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## Preliminary comparative lithic analyses from the Neolithic sites of Marawah and Ghagha islands (emirate of Abu Dhabi, UAE)

Rémy Crassard, Noura Al Hameli, Mark Jonathan Beech, Richard Thorburn  
Howard Cuttler

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# Advances in UAE Archaeology

Proceedings of Abu Dhabi's  
Archaeology Conference 2022





*Advances in UAE Archaeology* details the results of new excavations conducted across the United Arab Emirates over the last few years. These excavations have revealed a wealth of new data on all periods of UAE archaeology from the Palaeolithic to the recent past. Some of these discoveries have filled in important gaps in our knowledge, while others have fundamentally revised what we thought we knew already. For example, the Marawah Island excavations have added a new facet to our understanding of the Neolithic period by revealing intriguing and hitherto unknown funerary rituals.

Excavations in Al Ain in the emirate of Abu Dhabi continue to reveal extraordinary evidence of *falaj* irrigation, stretching back 3000 years. The ubiquity of this system across this oasis city further validates its status as a UNESCO World Heritage Site. Of particular importance is the discovery of extensive remains from the Late Pre-Islamic period, a significant time in history that has been best revealed in the excavations at Mleiha in the emirate of Sharjah.

The research presented here was conducted by specialists from across the world working alongside an ever-growing cadre of Emirati archaeologists who will take the lead in the coming years in revealing more of this country's extraordinary archaeology and history.



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DEPARTMENT OF CULTURE  
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# Contents

- 7 **Authors**
- 11 **Foreword**  
HE Mohamed Khalifa Al Mubarak
- 13 **Stones in the landscape: Recent discoveries of Palaeolithic sites in the Eastern Region of Abu Dhabi emirate**  
Marc Händel, Norbert Buchinger, Ali Abdul Rahman Al Meqbali and Peter Magee
- 41 **Filling in the gaps: New evidence for Middle and Upper Palaeolithic occupations in the central region of Sharjah**  
Knut Bretzke and Sabah Jasim
- 51 **Understanding the late-stage Flandrian Transgression and palaeo-geographic evolution of the Abu Dhabi islands using remote sensing and marine geophysics**  
Richard Thorburn Howard Cuttler, Noura Al Hameli and Peter Magee
- 73 **Funerary practices within Mortuary Complex F: New insights from recent excavations on Marawah Island**  
Noura Al Hameli, Richard Thorburn Cuttler, Mark Jonathan Beech, Peter Magee, Kevin Lidour, Baptiste Pradier, Rémy Crassard, Howell Magnus Roberts and Áurea Izquierdo Zamora
- 103 **Preliminary comparative lithic analyses from the Neolithic sites of Marawah and Ghagha islands (emirate of Abu Dhabi, UAE)**  
Rémy Crassard, Noura Hamad Al Hameli, Mark Jonathan Beech and Richard Thorburn Howard Cuttler
- 115 **Recent archaeological investigations at Umm an-Nar Island (Sas Al Nakhl)**  
Ali Abdul Rahman Al Meqbali and Daniel Eddisford with Michel de Vreeze, Diaeddin Tawalbeh, Hamad Fadel, Abdulla Al Yammahi, Hager Hasan Almenhali and Sam Botan
- 147 **Kalba: Main results of the renewed fieldwork during the campaigns of 2019–2022**  
Christoph Schwall and Michael Brandl
- 157 **Insights on the Late Bronze Age economy in south-eastern Arabia: Self-sufficiency and exchanges in Masafi-5**  
Maria Paola Pellegrino, Julien Charbonnier, Anne Benoist, Delphine Decruyenaere, Kevin Lidour, Michele Degli Esposti and Aurélien Hamel
- 183 **Another side to the story: Preliminary results from the renewed excavations on the eastern flank of Tell Abraç (2021–2022)**  
Michele Degli Esposti, Federico Borgi, Maria Paola Pellegrino, Rania Hussein Kannouma with Camille Abric and Francesca Barchiesi

