaments) for clothing and as an antiplastic in Amazonian ceramics.

For Patagonia Argentina, Hammond (2019) analyzes the shell-middens of the late Holocene of the north coast of Santa Cruz providing information on various characteristics of the human past related to subsistence, collection behaviors and modes of space occupation.

Also in Patagonia Argentina Zubimendi et al. (2019) analyze the beads of a necklace in a prehistoric burial recovered at the mouth of the Santa Cruz River, dated to ca. 1100 years BP

Finally, Leonardt (2019) presents the results of an experimental program through which she analyzes the pattern of production and distribution of malacological artifacts in Patagonia during the late Holocene.

Thus, and taking these 10 case studies and research as a reference, it is recognized for these countries of South America which comprises Argentina, Brazil and Uruguay: (1) the use of different species of marine, freshwater and terrestrial molluscs, according to availability in the different regions; (2) the use of freshwater and marine molluscs as food items for subsistence (3) the presence of molluscs in the domestic and funerary environment; (4) the existence of daily manufacturing and specialization practices within an artifact production and distribution chain, and the link with exchange networks; and (5) the symbolic value of certain species or as elements of social communication (Gordillo et al., 2019). All this allows conclusions about the economic, social and symbolic importance of molluscs in different spaces and temporalities of South America.

ACKNOWLEDGEMENTS. It is mentioned that for this dossier 20 researchers from Spain, France, Mexico, Brazil, Chile, Uruguay and Argentina participated in the evaluation process and that with their criticisms, comments and contributions they enriched the final version of the works. The volume was specified by the support of the Comechingonia editorial team, particularly Andrea Recalde and Sebastián Pastor.

REFERENCES


It is common to find variation in preservation amongst assemblages of sub-fossil land snail shells from archaeological and palaeoecological contexts, especially in situations where the burial of the sampled assemblage is shallow, or in dynamic environments such as dune systems. Some shells may be extremely eroded, whereas others may have the appearance of a very recent shell, with the periostracum intact or a glossy, translucent appearance. Explicit consideration of this point in snail reports in environmental archaeology appears to be rare, however.

It seems likely that variable preservation, even more so when it occurs within a single species, is the result of time-averaging, the mixing of non-contemporaneous fossils within a deposit, although variations in the biological, chemical and physical processes acting on a collection of contemporary shells within a soil or sediment should not be discounted. That there should be time-averaging within snail shell assemblages is well-understood theoretically (Thomas 1985, 135). Because land snails have relatively short lifespans, they have relatively high fossil genesis rates, as well as relatively durable shells (especially in arid environments) so a significant degree of time-averaging should be expected in land snail assemblages (New et al. 2019).

Recently, amino acid racemization (AAR) and graphite-target and carbonate-target accelerator mass spectrometry (AMS) radiocarbon dating have been applied to the problem of time-averaging in Holocene colluvial deposits from the Desertas Islands in the Madeira archipelago, Portugal (New et al. 2019). The sampling was undertaken underneath and around rocks at the base of actively eroding slopes of unconsolidated sediment (which is likely to be an extreme scenario for conflation of shells of different ages). The study found time-averaging within samples to be greater than 6,000 years, a considerably larger variation than the analytical error that might be expected from dating methods and calibration.

Direct analysis of shell characters can also be informative, a relief for those of us whose budgets seldom stretch to multiple AAR and AMS determinations. Yanes (2012) explored taphonomic variables among live and dead land snail assemblages from the Bahamas, the buried assemblages ranging in date from the Upper Pleistocene to the Middle Holocene, scoring each sample against six taphonomic and ecological variables:

1. Total number of shell remains >2mm in maximum dimension
2. Minimum number of individuals (MNI, calculated as the number with embryonic shell preserved).
3. Fragmentation (number of shells that preserved <c.80% of the shell)
4. Ornamentation loss (shells with partial and or total loss of ornamentation)
5. Colour loss (number of shells with total loss of the original colour pattern)
6. Carbonate coatings (number of shells with the presence of a partial or total carbonate crust).

She found that the percentage of the total number of shell remains affected by fragmentation, ornamentation loss and colour loss correlated with one another based on a Spearman rank analysis. Cluster analysis was then used to assign samples to taphofacies. Encouragingly, she found that, although clearly time-averaged, assemblages retained their ecological fidelity.

The categories of colour and ornamentation loss can be further refined within samples where variations in fragmentation are not that great. At Larkhill, on the chalk geology of Salisbury Plain in southern Britain, a shell assemblage from a shallow-buried Bronze Age round barrow ditch revealed considerable variations in preservation among intact shells within samples (Law, unpublished). A three-point scoring system for preservation was applied to one of the more abundant taxa, Helicella itala, in order to indicate the overall scale of mixing within the assemblage (Figure 1):

- *Helicella itala A*: Shell glossy and partially translucent, with colouration clear.
- *Helicella itala B*: Shell becoming more opaque, darker stripes remain visible.
- *Helicella itala C*: Shell fully opaque and white, no trace of darker colouration.
Although not present in the Larkhill assemblage, a further category (D) could be added for shells displaying pitting and loss of shell material due to biochemical erosion.

