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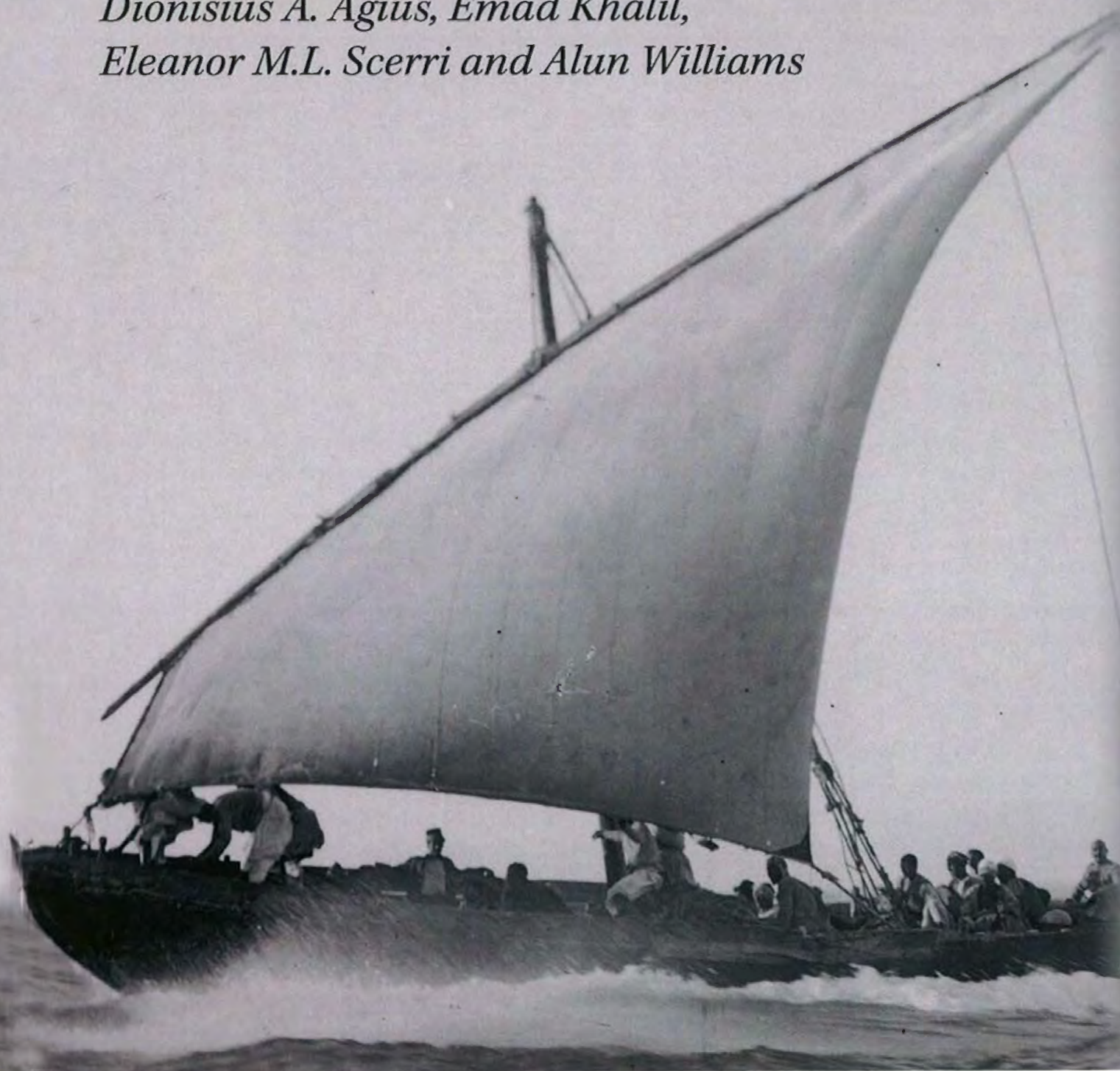


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Human Interaction with the Environment in the Red Sea

EDITED BY

*Dionisius A. Agius, Emad Khalil,
Eleanor M.L. Scerri and Alun Williams*



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Human Interaction with the Environment in the Red Sea