- 209 'We should build with the stones we have': An assessment of the Al Ain Oasis during the Iron Age based on the soft-stone vessels from the Oman Border Fence  
Eric Olijdam
- 239 Iron Age copper production and the 'ritual economy' of Saruq al-Hadid (Dubai, UAE)  
Lloyd Weeks, Tatiana Valente, Kristina Franke, Fernando Contreras, Mansour Boraik Radwan and Hassan Zein
- 271 Cultures, technologies and environment on the Oman Peninsula: Recent discoveries and some hypotheses about the *falaj* system in Al Madam, Sharjah, UAE  
Carlos Fernández and Carmen del Cerro
- 293 Secrets of the shaabiyat: Recent developments in the archaeology of the (urban) oasis landscape of Al Ain  
Peter Sheehan, Mohammed Khalifa, Malak Al Ajou and Nour Nasser Al Marzooqi
- 307 The discovery of a Late Antique and Early Islamic monastery on Siniya Island, Umm Al Quwain  
Timothy Power, Michele Degli Esposti, Robert Hoyland and Rania Hussein Kannouma
- 331 The Early Islamic period in Al Ain in light of recent archaeological discoveries  
Diaeddin Tawalbeh
- 353 Conserving and protecting the Early Islamic Site at Ūd al-Tawba in Al Ain  
Ola Shaker, Felipe Gutierrez, Diaeddin Tawalbeh and Amel Chabbi
- 377 New evidence for the Early Islamic landscape of Al Ain: Fieldwalking and surface ceramics from Slemi, Jimi Region  
Nour Nasser Al Marzooqi, Peter Sheehan, Timothy Power, Malak Al Ajou with Afnan Zayed Al Zeyoudi, Asma Humaid Al Badi, Aysha Awad Al Neyadi, Hessa Said Al Shamsi, Khuloud Juma Al Nuaimi, Sarah Salem Al Yammahi, Suhaila Salem Al Mansoori, Zainab Sulayman Nehis and Thamer Al Sayah
- 393 The UNESCO World Heritage Site of Al Ain: Management approaches  
Abdulrahman Al Nuaimi
- 429 Developing a Historic Environment Record system for the management of heritage resources in the emirate of Abu Dhabi  
Tariq Yousif Alhammadi, Richard Thorburn Howard Cuttler, Mark Jonathan Beech and Ahmed Abdalla El Faki
- 447 Historic mosque architecture in Abu Dhabi  
Hamdan Rashed Al Rashedi



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# Preliminary comparative lithic analyses from the Neolithic sites of Marawah and Ghagha islands (emirate of Abu Dhabi, UAE)

Rémy Crassard, Noura Al Hameli, Mark Jonathan Beech  
and Richard Thorburn Howard Cuttler

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**Abstract:** The lithic assemblages presented here come from two archaeological sites on Marawah and Ghagha islands (emirate of Abu Dhabi, United Arab Emirates): the well-dated stratified Neolithic sites of MR11 and GHG0014. Lithics from both sites are homogenous but show clear differences between each other. This probably implies a cultural change in a time range of a few centuries between the two main occupations on the two islands. Ghagha GHG0014, which is older (mid-7th millennium BC), yielded an industry of bifacial thin or thicker projectiles with no trihedral points, nor tile knives. Marawah MR11, which gave younger dates (mid-6th millennium BC), shows the use of rather opportunistic tile knives and highly-refined arrowhead technology from various types, from the typical South Arabian trihedral points to the more ubiquitous bifacial barbed and tanged arrowheads with symmetric or asymmetric flat sections. The lithic assemblages are also associated with a strong tradition of organised settlements made of perennial houses/buildings which span several centuries. These lithic assemblages represent a unique opportunity to understand better the evolution of regional lithic traditions on the scale of Southeast Arabia and the whole Arabian Peninsula.

**Keywords:** Neolithic, Marawah, Ghagha, lithics, Abu Dhabi

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## Introduction

Lithics, tools crafted from stone by ancient humans, are widespread globally and serve as valuable artefacts for archaeologists and prehistorians. They offer insights into the traditions, cultures, techniques and cognitive development of our common ancestors. The study of lithic industries yields extensive data sets that shed light on the intricate technical systems employed in tool production. By analysing and comprehending these individualised technical systems, critical data emerge, enabling assessments of how a particular group fits within a cultural framework. The interconnection between tradition, culture and technique forms a shared cultural register, facilitating understanding of human societal evolution, trade patterns and communication practices.

