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Archaeobotanical evidence for early date consumption on Dalma Island, United Arab Emirates

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The discovery of carbonized date stones in the United Arab Emirates has made a contribution to the dating of early date consumption in the Near East.

Key-words: dates, *Phoenix dactylifera*, chronology, subsistence, Near East

Introduction

Recent archaeological excavations carried out on Dalma island, located in the southwestern part of the Arabian Gulf some 45 km off the coast of Abu Dhabi in the United Arab Emirates (FIGURE 1), have revealed exciting new evidence for the early harvesting and consumption of dates (*Phoenix dactylifera*). Work carried out at the site (DA11) between 1992 and 1994 as part of the Abu Dhabi Islands Archaeological Survey established the presence of an early Neolithic beach settlement with structures and middens (Flavin & Shepherd 1994). Small quantities of imported painted 'Ubaid ware from southern Mesopotamia were recovered, along with a large assemblage of what appear to be locally made gypsum plaster vessels. Many thousands of flint flakes and numerous tools (including drills, arrowheads, scrapers and tile knives) were found, as well as nearly a hundred

ornamental beads and pendants of varying type. Food debris took the form of marine mollusca and animal remains, including a substantial assemblage of fish bones. Sondages excavated on the site in 1998 on the basis of earlier work revealed important further traces of the settlement, confirming the presence of at least two round-house-like structures with surviving post-holes and floors (Beech & Elders 1999; Elders & Beech 1998).

Radiocarbon dating of the Dalma date stones

During the excavation in 1998 of a burnt layer or possible hearth (context 15, first identified in 1993), located about 25 cm above the floor level of one of the structures, several interesting archaeobotanical finds were made. These were a complete carbonized date stone as well as two fragments of burnt mud-brick which had

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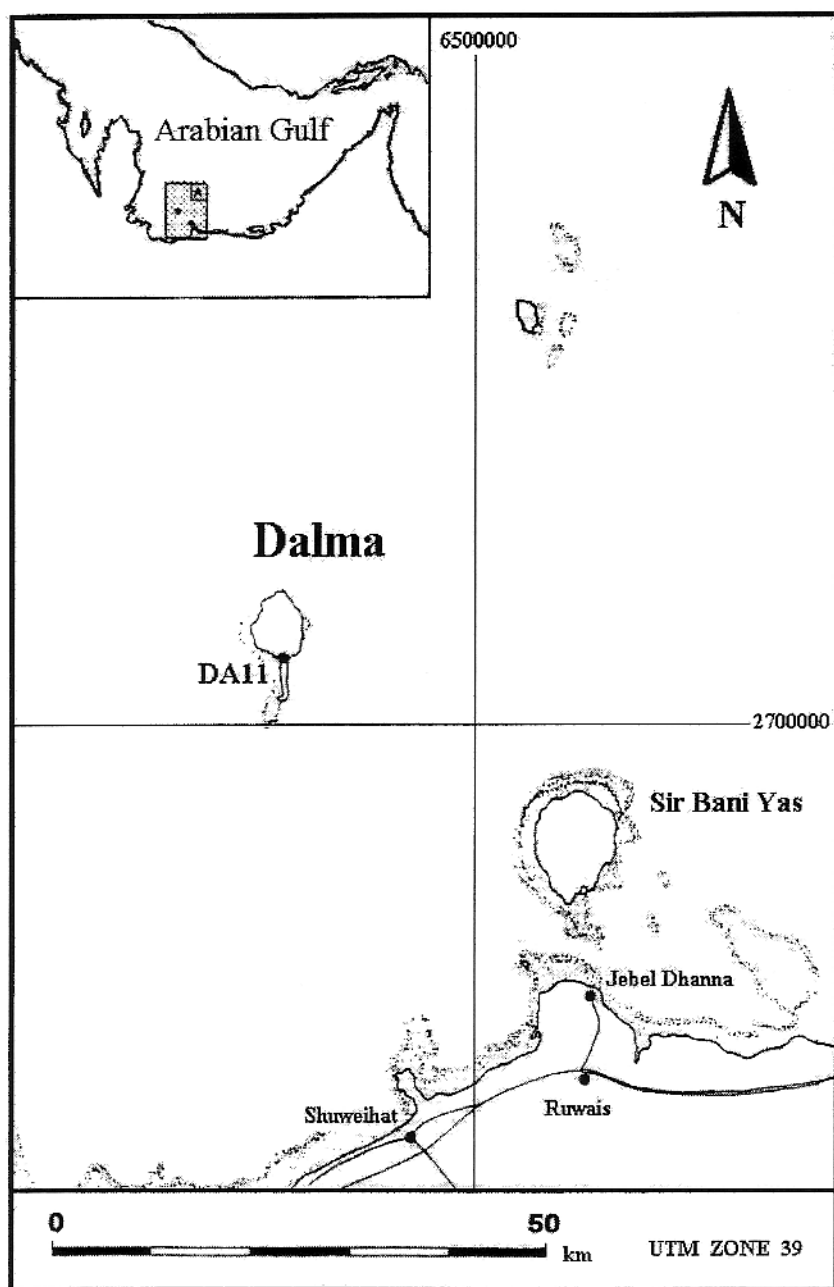