Selected Papers of Red Sea Project VI

Edited by

Dionisius A. Agius, Emad Khalil, Eleanor M.L. Scerri
and Alun Williams



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Food Globalisation and the Red Sea: New Evidence from the Ancient Ports at Quseir al-Qadim, Egypt

Marijke van der Veen and Jacob Morales

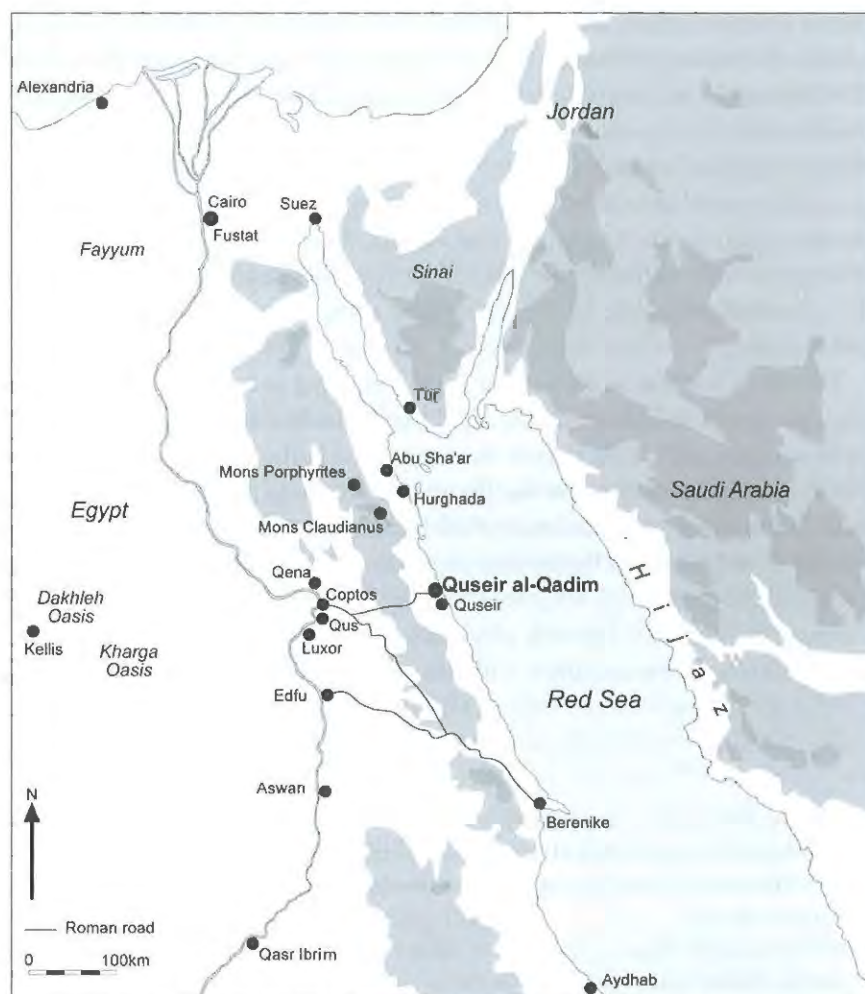
11.1 Introduction

The Red Sea is one of the busiest waterways in the world, forming a vital link between Europe, Africa and Asia. As an inlet of the Indian Ocean the Red Sea has, over the centuries, played a pivotal part in long-distance trade, especially that between Europe and the Middle East on the one hand, and India, China and Eastern Africa on the other. Foodstuffs have represented a considerable component of this trade and, in the case of the spice trade these were the target commodity. With food globalisation being such a key aspect of our modern world, this raises the question of when food globalisation began. Leaving aside for the moment definitions of what is meant by globalisation and whether it represents a positive or negative development (see discussion section below), the inter-continental translocation of foodstuffs has often had a significant impact on regional communities, economies and diets. A study of the range of goods transhipped through the Red Sea ports and shifts in the relative importance of these ports over time, can help bring into focus the changing history of long-distance trade with the East, early antecedents of food globalisation, and geopolitics more widely.

This paper presents the archaeological evidence for plant foods of Asian and African origins recovered from excavations at Quseir al-Qadim, one of the Egyptian Red Sea ports involved in the Eastern trade during both the Roman and medieval Islamic periods. Their presence is discussed in the contexts of trade, impact on local agriculture and changing foodways, while their relevance to debates about globalisation is also examined.