Regarding the Neolithic of the Arabian Peninsula, which is still a poorly documented region of the world on this topic, lithics are common from many surface sites, which unfortunately cannot be properly dated because of the lack of stratified contexts. This is why the discovery of two exceptional Neolithic sites in the emirate of Abu Dhabi, UAE will probably change our understanding of the regional Neolithic in Southeast Arabia.

We present here a preliminary overview of the lithic assemblages from two important stratified contexts: the Neolithic sites of GHG0014 on Ghagha Island and of MR11 on Marawah Island. Both sites have the exceptional specificity to present architectural remains of dry-stone-built houses/buildings arranged in several multicellular structures. The sites are, in fact, in chronological succession and have also well-dated stratigraphical sequences. Lithics from these archaeological layers are therefore particularly indicative of the evolution of traditions during the Neolithic period.

## **Geographical and archaeological contexts of the two sites**

The older Neolithic site on Ghagha Island, GHG0014, is situated about 280km west of Abu Dhabi Island, which exhibits distinct topography characterised by elevated rocky islands, *sabkha* areas, intertidal lagoons and a south-facing sandy shore, approximately 1km from the modern UAE mainland. Unlike other islands in the Al Dhafra region, Ghagha lacks mud flats and mangroves that typically support shellfish habitats (Al Hameli *et al.* 2023).

Archaeological surveys conducted by the Abu Dhabi Islands Archaeological Survey (ADIAS) in the early 1990s revealed Neolithic occupation of Ghagha Island (King and Tonghini 1999), while subsequent surveys by the Department of Culture and Tourism - Abu Dhabi (DCT) in the 2010s and 2020s further explored the site (Strutt *et al.* 2013; Al Hameli *et al.* 2023). After initial findings dated to the Islamic period, GHG0014 has been identified as an important Neolithic site. Excavations there have yielded rich prehistoric material cultural remains, including lithics.

GHG0014 is a multiphase site featuring two main stone structures (1-2) and four areas (1-4) positioned on and around a stone outcrop, providing a vantage point overlooking a lagoonal area. Structure 1 consists of six circular cells reminiscent of similar structures on Marawah Island (MR11 site), with radiocarbon dating placing its occupation by 6500 BC. Structure 2, located west of Structure 1, is a small circular building that likely existed contemporaneously but lacked associated deposits for radiocarbon dating. Excavations at GHG0014 concluded in November 2021, encompassing the exploration of both exterior and interior spaces down to bedrock, thus revealing the earliest known domestic architecture in the region (DCT 2019; Al Hameli *et al.* 2023).

The second Neolithic site studied here is MR11 on Marawah Island. Marawah is part of a chain of barrier islands on a shallow ridge and is located some 110 km west of Abu Dhabi and 170 km east of Ghagha Island. A 2002 survey revealed the island's composition of Pleistocene limestone cores and Holocene carbonates (Evans, Kirkham and Carter 2002). ADIAS explored Marawah Island in 1992, uncovering 13 archaeological sites spanning the time from the Late Stone Age to the Late Islamic period (King 1998). Among them, the MR11 site was identified, consisting of at least seven mounds (Areas A to G), with homogeneous lithic assemblages datable to the Neolithic period. Since 2003, excavations at MR11 are reshaping our understanding of Neolithic architecture, particularly the spatial layout of settlements, and each area's excavation has revealed distinct architectural features. Radiocarbon dating of charcoal fragments confirms that this settlement was inhabited from approximately 6000 to 4500 BC (Beech *et al.* 2005, 2008, 2019, 2022).

The MR11 lithic assemblage, predominantly sourced from stratified contexts, is consistently homogeneous across different excavation areas and structures, featuring diverse arrowhead technology. Polished stone artefacts are also present. The lithics primarily consist of imported flint, with occasional other rock types. Raw materials might originate from Delma Island, Sir Bani Yas Island and the mainland coast of Abu Dhabi emirate, encompassing thin flint of lower quality and potentially distant sources of fine-grained knappable stones in the form of wadi pebbles (Kallweit and Beech 2020).