FIGURE 1. Location of Dalma island and site DA11.

impressions of date stones within them (FIGURES 2–3). A further carbonized date stone had been recovered during the 1994 season from a redeposited sand layer just below the present-day ground surface (context 4, FIGURE 2). As no other suitable dating material had been recovered during previous work at the site, it was decided to submit both these carbonized date stones for AMS radiocarbon dating.

The date stones were sent to the Scottish Universities Research and Reactor Centre (SURRC) radiocarbon laboratory at the University of Glasgow who, in conjunction with the University of Arizona AMS facility, performed the dating of the samples. The details of their findings are presented in TABLE 1. Calibrations are made using the University of Washington, Quaternary Isotope Laboratory, Radiocarbon

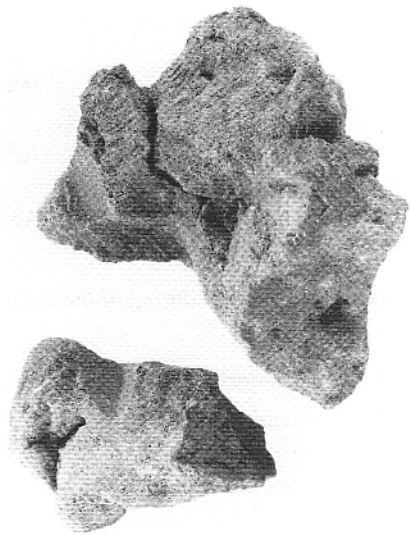
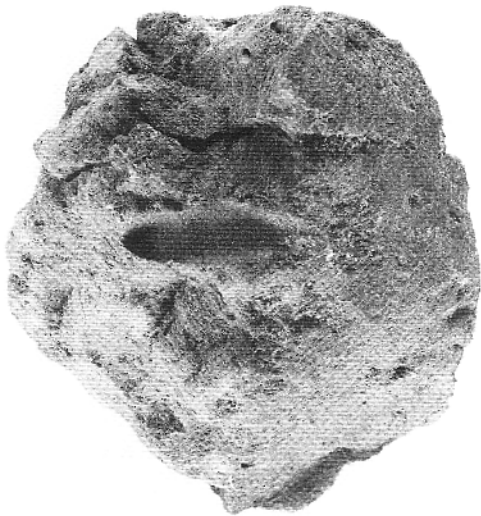
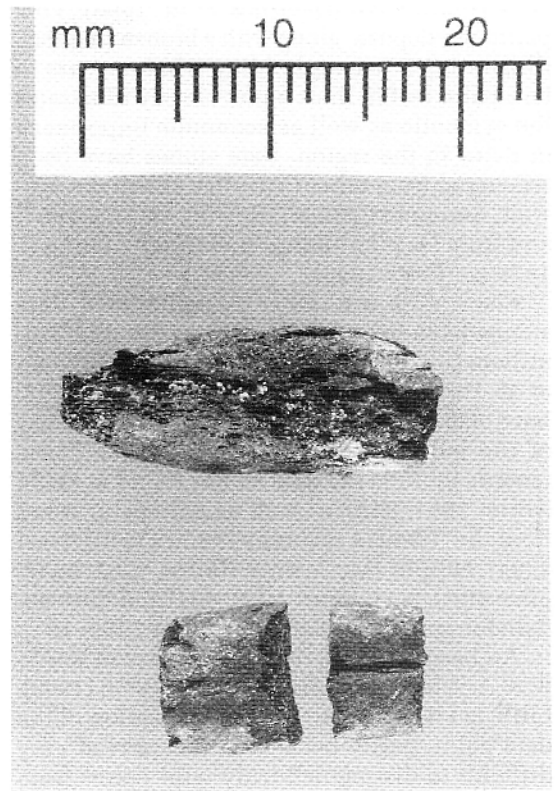
FIGURE 2 (right). The carbonized date stones from Dalma. Top: almost complete specimen (context 15); Bottom: half-complete specimen (context 4).