The majority of *Helicella* shells in each sample belonged to the least well preserved category, *Helicella itala* C. Typically, around 10-20% belonged to the best preserved category, *Helicella itala* A. The latter category tended to be shells at the smaller end of the size range (<4mm) for *H. itala* within the samples. As with the Bahaman example, time-averaging had not adversely affected the ecological interpretation of the assemblage, although the Bronze Age snail community at Larkhill seems likely to have been much the same in terms of species composition as that of the present day.

Although we can use these approaches to quantify variable preservation within an assemblage, the next logical step of linking this to a chronologically meaningful sequence of shell decay is likely to be impossible. The proteinaceous periostracum of shells is destroyed within a year of death (Evans 1972, 19), however, overall rates of decomposition of shells have been shown to be highly variable (Říhová et al. 2018). Smaller shells are, as might be expected, more susceptible to decomposition and disappear from soils faster than larger, more robust shells. The timescales implicated vary greatly depending on habitat type and factors such as humidity, soil pH and calcium carbonate content of the soil. Carter (1990), calculated mean residence times of shells in a biologically active calcareous soil of between less than 6 and more than 335 years, depending on the robustness of the shells of individual species. Říhová et al. (2018) note that in acidic settings, the shell may completely disappear before the periostracum does.

The absence of chronological certainty does not negate the usefulness of recording variable preservation. It is a marker (along with factors such as the abundance of modern root material, live invertebrates and geological fossils within a sample) for taphonomic mixing, and should be explicitly considered in assemblage interpretation. In both the Bahaman and British examples, the mixing does not appear to impact ecological interpretation, however such recording on sites with especially marked ecological transitions (such as forest clearance or a profound shift in
degree of precipitation) may be revealing. A recommended approach might be to apply the Larkhill scale illustrated above to one each of the most and least robust taxa within an assemblage. In situations such as developer-funded archaeology in the United Kingdom, where a rapid, often semi-quantitative, assessment of the potential of a sample is undertaken prior to analysis, an even simpler estimation of the ration of apparently ‘fresh’ (glossy, translucent or with intact periostracum) to ‘worn’ (entirely opaque, lacking periostracum) shells could be reported. An important consideration, however, is that even in scenarios where variable preservation is not visibly evident, time-averaging is still likely, with a likelihood that larger taxa represent greater time periods than small taxa. This situation is likely to only ever be resolved through direct dating of the shells.

REFERENCES


CATALOGING COWRIES: A STANDARDIZED STRATEGY TO RECORD SIX KEY SPECIES OF COWRIE SHELL FROM THE WEST AFRICAN ARCHAEOLOGICAL RECORD

Christie AC, Grant A, and Haour A.

_African Archaeological Review_

DOI: https://doi.org/10.1007/s10437-019-09351-z

Two species of the cowrie shell, _Monetaria moneta_ (Linnaeus, 1758) and _Monetaria annulus_ (Linnaeus, 1758), repeatedly occur in archaeological contexts across West Africa. Despite their archaeological and ethnographic importance, these shells remain poorly and inconsistently reported in the archaeological literature. The absence of standardized data on species composition, size, and condition of cowrie assemblages, and whether and how the shells were modified, make it difficult to examine their significance in a regional and chronological framework. To address this problem, we propose a set of standardized criteria and coding system for recording cowrie assemblages—in particular, species, size, condition, and state of modification. We aim to enable nonshell specialists within the wider archaeological community to securely identify intact or modified specimens of _M. annulus_ and _M. moneta_, showing how these can be distinguished from four cowrie species native to West Africa—_Luria lurida_ (Linnaeus, 1758), _Zonaria zonaria_ (Gmelin, 1791), _Zonaria sanguinolenta_ (Gmelin, 1791), and _Trona stercoraria_ (Linnaeus, 1758). We demonstrate how accurate species identification and the assessment of proportions of different sizes of shells within suitably large assemblages can provide insight into their provenance. This information can enhance our appreciation of the exchange networks within which these shells moved. We also identify five different strategies documented in the archaeological record that were used to modify cowries, detailing how these can be differentiated and classified. The aim here is to suggest a recording strategy that will enable comparisons of the use and value of cowries in West Africa and elsewhere.

This publication derives from work conducted at the University of East Anglia on the Leverhulme funded 'Cowrie Shells: An Early Global Commodity Project' (RPG-2014-359), PI Prof. Anne Haour, Co-I. Prof. Alastair Grant.

COWRIES IN THE ARCHAEOLOGY OF WEST AFRICA: THE PRESENT PICTURE

Haour, A., and Christie, A.