11.2 The Ports at Quseir al-Qadim, Egypt

The archaeological site of Quseir al-Qadim is located on the Egyptian Red Sea coast, some 8km north of the modern town of Quseir, at the point where the Nile is closest to the coast (Map 11.1). While the mountains of the Eastern Desert form a natural barrier, the site is linked to the Nile valley by an ancient



MAP 11.1 *Location of Quseir al-Qadim on the Red Sea coast of Egypt (after Fig. 1.1 in Van der Veen, "Consumption" 2011).*
MAP: IAN REEDS.

road through the Wadi Hammamat. Excavations by an American team from the University of Chicago identified that the site had functioned as a port in the Eastern trade during both the Roman and medieval Islamic periods.¹ The Roman site at Quseir al-Qadim was subsequently identified as Myos Hormos,

¹ D. H. Whitcomb and J. H. Johnson, *Quseir Al-Qadim 1978: Preliminary Report*. (Cairo: The American Research Center in Egypt, 1979); D. S. Whitcomb, and J. H. Johnson, *Quseir Al-Qadim 1980: Preliminary Report*. (Malibu: Undeena Publications, 1982).

one of the two main ports for the trade with India as described by classical authors.² Further excavations took place between 1999 and 2003, directed by David Peacock and Lucy Blue with a team from the University of Southampton.³ Ostraca and a papyrus recovered during these excavations refer to Myos Hormos and further corroborate this identification,⁴ while paper documents in Arabic refer to the site as Kusayr, confirming that during the Islamic period the site equates with "Kusayr, the port of Qus", as known from historical texts.⁵ During the latter period Quseir also functioned as a disembarkation point for the annual pilgrimage and as a transshipment point for grain intended for Mecca and the Hijaz.

The site is located on an ancient coral reef rising to ca. 8 metres above sea level, just north and east of a now silted lagoon. In Roman times the most sheltered northern part of the lagoon was used as the harbour and quayside, but its gradual silting up meant that the Islamic harbour was not much more than a small bay or *mersa* at the entrance of the former lagoon.⁶ All the dating evidence combined indicates that the Roman occupation dates from the early first to the early/mid-third centuries AD (though earlier Ptolemaic deposits are suspected underneath the silted lagoon), while the Islamic occupation spans the mid-eleventh to the fifteenth centuries, with the site left deserted and unoccupied for a

- 2 A. Bülow-Jacobsen, H. Cuvigny and J. L. Fournet, "The identification of Myos Hormos: new papyrological evidence", *Bulletin De l'Institut Français d'Archéologie Orientale* 94 (1994): 27–42; D. P. S. Peacock, "The site of Myos Hormos: a view from space", *Journal of Roman Archaeology* 6 (1993): 226–232.
- 3 D. Peacock, and L. Blue, L. *Myos Hormos—Quseir Al-Qadim: Roman and Islamic Ports on the Red Sea. Volume 1: Survey and Excavations 1999–2003* (Oxford: Oxbow Books, 2006); D. Peacock and L. Blue, *Myos Hormos—Quseir al-Qadim. Roman and Islamic Ports on the Red Sea. Volume 2: Finds from the Excavations 1999–2003* (Oxford: Archaeopress, 2011).
- 4 W. Van Rengen, "Written material from the Greco-Roman period", in Peacock and Blue, "Finds" (2011), pp. 335–338.
- 5 G. Frantz-Murphy, "Arabic documents and narrative sources", in *Quseir Al-Qadim 1980. Preliminary Report*, eds. D. S. Whitcomb and J. H. Johnson (Malibu: Undena/The American Research Center in Egypt, 1982), pp. 267–283; Guo, L. *Commerce, Culture and Community in a Red Sea Port in the Thirteenth Century: The Arabic Documents from Quseir* (Leiden: Brill, 2004); A. Regourd, "Trade on the Red Sea during the Ayyubid and Mamluk periods: The Quseir paper manuscript collection 1999–2003, first data", *Proceedings of the Seminar of Arabian Studies* 34 (2004): 277–292; Regourd, A. 2011. "Arabic language documents on paper", in Peacock and Blue, "Finds" 2011, pp. 339–344.
- 6 L. Blue, "Interpreting the harbour through the sedimentary sequence", in Peacock and Blue, "Survey and Excavations" (2006), pp. 43–61. Peacock and Blue, "Survey and Excavations" (2006): 176.

