Muge 150th

Muge 150th:

The 150th Anniversary of the Discovery of Mesolithic Shellmiddens—Volume 2

Edited by

Nuno Bicho, Cleia Detry, T. Douglas Price and Eugénia Cunha

Cambridge Scholars Publishing

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TABLE OF CONTENTS

Foreword ix

List of Contributors xi

Chapter One 1
A Few Steps Backwards … In Search of the Origins of the Late Mesolithic
Ana Cristina Araújo

Chapter Two 17
The Prehistoric Site of Prazo (Northern Portugal): Preliminary Data
on the 8th Millennium Cal BC Occupation
Sérgio Monteiro-Rodrigues

Chapter Three 29
Beyond the Mesolithic Shell Middens: A Chrono-Cartographic Overview
of the Ancient Peasant Communities in Muge
Marco António Andrade, César Neves and Gonçalo Lopes

Chapter Four 43
Approach to the Macrolithic Industry from El Conejar Cave (Cáceres,
Extremadura, Spain) Upper Breccia
Mª Dolores Mejías del Cosso, Fº Javier García Vadillo,
Antoni Canals i Salomó and Eudald Carbonell i Roura

Chapter Five 61
Evolution of Procurement and Management Strategies of Lithic Raw
Materials in the Mesolithic of Atxoste (Alava, Spain)
Adriana Soto, Antonio Tarriño and Alfonso Alday

Chapter Six 75
Open-air Mesolithic Sites in the Central Mediterranean Region of Spain:
New Evidence and Research Directions
Javier Fernández-López de Pablo, Carlos Ferrer García,
Magdalena Gómez-Puche, Carmen Tormo Cuñat and Alfred Sanchís Serra

Chapter Seven.. 93
Last Hunter-gatherers: Socioecological Dynamics in Mediterranean Iberia
Oreto García Puchol, Salvador Pardo Gordó, J. Emili Aura Tortosa
and Jesús F. Jordá Pardo

Chapter Eight... 109
AMS Radiocarbon Chronology of Late Mesolithic Sites in the Upper
Vinalopó Valley (Eastern Iberia)
Magdalena Gómez-Puche and Javier Fernández-López de Pablo

Chapter Nine.. 125
Recent Work at Star Carr: A POSTGLACIAL Landscape Study
Nicky Milner, Chantal Conneller and Barry Taylor

Chapter Ten 139
Pits in the Irish Mesolithic
Elizabeth Lawton-Matthews and Graeme Warren

Chapter Eleven 153
Salty or Sweet? Isotopic Evidence for the Use of Aquatic Resources
in Mesolithic Europe
Rick Shulting

Chapter Twelve 173
'Fishing' Mesolithic Settlement-Subsistence Systems using Notions
of Economy of Debitage and Raw Material toward Production
of Bone Points
Éva David, Sinead Mc Cartan, Frederik Molin and Peter Woodman

Chapter Thirteen.. 189
Bone Fragmentation as a Tool for Quantification and Identification
of Taphonomic Processes and their Effects: The Case Study from Havnø,
a Stratified Danish "Køkkenmødding."
Kurt Gron, Søren H. Andersen, and Harry K. Robson

Chapter Fourteen 207
Between 1820s and 1900: Discovering the Køkkenmøddings and the Older
Stone Age (Mesolithic) of Denmark
Erik Brinch Petersen

Chapter Fifteen 219
Material Culture and Mesolithic Actions in Space: Results of the Spatial Analysis of the Verkstadsvägen Site in Motala
Linus Hagberg and Ann Westermark

Chapter Sixteen 235
Territorial Infrastructure, Markers and Tension in Late Mesolithic Hunter-Gatherer Societies: An Ethnoarchaeological Approach
Ole GrØn

Chapter Seventeen 253
Red Colour in Mesolithic Burial Rites
Judith M. Grünberg

Chapter Eighteen 267
An Osteobiography from Lepenski Vir: Paramasticatory Use of Teeth and Musculoskeletal Stress of a Woman dated to the Early Neolithic
Marija Radović and Sofija Stefanović

Chapter Nineteen 279
Where is the *Household Boundary*? Substantial Spatial Considerations in "Little" Shell Middens
A. Maximiano Castillejo

Chapter Twenty 291
A Significant Component into Pre-Historical Canoeists Passages: Heuristic Implications of Shell-Middens in Fuego-Patagonia Landscape
A. Maximiano Castillejo and A. Prieto Iglesias