## **The lithic assemblages from the Ghagha GHG0014 site**

The present study discusses the lithic artefacts from the 2019, 2020 and 2021 seasons on Ghagha Island, during which the excavation of GHG0014 site has been carried out.

As observed at MR11, the raw material used for the lithic industries on Ghagha Island are essentially made of flint, a rock that does not naturally appear in local outcrops or sources, although some brownish flint outcrops can be found on the way to the island in several localities at Ras Ghumais. This observation will need to be confirmed and documented to clarify the original source(s) of raw material used for the Neolithic artefacts on the island. It is still possible that some of the raw materials might come from more distant sources.

The 2019, 2020 and 2021 lithic assemblages from GHG0014 consist of 103 finds inventoried as individual artefacts ('special finds') and 195 lithic/stone elements recovered from the sieve. The three seasons of work have completed the excavation of the entire GHG0014 site, which means that the lithic assemblage from the three seasons perfectly represents the whole occupation at the site (thus 298 pieces in total). Tools are numerous ( $n = 30$ ; Table 1), while

the majority of the lithics (more than 50 per cent) collected from the dry sieve are mostly unworked small pebbles of white quartz that must be local. Some of them look as if they have been worked and maybe used, such as cortical flakes, and one potential core was made on a larger pebble.

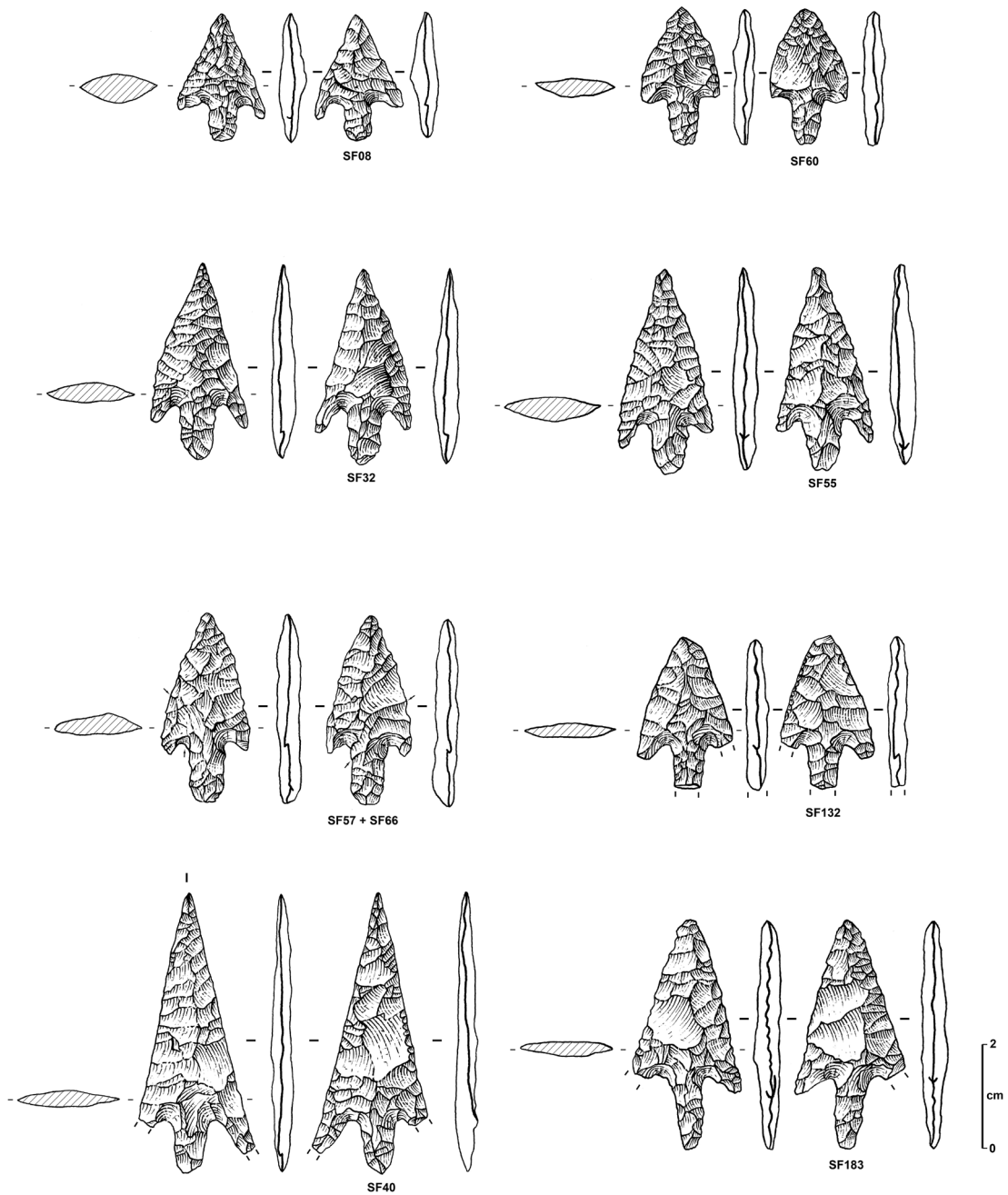
*Table 1: Number and types of tools from the GHG0014 excavation.*