Calibration Program, Rev. 4.0 1998, using the datasets derived from Stuiver *et al.* (1998). The decadal atmospheric calibration curve is used. Calibrated age ranges are calculated with 2-sigma errors from the probability distributions. The relative area under the probability distribution is given in brackets after the age range.

Discussion

The previous earliest evidence for date palm (*Phoenix dactylifera*) remains in the United Arab Emirates were the date palm imprints excavated from Hili 8. These were from the Building VI deposit in Period 1, dating to around 3000 BC (Cleuziou & Costantini 1980). Dates also occur in late 3rd–early 1st-millennium levels at Tell Abraq, UAE (Potts 1990). Very recently date palm phytoliths have been successfully identified from a 1st-century BC–AD 1st-century layer near the main entrance of a temple at ed-Dur, Umm

FIGURE 3 (a & b) (below). Impressions of date stones in burnt mud brick from Dalma (context 15).



al-Qaiwain, UAE (Haerinck *et al.* 1998). This particular deposit, along with a bronze ring seal, illustrating a person holding what appears to be a palm leaf in their hand, clearly illustrates the symbolic as well as economic importance of dates in the region. Date stones have been recovered from other Gulf sites at Failaka, Kuwait, dating to 2000 BC (Rowley-Conwy 1987) and from Qala't al-Bahrain, Bahrain, dating to 1475 BC (Potts 1990).

Elsewhere, a number of carbonized date stones have been reported from the mid 3rd-millennium BC 'Royal Cemetery' at Ur (Ellison *et al.* 1978: 171–2). Moorey & Postgate (1992) have also summarized the evidence for the use of the palm on Mesopotamian sites. These records include the date stones found at Eridu (Gillet 1981: 318), as well as date-palm wood from the 'Ubaid 4 levels at Tell El'Oueili (Neef 1991), Nippur (McCown & Haines 1967: 36–7, plate 40A), Nuzi (Starr 1939: 494) and the Neo-Babylonian ziggurat at Larsa (Neef 1989: 151).

Archaeobotanical records for dates in southwest Asia have been discussed by Nesbitt (1993). Little is known about the domestication of the date palm, partly because it has proved very difficult to distinguish truly wild palms from feral escapes. The original wild ancestors could have grown somewhere in North Africa, Arabia, in the southern parts of the Near East or in