Chapter Twenty One... 301
Results of Recent Excavations on the Farasan Islands and Studies of Large-scale Prehistoric Shellfish gathering in the Red Sea
Niklas Hausmann, Matthew Meredith-Williams and Geoff Bailey

Chapter Twenty Two 315
Comparative Studies of Technological Practices between Coastal and Mediterranean Patagonian Hunter-Gatherer Groups
Manuel Cueto, Alicia Castro and Pablo Ambrústulo

FOREWORD

During the month of March, 2013 a team from the University of Algarve, organized an international conference, MUGE150th - The 150th Anniversary of the discovery of the Mesolithic Shell Middens, held in Salvaterra de Magos, celebrating the discovery of the shell middens century and half before by the geologist Carlos Ribeiro and his team from the Portuguese National Geologic Services.

During those four days, close to 100 papers and posters were presented, resulting in a two volume proceedings published by Cambridge Scholars Publishing. While the first volume focused on the Mesolithic from both Muge and Sado valleys, the present Volume with a total of twenty two chapters, combines a series of papers on Mesolithic and the transition to the Neolithic from all over Europe, including Denmark, France, Germany, Ireland, Portugal, Spain, Servia, Sweden and UK, as well as a series of general papers presenting methodological or theoretical aspects on the Mesolithic. In addition to those, the last few chapters of this Volume 2 are outside of the realm of the European Mesolithic-Neolithic world, presenting case studies on shell middens from Patagonia and the Red Sea.

The organization of the conference and the publication of the Proceedings were only possible due to the interest and help of Casa Cadaval, estate where many of the Muge Shell Middens are located, the funding by Câmara Municipal de Salvaterra de Magos and the CIAS - Research Centre for Anthropology and Health, from the University of Coimbra.

Finally, it should be said that the work that started in 2008 by the University of Algarve team was funded by Fundação para a Ciência e Tecnologia (the Portuguese Science Foundation) for two sequential research projects, *The Last Hunter-gatherers in the Tagus Valley - The Muge Shellmiddens* (PTDC/HAH/64185/2006) and *The last hunter-gatherers of Muge (Portugal): the origins of social complexity* (PTDC/HIS-ARQ/112156/2009). All new data from Cabeço da Amoreira that provided the basis for the new interpretations and revisions of earlier data were obtained during the course of those two projects and largely presented in the meetings in 2013.

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CHAPTER TWENTY ONE

RESULTS OF RECENT EXCAVATIONS ON THE FARASAN ISLANDS AND STUDIES OF LARGE-SCALE PREHISTORIC SHELLFISH GATHERING IN THE RED SEA

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Abstract

In recent investigations in the southern Red Sea we have found over 3000 prehistoric shell middens, suggesting a marked intensification in coastal resource exploitation. This paper reviews the data we have collected from these sites. The spatial and temporal distribution of the evidence shows very interesting patterns that we show here. We also outline a framework for further research as part of the ERC DISPERSE project. This focuses on further excavation to determine whether different sites had different functions and different contexts. Analyses will be carried out of thin sections from the gastropod *Conomurex fasciatus* (Born 1778) and of oxygen isotope ratios to assess the seasonality of activities, the local climate and the processes of midden formation.

Introduction

The Neolithic of Saudi Arabia is still a developing field of research. Through our excavations on the Farasan Islands archipelago we attempt to get a better understanding of the archaeological background of a period that is characterised by a rich coastal environment and intensive habitation of a now deserted landscape.

Coastal exploitation is a theme that has been focused on in many parts of the world and still yields promising results for researchers. The southern Red Sea is especially rich in information about prehistoric life along the coastline. The southern corridor theory has been widely acknowledged among archaeological scholars as a likely alternative route out of Africa (Bailey *et al.* 2007). The Bab al-Mandab strait and the Hanish Sill form a corridor that connects the Red Sea with the Indian Ocean and is key to this theory. This is the narrowest and shallowest point between East Africa and southern Arabia. In Palaeolithic times of lower sea level it would have been easy to travel from one coastline to another using intervening islands as stepping-stones (Lambeck *et al.* 2011). This is why the activity around this gateway is of high interest for Arabian prehistory. As most coastal sites of the Palaeolithic are now likely to be submerged, similar sites of later date with a high amount of coastal exploitation become more interesting and are being researched to provide a point of reference.