<b>Tool types</b>	<b>Number</b>
Tile knife/tested thin tabular nodule	2
Simple tanged bifacial point	1
Bifacial short point with long tang and short wings	5
Bifacial piece	3
Bifacial triangular point with short tang and long wings	4
Long bifacial point with long tang and short wings	7
Polished stone	1
Hammerstone	2
Retouched blade/flake	4
Large triangular point with long tang and long wings	1
<b>TOTAL</b>	<b>30</b>

Only two tile knife fragments have been found in the assemblage, but their fragmentary nature does not confirm that they are proper tile knives, as they can be found in high numbers at MR11. They can, for example, just be fragments of a tabular flint nodule that has been opportunistically used or that has been tested (just a few flakes have been knapped from it) and then abandoned. As they are not convincing enough to be clearly defined as tile knives, we can assume that this tool type is absent from the GHG0014 assemblage.

This observation is important, as the series reveals being clearly different from Marawah MR11. Another type is absent in the GHG0014 assemblage: the trihedral points (the classical main type, or any sub-type observed in Marawah, for example). Instead, the arrowhead types are all characterised by bifacial thin points with a symmetrical section, and 17 of them are barbed and tanged (Table 2), of four distinctive types, being from short to long, with more or less long wings and a tang (Figure 1).

The presence of fragmentary bifacial pieces made of allochthonous beige fine-grained quartzite is also very peculiar and was not observed at MR11. Other tools discovered are a few hammerstones and retouched flakes (including elongated ones, almost looking like proper flint blades), obviously made from non-local raw material.



### The lithic assemblages from the Marawah MR11 site

The lithic analyses presented here are based on the assemblages collected between 2003 and 2022 during excavations at the MR11 site. The lithics come from different areas of the site, but are consistently dated to the Neolithic period, between 6000 and 4500 BC.

The total number of lithics reaches 2389 pieces that have been studied so far for the MR11 site, which constitutes a very important lithic series for

*Figure 1:* Flat bifacial barbed and tanged arrowheads from the Ghagha GH0014 Neolithic site.



a single Neolithic site in the whole region of the Arabian Gulf. These pieces have been directly plotted on the site during excavation or retrieved from the systematic dry sieving (note that dry sieving on the excavation was carried out using 4mm mesh screens). Among these artefacts, 434 are described as 'tools' (18.8 per cent of the total).