period of some 800 years in between.⁷ Historical references to the ports include an early-first-century AD reference to Myos Hormos by Strabo, who indicates that while the port was used in Ptolemaic times, trade increased significantly in the Early Empire (early first century AD), and a description by Al-Qalqashandī (writing in the late-fourteenth or early-fifteenth century) refers to it as the port of Qus, used as a transport hub for spices and other Eastern commodities:

... I learned that as many as one hundred and twenty vessels were sailing from Myos Hormos to India, whereas formerly, under the Ptolemies, only a very few ventured to take the voyage and to carry on traffic in Indian merchandise.

STRABO: *THE GEOGRAPHY* 2.5.12⁸

Al-Quseir is on the northern side of Aydhab and some of the ships frequent it; it is near to Qus and Aydhab is far from Qus. The merchandise is carried from Quseir to Qus, then from Qus to the warehouse of al-Karim in Fustat.

AL-QALQASHANDĪ: *ṢUBḤ AL-A'SHĀ* VOL. 3⁹

A wealth of information concerning the Eastern trade was recovered by the excavations, including textiles, spices, ceramics, ship timbers and sails, ballast, and, of course, documents describing aspects of the trade.¹⁰ The focus of this paper is the trade in plant foods. A full analysis of the botanical remains of foodstuffs, ship timbers and wooden artefacts, including details of sampling strategy and dating evidence, is presented in Van der Veen.¹¹ Details of the faunal evidence can be found in Hamilton-Dyer.¹²

7 Peacock and Blue, "Survey and Excavations" (2006); M. Van der Veen and D. Hamilton, "Chronology", in M. Van der Veen, *Consumption, Trade and Innovation: Exploring the Botanical Remains from the Roman and Islamic Ports at Quseir al-Qadim, Egypt* (Frankfurt: Africa Magna Verlag, 2011), pp. 18–37.

8 Strabo. *The Geography*. trans. H. L. Jones [The Loeb Classical Library] (Cambridge MA/London: Harvard University Press/Heinemann, 1969).

9 Cited by Peacock and Blue, "Survey and Excavations" (2006), 4.

10 See Peacock and Blue, "Survey and Excavations" (2006) and "Finds" (2011) for details.

11 M. Van der Veen, M. *Consumption, Trade and Innovation: Exploring the Botanical Remains from the Roman and Islamic Ports at Quseir al-Qadim, Egypt* (Frankfurt: Africa Magna Verlag, 2011).

12 S. Hamilton-Dyer, S. "Faunal remains", in Myos Hormos—Quseir al-Qadim. Roman and Islamic Ports on the Red Sea. Volume 2: Finds from the Excavations 1999–2003, eds. D. Peacock and L. Blue. (Oxford: Archaeopress, 2011), pp. 245–288.