Extensive survey and trial excavations of shell middens were carried out in the Farasan Islands in 2006, 2008 and 2009 (Bailey *et al.* 2013), and a more recent and intensive phase of excavation involving 18 shell middens took place from January to March 2013 (Fig. 21.1). These islands are located only 40 km off the Saudi Arabian coast in the Jizan area. Farasan Kabir and Saqid are the two main islands with over a hundred smaller islands surrounding them. The excavated shell middens are only a small percentage of over 3000 shell middens currently recorded on the islands. The sheer number suggests an intensive and well-accustomed coastal exploitation that needs further research, especially when compared with other sites in southern Arabia lacking this size and evidence of intensive exploitation (Durrani 2005; Edens and Wilkinson 1998; Tosi 1986).

In this paper we present the preliminary results of our 2013 fieldwork and how they can provide an insight into the social and environmental background during the period of heavy utilisation of marine resources in southern Arabia in the mid-Holocene. We focussed our research on a former bay area on Farasan Kabir, which is now the location of hundreds of shell middens that are found along the palaeoshore. Their spatial distribution shows a gradual lateral shift in the palaeoshoreline, most probably as a result of a gradual drop in relative sea level resulting from tectonic movement. In this group the shell mound JW 1727 is of special significance as it not only yields one of the first examples of stratified

Neolithic pottery in the Farasan shell middens but also shows great potential in the study of seasonality in shell middens using δ^{18}O-isotopes.

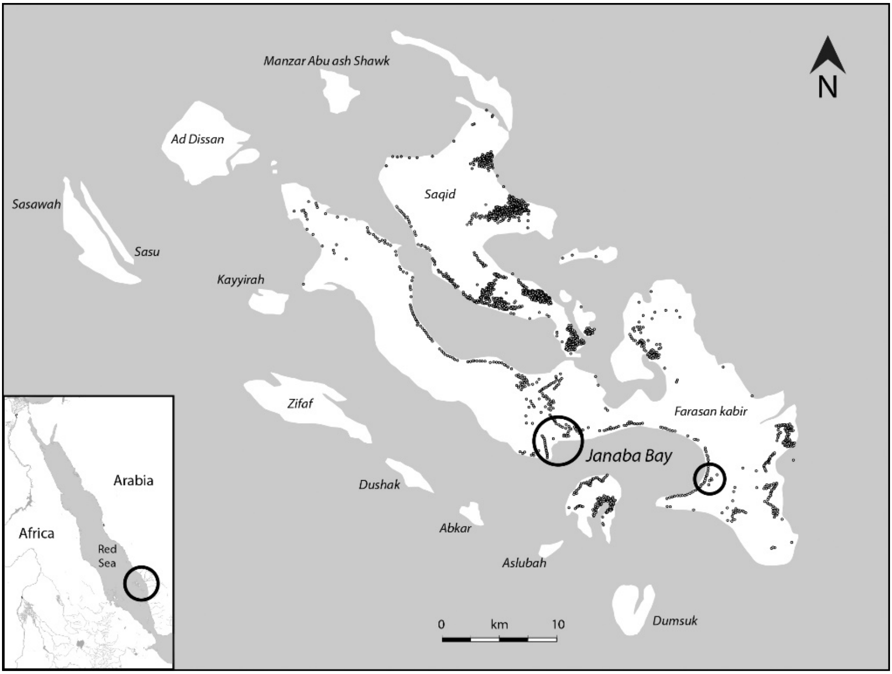

Fig. 21.1. Location of Farasan Islands; dots mark recorded middens; circles mark excavation areas. The circle to the right is Janaba Bay East, the circle to the left is Janaba Bay West, with the Janaba Bay North sites to the right and the Janaba Bay South sites to the left.

Archaeological Background

The Arabian environment changed substantially during the mid-Holocene. Palaeoclimate data indicate the beginning of an arid phase at 6000 BP that ended an early Holocene humid phase for the Arabian Peninsula as a whole and started shaping the deserts that are at the core of the Peninsula today. Radiocarbon dating sets the excavated Farasan shell middens at the beginning of this arid period.