Flint (or chert) is not available naturally on the island, and necessarily comes from somewhere else. Nevertheless, the raw materials do not necessarily come from very far away. Several flint sources have been previously identified in recent years by the DCT team. We have already mentioned the sources from Delma Island and the actual mainland of Abu Dhabi emirate, facing Marawah. These places mostly offer thin tabular flint of rather low quality, while fine-grained knappable stones are found in the form of small wadi pebbles (most probably coming from more distant places). A selection of Delma raw material available at DCT suggests a very close nature of the raw material that has been used for producing some of the tile knives recovered at MR11. There is also an interesting collection of unknapped natural flint nodules from Ras al-Jila' and from around Al Hamra (close to Jebel Barakah). Ras Ghumais is another potential source with small brownish flint outcrops, on the way to Ghagha Island. These first elements of raw material origins will serve as a basis for future research on flint sources in the emirate of Abu Dhabi. Once properly identified, mapped and sampled, it will be possible to clearly link the sources and the discovered artefacts. It will then be possible to assess if there are artefacts using raw materials from more distant sources.

In general, little *debitage* (flakes, blades, etc.) is present at MR11; it is mostly composed of undetermined fragments (chunks) and tinier debris (small flakes less than 2 cm long). The identified flakes that are more than 2cm are in majority wider than they are long, and they often come from the use and/or fabrication of the tile knives. This shows a not necessarily controlled flaking out of the tile knives, and the existence of these flakes is more due to the percussive action on the active edge of the tile knives on a worked surface (wood or other?).

There are only rare flakes that come from bifacial shaping, and there is almost no debris or any flake that could indicate a production or even a resharpening of the arrowheads on the site. Either the production places of the arrowheads have not been excavated at MR11, or they were produced elsewhere and brought to the site. Cores are almost absent in the whole assemblage, showing no flake/blade-oriented production at MR11.

Of the 434 tools from MR11 (Table 2), 121 are complete or fragmentary tile knives. They are made of thin tabular flint nodules of different degrees of quality. In general, their shaping is rather irregular, with short scalariform retouches that are usually bifacial along one long edge (or more rarely along both edges of the thin nodule). It is interesting to note that the tile knives'

single edge, the active surface, seems to have been percussed, rather than used as a cutting tool. A program of replication/experimentation of tile knives, using natural thin tabular flint nodules, would complete the study of this type of tool and will clarify their function.

**Table 2:** Number and types of tools (complete or fragmentary) from the MR11 excavation.

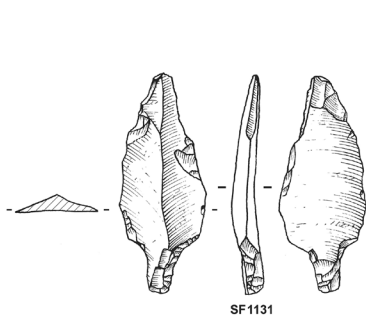
<b>Tool types</b>	<b>Number</b>
Tile knives	121
Trihedral points	116
Bifacial arrowheads	59
Other bifacial tools	27
Other tools and retouched flakes	111
<b>TOTAL</b>	<b>434</b>

Arrowheads from MR11 are definitely the main types of tools that yield the higher level of information in terms of technological and cultural traditions (Figure 2). Two main types are the trihedral points (bifacial, sometimes trifacial, with a triangular or subtriangular section), and the flat bifacial arrowheads with a symmetrical section.

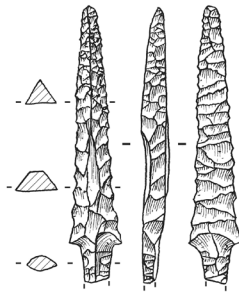
Marawah MR11's arrowheads present a high degree of standardisation, especially the 116 complete or fragmentary trihedral points, with the presence of barbs along each edge, a tang that is slightly out of the longitudinal axis alignment, and the formation of pseudo-wings forming a T-shape with the rest of the piece. The typology of the trihedral points will be refined by further studies.

Other arrowhead types are the 59 bifacial barbed and tanged ones, mostly with a symmetrical flat section, sometimes asymmetric, but always very regular and finely made. The other 27 bifacial pieces, sometimes proper tools such as projectile points, sometimes just preforms or unfinished pieces, indicate a strong tendency to produce bifacial tools, made by pressure flaking, and in a more exquisite way than the cruder tile knives. Both types of tools had different purposes, which will need to be explored.