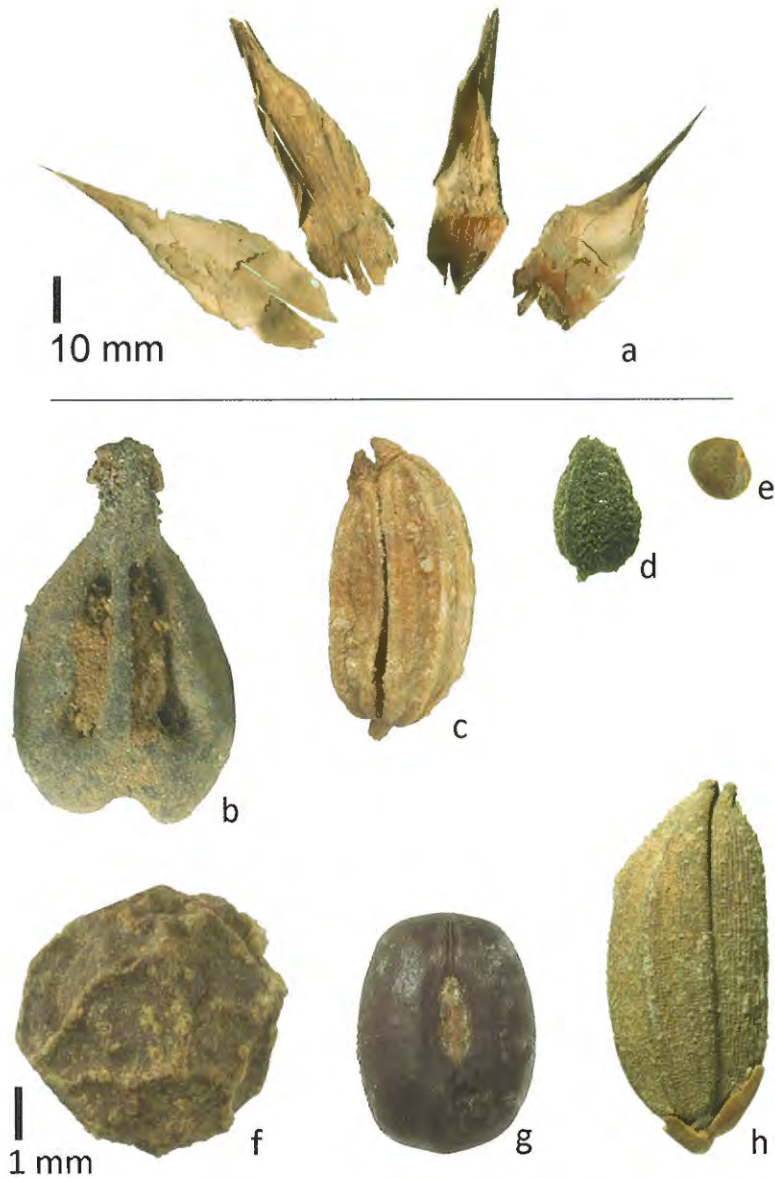


FIGURE 11.1A Archaeobotanical remains of some of the foodstuffs found in the Roman deposits at Quseir al-Qadim, Egypt: a) artichoke, bracts (*Cynara cardunculus*, var. *scolymus*); b) grape, seed (*Vitis vinifera*); c) fennel, fruits (*Foeniculum vulgare*); d) black cumin, seed (*Nigella sativa*); e) fig, seed (*Ficus carica*); f) black pepper, corn (*Piper nigrum*); g) mung bean, seed (*Vigna radiata*); h) rice, hulled grain (*Oryza sativa*) (after Figs. 2.3, 2.5, 2.7 and 4.17 in Van der Veen "Consumption" 2011).

PHOTOGRAPHS: JACOB MORALES.