the Indus basin. Dates are cultivated in all these areas at the present day. According to Nesbitt (1993: 30), the only reliable archaeobotanical records of its occurrence on early sites are: Tepe Gaz Tavila, located near Daulatabad south of Kerman in southeastern Iran — 5400–4800 BC (Costantini 1985) — and Tell el-Ouelli, Iraq — 5th millennium BC (Huot 1988). Costantini (1985: 214) has reported two uncarbonized, silicified date stones from Mehrgarh in Pakistan, dating to 6000 and 5000 BC. As these are uncarbonized, however, their date and contextual provenance may be questionable. Zohary & Hopf (1988) mention the presence of a few date-palm kernels from Egypt, Iran and Pakistan dating to the 6th and 5th millennia BC, but dismiss them as probably representing material collected from the wild. They say that the earliest remains of what seem to be cultivated dates are those excavated by Safar *et al.* (1981) in the Ubaid horizon (*c.* 4000 BC) at Eridu in Lower Mesopotamia (Gillet 1981: 318). Zohary & Hopf (1988: 150) suggest that the date palm was first brought into cultivation somewhere in the lower Mesopotamian basin, or in some oases in the southern fringe of the Near Eastern arc. In assessing the question of the origin of the date palm and Mesopotamia, it is worth noting that the words for date (*zulum*) and date palm (*gishimmar*) in Sumerian belong to a group

site/context	material	lab. no.	uncalibrated determination	calibrated date
Dalma DA11 Context 4	<i>Phoenix dactylifera</i> (carbonized)	AA-32031	5830±55 BP	4670±130 BC (1-000)
Dalma DA11 Context 15	<i>Phoenix dactylifera</i> (carbonized)	AA-32032	6165±55 BP	5120±170 BC (0-988)

TABLE 1. AMS Radiocarbon dating of the Dalma date stones.

site/context	material	length (mm)	width (mm)	thickness (mm)
Dalma DA11 context 4	carbonized date stone	—	7.1	6.1
Dalma DA11 context 15	carbonized date stone	20.0	7.6	6.4
Dalma DA11 context 15	mud brick impression	19.0	7.0	—
Dalma DA11 context 15	mud brick impression	—	7.0	—

TABLE 2. Size of the Dalma date stones.