The recording of shell middens on the islands was divided into two stages, with the first one using satellite imagery to pick up characteristic signals of shell deposits and the second one using four-wheel drive vehicles and foot survey for ground-truthing and the recording of further information on the shell middens. Using these methods, it was possible to record over 3000 shell middens. Many of them are mounded, the tallest being up to 5 m thick. The dominant shell species is the small gastropod *Strombus fasciatus* (Born 1778), but the middens contain a wide range of other species including gastropods and bivalves, amongst which large gastropods of the *Chicoreus* and *Pleuroploca* genera are quite prominent. The landscape on the islands is characterised by an arid environment and consists of exposed coral bedrock (Bantan and Abu-Zied 2013). This is why small-scale geological and archaeological features can easily be recognised on satellite imagery, as there is no vegetation or soil formation of any significance. Shell middens remain uncovered and can be seen as bright spots on the surface. They can be put into two categories showing different spatial distributions. The first one is linear and follows palaeoshorelines, showing a high degree of regularity. The middens are only a few metres apart or they merge into each other forming long lines of middens with individual peaks every 10 to 20 m. These middens are interpreted as being contemporaneous, not only because of the similarity in shape and composition but also because they follow a palaeoshoreline that represents a short-lived feature formed during the mid-Holocene, an interpretation supported by the available radiocarbon dates. This makes it possible to reconstruct shorelines and the islands' changing shapes throughout the occupation of the archipelago.

The second group of shell middens follows a more irregular spatial pattern and can be found in different places on the islands. This group includes individual middens without any obvious connection to other sites, and middens that form clusters, in which some middens are situated at some distance (tens to hundreds of metres) from the nearest shoreline. Ground survey shows that these clusters often form around pockets of sediment or fissures in the coral bedrock formed by tectonic activity. These are often associated with very fine sediment with a high percentage of clay and access to the water table 21.2–3 m below the surface. Soil characteristics like these would have been beneficial for vegetation and might have even been caused by it. Places of vegetation are likely to attract animal and human life and can lead to the deposition of shells further away from the shore. Initial descriptions of middens inland show a higher proportion of large gastropods like *Chicoreus sp*. and *Pleuroploca sp*. rather than the more common *Conomurex fasciatus*, which is only about a third of their size and can be found in every midden close to the shore. Middens found in clusters are also of a smaller size, suggesting a shorter occupation period, but this can also be explained by other activities like redeposition and the frequent cleaning of habitational areas, environmental processes that lead to the deflation of the middens, or a much lower accumulation rate than the bigger middens near the water.

We focused our field survey on three main areas on the Farasan Kabir Island. They are all located around Janaba Bay in the south of the island but their landscape settings are very different due to localised anomalies caused by salt tectonics. Tectonic uplifting has occurred around the bay area and the uplift in some areas is higher than in others. This has resulted in locally varied rates of coastal change and thus varied patterns of shell exploitation and accumulation.

Janaba East

The eastern part of Janaba Bay is marked by a line of shell middens that is several kilometres long and located at a distance of about 100 m inland from the modern shore. From the modern beach sandy deposits gradually slope upwards as one moves away from the beach and culminate in a dune of 0.5 m to 2 m in height. Behind the dune the ground has little covering of sand and the uplifted coral terrace that makes up the island's bedrock is completely exposed. Small drainage channels of half a metre in width can be found in the bedrock that build up shallow fluvial deposits during intermittent rains. These serve as a water reservoir for sparse vegetation. At some sites these small wadis break through the sand dune and reach the bay, exposing the coral surface below the beach sand.

The main line of shell middens that follows the bay can be found on top of the dune separating the modern beach from the inland coral surface. This makes the middens a prominent feature in the landscape and visible from far away inland and from the sea. Directly behind the dune and opposite an excavated shell mound (JE0087), we found another shell mound (JE0086) of equal size and equal composition. Why this shell mound is not in line with the others is not yet clear, however the sand deposits that make up the line of dunes on which the major mounds are formed were also present under this inland shell mound, suggesting some kind of relationship in which the dune may previously have extended further inland than appears the case today. Further inland we excavated three sites at an increasing distance from the shoreline. They are all smaller and possibly deflated middens of under a metre in height and are accompanied by shell scatters of a similar composition, with large gastropods and some bivalves. *C. fasciatus* was only found occasionally in these inland sites

Janaba West (North)

On the central part of Janaba Bay a similar setting of coastal and inland sites can be found (Fig. 21.2). The main difference is the general distance from the modern shoreline, which in this location is about 1 km away. The western part of Janaba Bay shows remnants of a former bay that has been uplifted and is now a dry, flat sandy surface. In prehistoric times when it was filled with water, it might have even connected Janaba Bay to the waters around Saqid Island in the North.