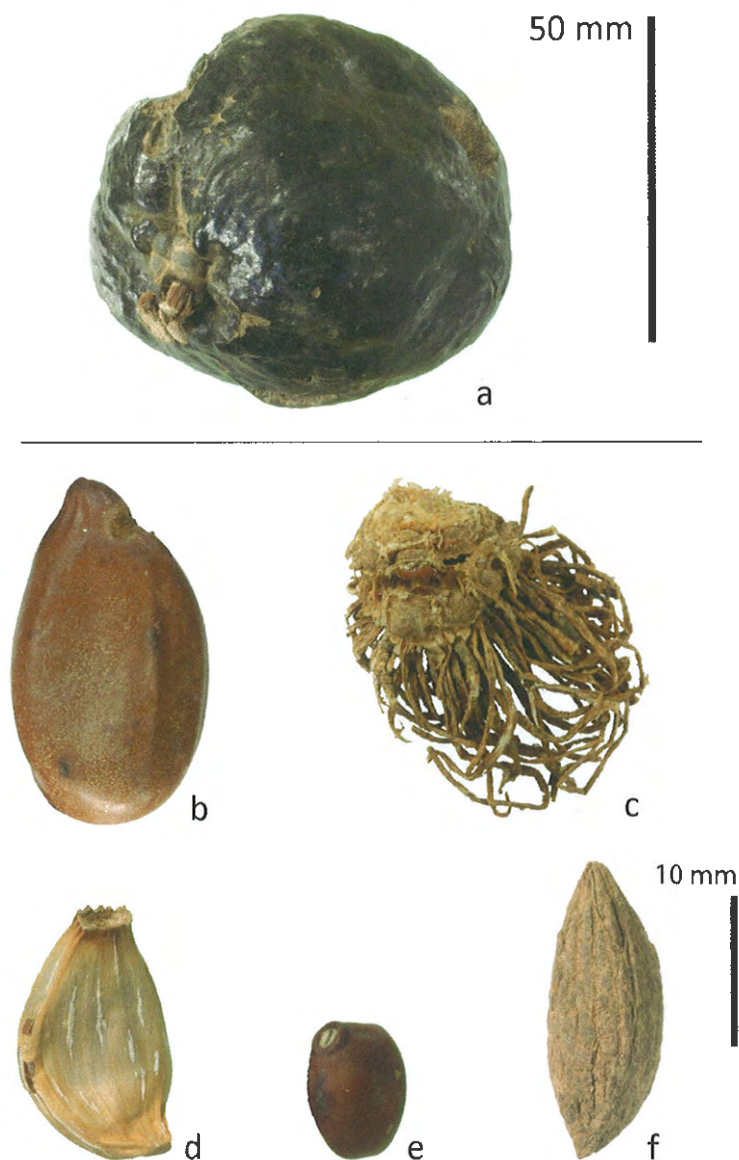


FIGURE 11.1B Archaeobotanical remains of some of the foodstuffs found in the Roman deposits at Quseir al-Qadim, Egypt: a) dom tree, complete fruit (*Hyphaene thebaica*); b) persea, seed (*Mimusops laurifolia*); c) garlic, base plate (*Allium sativum*); d) garlic, clove (*Allium sativum*); e) white lupin or termis bean, complete seed (*Lupinus albus*); f) olive, stone (*Olea europaea*) (after Figs. 4.8 and 4.17 in Van der Veen "Consumption" 2011).

PHOTOGRAPHS: JACOB MORALES.