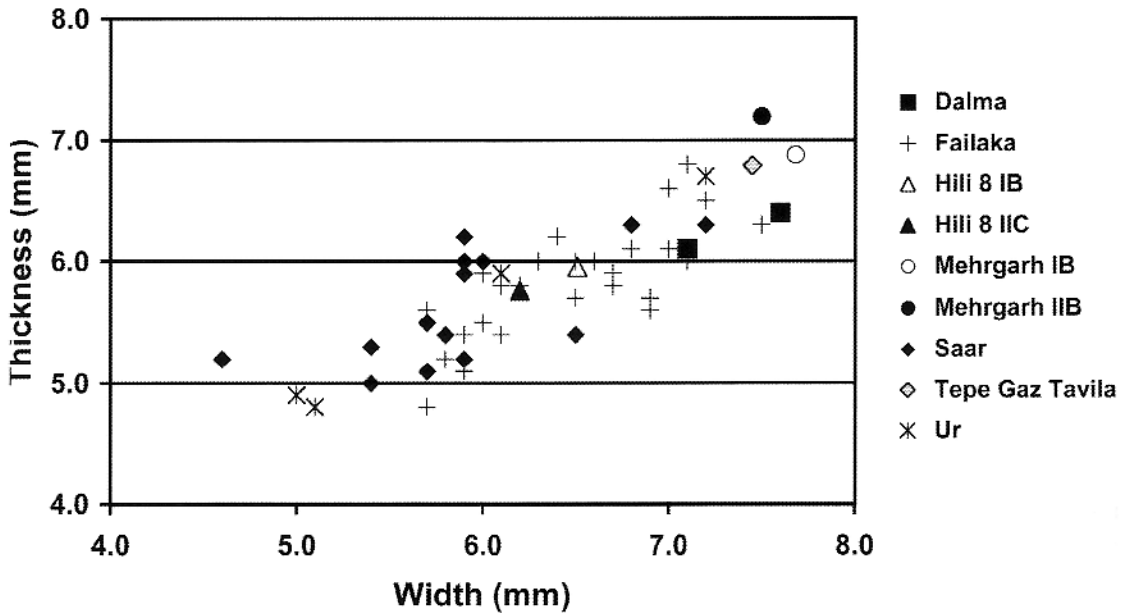


FIGURE 4. Width and thickness of date stones from Dalma in comparison with: Failaka, Kuwait — 1800 BC (Rowley-Conwy 1987); Hili 8 IB, UAE — 3000 BC (Costantini 1985); Hili 8 IIC, UAE — 2600–2500 BC (Costantini 1985); Mehrgarh IB*, Pakistan — 6000 BC (Costantini 1985); Mehrgarh IIB*, Pakistan — 5000 BC (Costantini 1985); Saar, Bahrain — 1900 BC (Nesbitt 1993); Tepe Gaz Tavila, Iran — 5400–4800 BC (Costantini 1985); and Ur — mid 3rd millennium BC (Ellison et al. 1978).

* N.B. the Mehrgarh examples are not carbonized.

of words which the Sumerologist Benno Landsberger considered to be non-Sumerian loanwords from a hypothetical pre-Sumerian language used in the region, which he associated with a pre-Sumerian, aboriginal population (Landsberger 1974; Potts 1997: 46). A recent systematic analysis of the genus *Phoenix* has considered morphology, anatomy and DNA sequencing (Barrow 1998). This work identified the date palm's closest relative as being the Indian date palm, *Phoenix sylvestris*. This species is cultivated/managed all over India and Pakistan at the present day. The identification by systematic analysis of the *P. sylvestris* and *P. dactylifera* as 'sister species' supports the view of the Irano-Arabian area as the home of the date palm.

Taking all the existing records as a whole, it seems likely that dates have been cultivated since at least the 5th millennium BC (Nesbitt 1993: 31; Zohary & Hopf 1988: 149). In this

context, the discovery and dating of the Dalma carbonized date stones is therefore of some interest, particularly as their age range falls within the late 6th–early 5th millennia BC ('Ubaid 1–2). They represent some of the earliest evidence for date consumption found within the Middle East. Although it cannot be determined whether they represent wild or cultivated dates, it is at least clear that they were consumed at that time. They may have been harvested locally on Dalma but it also quite possible that they may have been brought as trade goods into the settlement (*cf.* Oates *et al.* 1977).

Comparing the size (width *versus* thickness) of the Dalma date stones with those published measurements available from a number of other contemporary and later sites in the region, it can be seen that the two Dalma examples fall at the upper end of the size range (TABLE 2 & FIGURE 4). The older stone from context 15 falls

just outside the upper range of the Failaka and Saar distributions, whilst the younger one from context 4 falls within the upper part of the distributions from these sites. Interestingly all the largest date stones belong to the early period sites such as Mehrgarh and Tepe Gaz Tavila, which are the closest in age to the Dalma specimens. It should be noted, though, that as the Mehrgarh examples were not carbonized this difference may be due to the fact that they have not suffered from shrinkage as a result of the burning process.

The respective measurements of the Dalma date-stone impressions from the two burnt mud-brick fragments (context 15) are presented in TABLE 2. The size of these falls within the upper distribution range of the Failaka and Saar date stones, and appears to match the size of the two carbonized examples from Dalma.

Conclusions

This discovery on Dalma island of early evidence for the harvesting and consumption of dates presents some intriguing questions. Might it suggest that early Neolithic peoples settled on the island were already learning how to exploit the stands of wild date palms scattered around the shores of the Gulf? Were they already managing or cultivating dates at that time? Many seal engravings and texts documenting the use of the date palm in Mesopotamia are known from the Sumerian period (c. 2500 BC) onwards. The archaeobotanical record suggests, however, that the history of their use goes back much further than that time. The new evidence from Dalma further supports the suggestion that

the early Neolithic settlers of the Gulf were already aware of the use of dates. It is worth noting that no other early finds of date stones have been made on other broadly contemporary sites in the United Arab Emirates. Is Dalma really a special site because dates are present there, or is it simply a case of preservation and retrieval not being adequate on other sites? Only further work will tell.