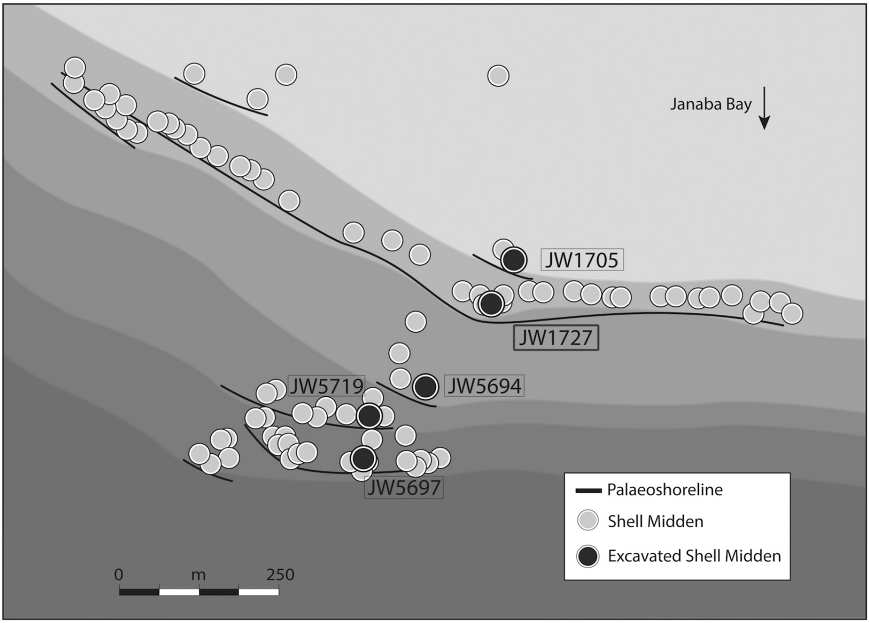

Fig. 21.2. Janaba West (North); Gradual change of sea level and corresponding shorelines and sites.

We find shell middens on shorelines representing several different stages of this uplifting. The line of middens that shows the largest volume of shell deposits is similar to the main line of middens found in Janaba East. They are comparable when it comes to size and shell composition, with *C. fasciatus* being the dominant shell species. More middens were found between the modern shoreline and the main palaeoshoreline. This differs from the spatial distribution in Janaba East where there were no significant shell accumulations in front of the dune forming the main palaeoshoreline. In the Janaba West (North) group we targeted excavation on mound JW1727. We also excavated three middens in front and also one behind JW1727 with different shell compositions and sizes. The supposedly youngest mound (JW5697) was mostly made up of matrix-supported pearl shells (*Pinctada sp.*) and layers of degraded charcoal. It was found on a small sand dune about 200 m in front of the main palaeoshoreline. The next mound (JW5719) was part of an extensive scatter of large gastropods and mainly consisted of *Pleuroploca sp*. and degraded charcoal layers. It was again part of a smaller dune and consequently had a sand-dominated matrix. The third midden (JW5694) was again found on a small sand dune and showed traces of intensive burning, mammal bones, stratified pottery with encrustation, and some *C. fasciatus* and *Chicoreus sp*. The fact that the middens were part of a dune can have several reasons, but the most likely one is that covering a sand dune with shells increases protection from erosion just as vegetation would do. The areas around the middens become eroded and the sites stand out in the landscape even more. Behind the line of shell middens on the main palaeoshoreline, several shell scatters were found which again focused on large gastropods and also showed a change in supporting matrix. The sediment found in the excavated midden (JW1705) had a high clay content and even showed signs of moisture starting 30 cm below the surface. OSL samples were taken from all sites together with soil micromorphological samples.

Janaba West (South)

Although part of the same strait that used to connect Janaba Bay with the northern waters of the archipelago, the palaeoshoreline in Janaba West (South) has a different geomorphology than its northern equivalent. Here a raised palaeoshore has been undercut by wave action and a distinct step with an undercut notch can be found, very unlike the gradual slope, which is characteristic for the other study areas.

Numerous shell mounds can be found on this raised shore and the basic composition as well as the shape indicates that they belong to the same period as those in the rest of Janaba Bay. The uplift of the palaeoshoreline due to salt tectonics and the resulting erosion through wave action are likely to be the main reasons why there are no additional sites in front of the main line of shell middens. On top of this ridge we excavated two shell middens of significant size, JW2298 in the south and JW1807 in the north. They are about 1.5 km apart and represent both ends of a long line of middens that can be found every 10–15 m. Inland of this ridge, we discovered several clusters of shallow middens that follow no obvious spatial pattern but are occasionally accompanied by concentrated areas of burnt coral bedrock and pockets of sediment, suggesting there had been potential for large patches of vegetation and possible human activity as the cause of the burning events near them (Fig 21.3).