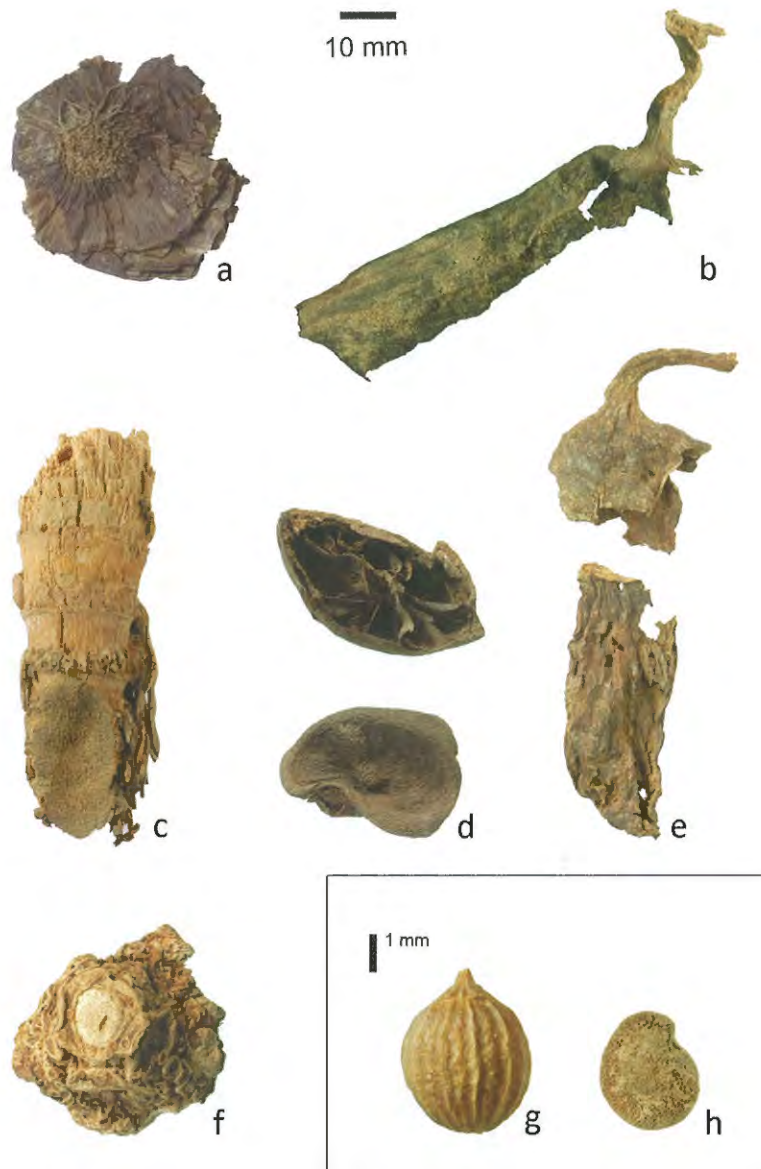


FIGURE 11.2A Archaeobotanical remains of some of the foodstuffs found in the Islamic deposits at Quseir al-Qadim, Egypt: a) onion, skin and base plate (*Allium cepa*); b) banana, skin fragment (*Musa sp.*); c) sugar cane, stem fragment (*Saccharum sp.*); d) lime, rind fragments (*Citrus cf. x aurantifolia*); e) aubergine, calyx and fruit (*Solanum melongena*); f) taro, corm fragment (*Colocasia esculenta*); g) coriander, seed (*Coriandrum sativum*); h) aubergine, seed (*Solanum melongena*) (after Figs. 3.6, 3.13 and Plate 12 in Van der Veen "Consumption" 2011).
PHOTOGRAPHS: JACOB MORALES.

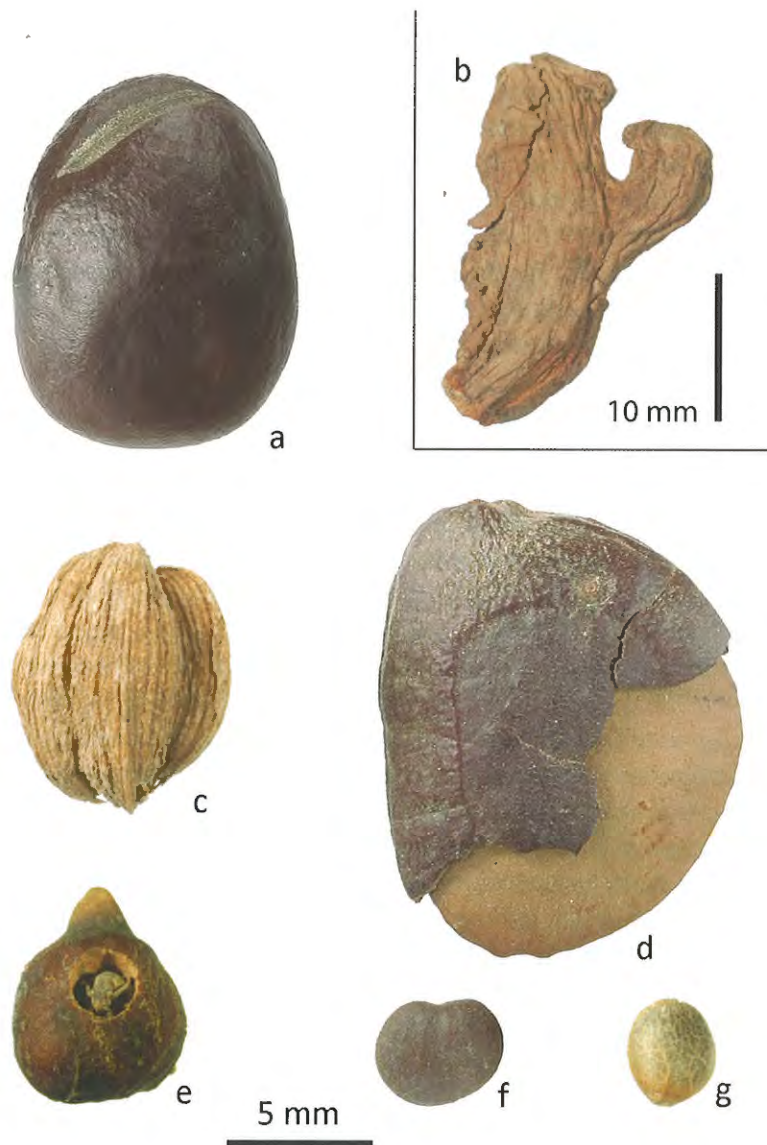


FIGURE 11.2B *Archaeobotanical remains of some of the foodstuffs found in the Islamic deposits at Quseir al-Qadim, Egypt: a) fava bean, seeds (Vicia faba); b) ginger, rhizome fragment (Zingiber officinale); c) cardamom, fruit capsule (Elettaria cardamomum); d) tamarind, seed (Tamarindus indica); e) chickpea, seed with resident insect (Cicer arietinum); f) sumac, fruit (Rhus coriaria); g) cannabis, fruit (Cannabis sativa) (after Figs. 2.10, 2.12, 4.6, 4.10 and 4.14 in Van der Veen "Consumption" 2011).*
 PHOTOGRAPHS: JACOB MORALES.