_Azania: Archaeological Research in Africa_, 54:3, 287-321,

DOI: 10.1080/0067270X.2019.1648726

ABSTRACT:

Despite the perceived importance of cowrie shells as indicators of long-distance connections in the West African past, their distribution and consumption patterns in archaeological contexts remain surprisingly underexplored, a gap that is only partly explicable by the sparse distribution of archaeological sites within the sub-continent. General writings on the timeline of importation of cowries into West Africa often fail to take into account the latest archaeological evidence and rely instead on accounts drawn from historical or ethnographic documents. This paper is based on a first-hand assessment of over 4500 shells from 78 sites across West Africa, examining chronology, shell species and processes of modification to assess what distribution patterns can tell us about the history of importation and usage of cowries. These first-hand analyses are paralleled by a consideration of published materials.
We re-examine the default assumption that two distinct routes of entry existed — one overland from North Africa before the fifteenth century, another coming into use from the time sea links were established with the East African coast and becoming predominant by the middle of the nineteenth century. We focus on the eastern part of West Africa, where the importance of imported cowries to local communities in relatively recent periods is well known and from where we have a good archaeological sample. The conclusion is that on suitably large assemblages shell size can be an indication of provenance and that, while the present archaeological picture seems largely to confirm historical sources, much of this may be due to the discrepancy in archaeological data available from the Sahara/Sahel zone compared to the more forested regions of the sub-continent. Future archaeological work will clarify this matter.

HOMER 2020: ARCHAEOLOGY OF COASTAL SETTLEMENTS AND HUMAN/ENVIRONMENTAL INTERACTIONS IN THE ATLANTIC NORTH OF THE EQUATOR
28th of September- 3rd of October 2020, on the island of Oléron (France)

The second international conference "HOMER 2020" (10 years after the first edition held in Vannes https://homer2011.univ-rennes1.fr/), aims to propose a broad scientific meeting on the question of the archaeology of coastal settlements and Human/Environmental interactions around recent advances in coastal and island archaeology. The geographical area of this second edition concerns the Atlantic north of the equator. On the one hand, it will generate syntheses and confrontations of experiences in the various countries of Europe and North and Central America and, on the other hand, a prospective study on developments in archaeology and archaeometry research in the coastal field.

The various sessions will take stock, ten years later, on issues such as island and coastal cultural identities, interrelationships between communities, on the coastal structures, on the evolution of the maritime landscapes, on the production and use of raw materials, but also on methodological issues and new challenges of coastal archaeology (**lato sensu**).

The Homer 2020 conference will take place from the 28th of September and 3rd of October 2020, on the island of Oléron (Charente-Maritime, Nouvelle-Aquitaine), island of the French Atlantic coast with a rich prehistoric, historical and archaeological past and will propose an attractive program of excursions and events inviting to discover the exceptional island and coastal heritage of the region.

The official languages of the conference will be French and English, and the papers and debates will be translated simultaneously.

The sessions will host oral communications and posters.

Deadline for submission: April 17th, 2020


Archaeomalacologists are welcome!
List of sessions
Session 1: Coastal and maritime archaeology: today’s challenges.
Session 2: Unlocking the potential of submerged, intertidal and coastal sites: Developing methods for their identification and study.
Session 3: Islands: isolation or interconnection?
Session 4: The anthropization of the coast: infrastructure, transformation and production techniques.
Session 5: Marine resources: new approaches, new challenges.
Session 6: Navigation, circulation and port installations.

Member of the organizing committee: Catherine Dupont catherine.dupont@univ-rennes.fr

MOLLUSCS AND ANCIENT HUMAN SOCIETIES CONFERENCE

The International Council for Archaeozoology (ICAZ): Archaeomalacology Working Group (AMWG) and Indian Society for Prehistoric and Quaternary Studies (ISPQS) will host an international conference on Molluscs and Ancient Human Societies

Venue: Dept. of A.I.H.C. & Archaeology, Deccan College P.G.R.I. Pune 411006, Maharashtra, India

Date: 11-13 September 2020

The International conference on Molluscs and Ancient Human Societies will be held at Dept. of Ancient Indian History and Culture and Archaeology, Deccan College Post-Graduate and Research Institute, Pune from 11-13 September 2020.

PROGRAM: Single session of three days of oral and poster presentations and meeting of the working group (AMWG).

FIELD VISIT: One day tour of archaeological sites nearby. Pune is surrounded by forts, temples and ancient Buddhist rock cut caves which could be visited (Charges will be notified later at the time of registration).

REGISTRATION: Will open in March/April 2020. It will cover the conference kit, coffee/tea breaks, lunch and Dinner.

TRAVEL AND ACCOMMODATION: Due to limited funds, the participants are requested to arrange their own travel and accommodation. However, efforts will be made to arrange accommodation for students. Pune is well connected by flights and trains internally, the nearest international airport is at Mumbai which is approx. 5 hours by road (rush hour time). There are buses, trains and taxis between Mumbai and Pune (very few flights).

Pune is very pleasant during September with light showers, and being mid semester it will be a good opportunity for our students to interact with scholars and participate.

RECENT PUBLICATIONS BY MEMBERS

BOOK CHAPTER