Fig. 21.3. Burnt coral bedrock; size of scale is 3m.

Excavation of JW1727

We chose JW1727 for its dominant position in the landscape on the main palaeoshoreline and its size, because it was the best chance to access a deep stratigraphy of shell deposition. We dug a 1 m wide and 9 m long trench into the shell mound from the rim towards the very centre. Ideally the build-up of the mound should happen symmetrically so that the earliest phase of shell accumulation should be in the middle. We cannot, however, be sure of this, as we did not excavate the whole mound. Following our excavation strategy, we believe that we did find the full depositional history of the mound from the very top to the base (Fig. 21.4).

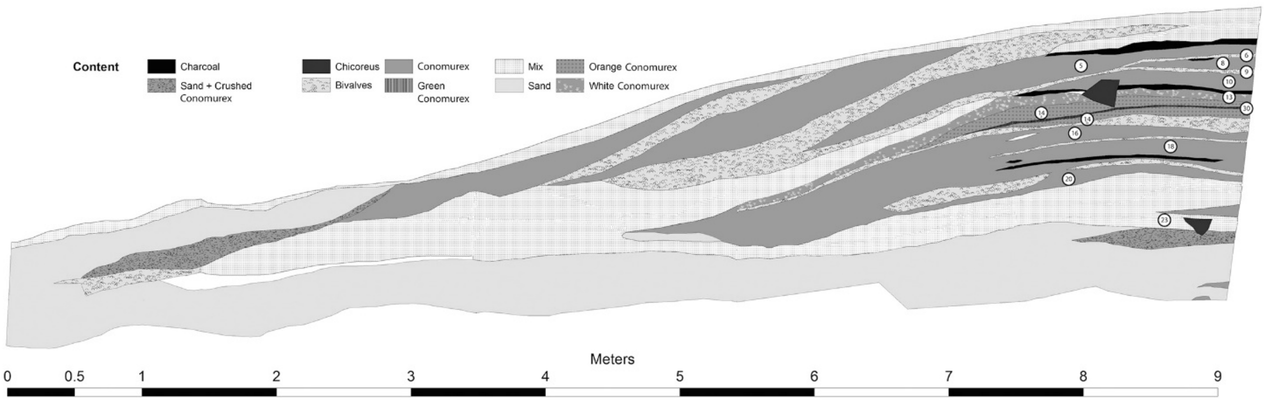

Fig. 21.4. JW1727; N-S section; facing West.

The main constituent of JW1727 is the *C. fasciatus* marine gastropod, although several mixed layers also show a high proportion of mussels and other bivalves. Starting at the bottom of the mound we believe we have found the palaeo surface of the sand dune on which the shell mound is located. Here we could locate several different events of sediment accumulation including layers of natural beach deposits with shell. On top of these natural layers we found a layer of mixed shell with a high concentration of *C. fasciatus*, which we believe could be the initial deposition (or one of them) that started the construction of the mound (23). In the centre part of the mound we found a cut into the initial layer and underlying sand dune that had subsequently been filled with *Chicoreus sp*., which could be interpreted as a post-hole. We found other cuts into layers of small shells that had been filled with *Chicoreus* shells higher up in the stratigraphy and on other sites such as JE0004 and JW1807. They would have been excellent for positioning posts or stakes into the less stable layers of small gastropods to steady dwelling structures built on top of the mound. Since no remains of such structures were found, we do not intend to further interpret these features.

Very characteristic of the JW1727 shell mound are the thick layers of *C. fasciatus* shells with occasional layers of charcoal and fishbone, and bivalves, as can be seen in layers (20), (18), and (16), and these are separated by layers of *Pinctada sp*., charcoal and mixed bivalves. The drawing of the stratigraphy is limited by the fact that there is no other obvious way to subdivide the thick *C. fasciatus* layers into stratigraphic units where dividing layers like the ones above do not occur or have been disturbed and integrated into the surrounding shell matrix. This is the case at the outer margin of the mound. Finer stratigraphic detail will have to be interpreted from column samples excavated into the trench section, subdivided into narrow excavation units 5 cm thick, and sampled for the bulk analysis of shells and for radiocarbon dates. When comparing the *C. fasciatus* layers to others with different shell compositions, it is apparent that charcoal seems to be less common. This might be due to differential accumulation rates, different processing techniques, or bad preservation conditions typical in *C. fasciatus* layers.