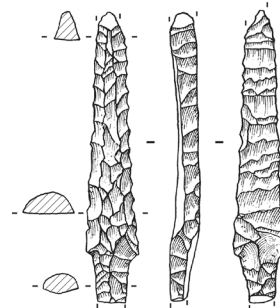
The general shapes of the arrowheads show a very careful production of trihedral points and other flat bifacial points. The trihedral tradition is very similar to the one known from the second half of the 7th millennium BC in western Yemen, up to the end of the 6th millennium BC, beginning in the 5th millennium BC in the Oman Peninsula (e.g., Charpentier 2008, Maiorano *et al.* 2020). However, the absence of fluting indicates a tradition influenced by the eastern sphere of the trihedral tradition (Crassard *et al.* 2020). Finally, the presence of a projectile point that was clearly made on a flaked blank can be associated to the 'Fasad' type, *sensu stricto* (Charpentier and Crassard 2013). While this point has been found on the bedrock during the



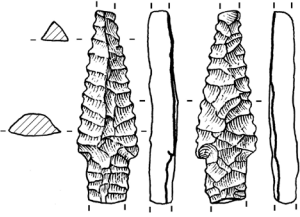
SF1131



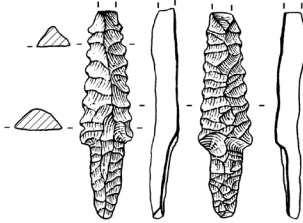
SF1189



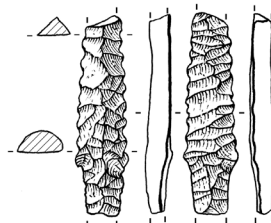
SF1186



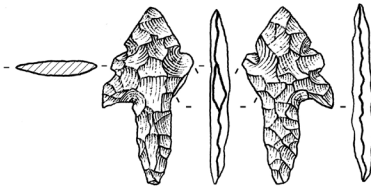
SF1414



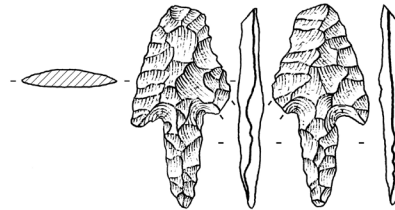
SF1238



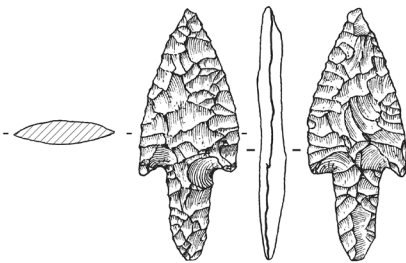
SF1623



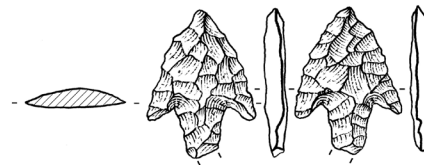
SF1424



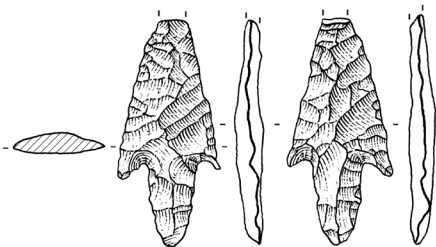
SF1602



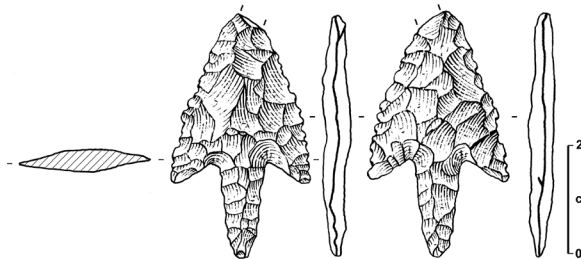
SF1044



SF1289



SF1372



SF1393

2020 excavation season, at the bottom of a rubble and ashy area to the exterior of the main built structure of Area C at MR11, it is still difficult to interpret its presence as it should indicate a rather older dating than the older period of occupation admitted for MR11. This Fasad point could also represent an interesting example of a lithic tradition that survived at a later period than expected. This will be confirmed by further radiocarbon dating.