Acknowledgements. The Abu Dhabi Islands Archaeological Survey (ADIAS) was established in 1992 on the directives of His Highness Sheikh Zayed bin Sultan Al Nahyan, and operates under the patronage of His Highness Sheikh Mohammed bin Zayed Al Nahyan. The Project is charged with the responsibility of surveying for, recording, and, where necessary arranging for the excavation of archaeological sites on the coast and islands of the Western Region of Abu Dhabi. Its Academic Director is Dr G.R.D. King, Reader in Islamic Art & Archaeology at the School of Oriental & African Studies, University of London, while the Executive Director in Abu Dhabi is Peter Hellyer. Excavations at Dalma were directed by Katelin Flavin and Elizabeth Shepherd during the 1993–4 seasons, and by Mark Beech and Joseph Elders during the 1998 season. The participation of Mark Beech in this work was carried out as a component of his DPhil research in the Departments of Archaeology and Biology at the University of York. This research is financially supported by the University of York, ADIAS, the British Council (Abu Dhabi) and the Environmental Research and Wildlife Development Agency (ERWDA) in Abu Dhabi. We would like to thank the anonymous reviewer for their comments on an earlier version of this paper, and for bringing the work of Landsberger, as well as Moorey and Postgate, to our attention. Peter Rowley-Conwy (University of Durham) kindly supplied us with a copy of his paper on the Failaka dates, and Mark Nesbitt and Sasha Barrow (Centre for Economic Botany, Royal Botanic Gardens, Kew) provided comments on an earlier version of this paper. Dr Gordon Cook (SURRC radiocarbon laboratory) provided advice regarding the radiocarbon dating.

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Testing ancient Egyptian granite-working methods in Aswan, Upper Egypt

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Rose granite was a favoured, but difficult, stone to work in ancient Egypt. Recent sawing, drilling and cutting tests of the granite in Aswan suggest how exacting were those tasks for craftworkers.

Key-words: granite, stone-working, Egypt, Aswan

The shaping of igneous stones by ancient Egyptian artisans into building blocks, statuary, sarcophagi and obelisks, many of them decorated with deeply cut hieroglyphs and reliefs, has engendered an admiration for such highly skilled work in hard stone. Rose granite (hardness Mohs 7), in use for all of these objects, was obtained from Aswan, Upper Egypt. This coarse-grained stone is composed mainly of quartz, mica and pinkish feldspar, the latter mineral being slightly softer than the quartz and widely distributed within the stone's matrix.

Three important techniques for working the granite were sawing, tubular drilling and relief cutting. The copper stone-cutting saw was employed for shaping hard stone blocks and sarcophagi (e.g. the basalt paving blocks at the Great Pyramid, Giza). The copper stone-cutting tubular drill (Stocks 1993: figure 1a) hollowed stone vessels (e.g. a porphyry vessel, Cairo

Museum JE18758) and the interiors of stone sarcophagi (e.g. Khufu's granite sarcophagus at Giza). The cutting of stone is exemplified by the hieroglyphs incised into a rose granite column, British Museum EA1123.

In March 1999, an opportunity arose to saw, drill and cut the granite at a quarry located in Aswan. I received the able assistance of several Egyptian quarry workers to operate a reconstructed 1.8-m long copper saw and a reconstructed 8-cm diameter copper drill-tube, which I had taken to Egypt with a large driving bow. These sawing and drilling experiments were undertaken to test two theoretical propositions, first suggested by me (Stocks 1986a: 28, top and bottom illustrations), that two- and three-worker teams were required to drive large ancient saws and tubular drills respectively. I believe that these Aswan tests on the rose granite are the first to be carried out with reconstructed tools driven by teams of Egyptian stoneworkers.

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