A change in preservation or processing techniques is also possible for the *C. fasciatus* layer higher in the section profile. An undisturbed *C. fasciatus* layer shows distinct internal changes in colour, changing from intense orange (14b), to green (30), back to orange (14a), and to pure white (13), without changing density, matrix or any other typical layer characteristic. Above this group of *C. fasciatus* layers is an extensive layer of ash mixed with *C. fasciatus*. Above this there are layers of a similar nature as below: thick *C. fasciatus* layers (10, 8, 5) divided by thin bivalve layers (9, 6). On the very top of the mound we find layers of mixed shell with the occasional ash pocket.

In the southern part of the trench the layers become less distinct and thicker. They are also likely to be disturbed and partially redeposited, being on the slope of the mound. The disturbance is especially suggested by the disappearance of thin layers, which might now be mixed into the thicker surrounding shell deposits, and by the overall dominance of layers of mixed shell at the bottom of the slope. Most layers are cut off at the top and end in a disturbed layer of mixed composition and a higher amount of matrix that contrasts with the overall clast-supported nature of the mound.

The east section of the mound has not been recorded in detail as it seemed to be similar to the opposite profile in the 1 m trench. However, subsequent photogrammetry of the trench revealed a cut in the eastern part of the shell midden that is very similar to a cut discovered in 2009 in JE004, which was related to a burial. Due to limited excavation time the trench has not yet been extended to clarify the origin of this cut.

Isotopic Framework and Seasonality Studies

To find out about the seasonal background of the site and the possible accumulation processes of the dominant *C. fasciatus* layers, single specimens have been extracted directly from the section for isotopic analysis. Extracting archaeological specimens directly from the section rather than using shells from bulk samples has the major advantage that the origin of the shell can be directly linked to specific locations in the stratigraphic sequence. In the case of JW1727, with layers thinner than 2 cm, it is common that the layer slopes in the section and when taking bulk samples from a narrow column, excavated in 5 cm spits, the distinct borders of layers are harder to determine. In these cases, we have tried to sample the top and base as well as the central part of the 5-cm-thick excavation unit. On average 4 complete shells and 6 shell edges were extracted per spit. The biggest disadvantage of sampling from the section profile is the limited availability of pristine, unbroken shell specimens that can be used for isotope sampling. They can however still be supplemented by shells from bulk samples, provided that they are marked as such.

Preliminary results of $\delta^{18}O$-isotope values from modern specimens of *C. fasciatus* and corresponding growth studies show a rapid growth rate in the first two years of the mollusc's life. After this initial stage the growth rate declines and new layers of shell build up a distinct lip at the aperture, which only grows in thin layers of a few millimetres. No modern shell has yet been found that indicates a lifetime exceeding 4 years. In fact, most modern shells now being found on Farasan are very young and often do not have a distinct lip. This is in stark contrast to the generally bigger and older shells found in archaeological contexts. Another apparent major difference between modern and archaeological populations of *C. fasciatus* is population size. While vast exploitation during the Neolithic suggests large populations in the past, the modern populations appear to be significantly smaller. Rich clusters of live *C. fasciatus* have occasionally been found (Bailey *et al.* 2013) but are not very common; depending on the season it can take over an hour to gather more than 10 specimens. Typical habitats and favourable conditions have not yet been thoroughly defined and this needs further research.

Summary

In this paper we have presented the most recent progress of the excavations on the Farasan Islands. The increasing number of registered shell middens and excavations of characteristic sites are a rich source of information, and further analyses of shell composition, rates of accumulation and isotopic studies of seasonality are planned. The find of the first stratified pottery in this area dating to this period is of special importance and we hope to undertake residue analysis that will provide us with additional information about how people were making use of the shell middens. The overall spatial distribution of the shell middens, together with geomorphological aspects of the archipelago, indicates several periods of shell exploitation with varying intensity or duration. The analysis of shell species and the use of stable isotope analysis to find out about seasonality will help to shed light on the accumulation processes that led to the construction of the shell mounds and the small scatters associated with them. Our on-going research works towards solving this puzzle.

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