Other stone tools are also present, made of igneous rocks of a probable exogenous magmatic origin. They are most of the time interpreted as being fragmentary net sinkers and fragments of hammerstones. Some polished stones, made of the same raw material, were also used at the site.

The MR11 assemblage shows an interesting and very clear and homogeneous lithic assemblage. There is a quite evident dichotomy between the use of rather opportunistic tile knives and the highly refined arrowhead technology of various types, from the typical South Arabian trihedral points to the more ubiquitous bifacial barbed and tanged arrowheads with symmetric or asymmetric flat section and the unique example of a Fasad-like point. Future work will be focused on the spatial distribution of the points related to the different excavation areas and their associated stratigraphy, to explain the different arrowhead counts per context.

## **Comparative approach between GHG0014 and MR11 lithics and perspectives**

The absence of a trihedral tradition at GHG0014, associated with the exclusive presence of flat bifacial barbed and tanged arrowheads and other specific tools, indicates a clear change in lithic traditions between the mid-7th millennium BC (GHG0014) and the mid-6th millennium BC (MR11). This confirms the anteriority of the flat bifacial barbed and tanged arrowheads when they are found as the single arrowhead type, and not associated with any trihedral points. This specificity was already observed in Hadramawt, eastern Yemen, where trihedral points seem to appear later than the barbed and tanged flat bifacial points. At these sites (HDOR 538, HDOR 561; e.g., Crassard 2009; Crassard and Khalidi 2017), the stratigraphic contexts and the number of finds could not fully confirm this hypothesis. It now seems, however, that the comparison between the two very well-dated sites of MR11 and GHG0014 can confirm a shift in lithic traditions. This goes quite in a different direction than the commonly accepted appearance of the Arabian Bifacial Tradition (ABT) after the trihedral points (Magee 2014). This ABT tradition might not have existed as it was thought, especially when evidence of more complex lithic traditions seems to have occurred. This is especially the case when Neolithic sites from the Gulf and other parts of the southern Arabian Peninsula yielded both trihedral and bifacial flat arrowheads, but now we can discuss a more

*Figure 2 (opposite):* Different types of arrowheads from the Marawah MR11 Neolithic site. Two upper rows show trihedral points (except SF1131 is the 'Fasad-like' point); three lower rows show flat bifacial arrowheads with symmetrical sections of various types.

complex image of the lithic traditions thanks to these new discoveries from Abu Dhabi emirate.

The two Neolithic stratified Sites MR11 and GHG0014 yielded homogeneous lithic assemblages showing clear differences between each other. It probably implies a cultural change in a time range of a few centuries between the two main occupations on the two islands. The Ghagha Neolithic sites are extremely interesting to compare with the Marawah Neolithic sites, especially the two well-dated sites presented here. They represent a real tradition of organised settlements made of perennial houses/buildings that are in use for several centuries. This is a unique opportunity also to better understand the evolution of regional lithic traditions. They are so homogeneous and strict that they represent an ideal reference for recent prehistory at the scale of the Arabian Peninsula. Resuming excavations on Ghagha Island, especially of the ongoing excavations at the GHG0063 site as well as the further excavation of new sites along its northern coast, will necessarily add crucial information to our understanding of Neolithic development at a subcontinental scale.

Once the lithic analysis is completed, when the ongoing Neolithic excavations are finished, a comprehensive report will be needed, with definitive counts, proportions and statistics, as well as a spatial analysis of the lithic artefacts related to the excavation areas and their stratigraphic contexts. A functional analysis will be needed as well (use-wear analysis, traceology) on tile knives, combined with a flint sourcing project and an experimental and replicative project, exploring in more detail the hypothesis of their use as percussive rather than cutting tools. The arrowheads, with their wide range of types, are the main typological category present at the Neolithic sites. Their use will need to be detailed, as their state of conservation is often excellent, and this will allow further studies to illustrate and document this very peculiar and rich Neolithic material culture that is starting to be better understood. Finally, the ultimate goal will be to define the nature and reasons for the observed change in traditions at the turn of the 7th to 6th millennia BC, combining a wider approach and interdisciplinary studies related with environmental, climatic and regional cultural proxies.

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