Botanical remains of foodstuffs were also recovered at the other main Roman port involved in the spice trade, Berenike, located south of Quseir al-Qadim (Figure 11.1). This site, excavated by an American-Dutch team from the Universities of Delaware and Leiden between 1994 and 2001 and with further excavations ongoing, was occupied from the Ptolemaic to the late Roman period (third century BC to the early sixth century AD, though with a decline in the middle of this period).¹³ A rich assemblage of botanical remains of spices and other foods is available for the early (first to second centuries AD) and late (fourth to early sixth centuries AD) Roman phases of occupation. Where relevant, this information will be referred to here.¹⁴

11.3 Food Plants at the Ports

The arid climate at Quseir al-Qadim and of the Red Sea coast of Egypt more generally, has created conditions very favourable to the preservation of organics on archaeological sites, including remains of food plants (seeds, fruit stones and skins, grains, etc.), papyri, paper, textiles, wood, and faunal remains. Due to this excellent preservation environment, and to extensive archaeobotanical sampling, the botanical assemblage recovered here ranks amongst the richest and most well-preserved in the world (Figures 11.1 and 11.2). It comprises a total of 67,953 identifications of food and other economic plants, as well as wooden artefacts and charcoal; a total of 85 different food plants was recovered.

In terms of types of food, these include cereals, pulses, fruits, nuts, oil-rich seeds, vegetables, herbs and spices (tables 11.2 and 11.3), with fruits, herbs and spices the most numerous in terms of variety, and cereals the most numerous in terms of actual number of items found.

Most of the food remains represent left-overs of food and fodder consumed by the people and pack animals working in the ports, but some represent commodities spilled during transshipment from ship to animal caravan.

¹³ S. E. Sidebotham, *Berenike and the Ancient Maritime Spice Route*. (Berkeley: University of California Press, 2011); W. Z. Wendrich, R. S. Tomber, S. E. Sidebotham, J. A. Harrell, R. T. J. Cappers and R. S. Bagnall, "Berenike crossroads: the integration of information", *Journal of the Social and Economic History of the Orient* 46, 1 (2003), pp. 46–87.

¹⁴ For full details, see R. T. J. Cappers, *Roman Food Prints at Berenike: Archaeobotanical Evidence of Subsistence and Trade in the Eastern Desert of Egypt* [Institute of Archaeology, Monograph 55] (Los Angeles: Cotsen 2006).

TABLE 11.1 *Botanical assemblage from Quseir al-Qadim (after Table 1.7 in Van der Veen, "Consumption" 2011).*

	No. of ids.
Seeds, fruits, etc.	67,953
Charcoal fragments	1,728
Wooden artefacts	238
	No. of taxa
Economic plants	95
Food plants	85
Woody plants	36

TABLE 11.2 *Number of food plants recovered at Quseir al-Qadim by period of occupation and plant category. N.B. Few samples were available from the Late Islamic phase and the results for that phase are thus not representative of that phase (after Table 6.3 in Van der Veen, "Consumption" 2011).*

	Roman 1st–3rd c. AD	Main Islamic 11th–13th c. AD	Late Islamic 14th–15th c. AD	Total
Cereals	3	6	5	6
Pulses	7	8	6	8
Fruits	18	21	16	25
Nuts	5	6	4	6
Oilseeds	4	6	4	6
Vegetables	7	12	7	13
Herbs and spices	12	21	9	21
Other	4	9	4	10
TOTAL	60	89	55	95

TABLE 11.3 Food plant recovered at Quseir al-Qadim (desiccated remains only); approximate abundance per period; + = rare (one or two specimens), √ = present (< 1 item per litre); √√ = common (≥ 1 item per litre); √√√ = abundant (> 10 items per litre). (after Table 6.2 in Van der Veen, "Consumption" 201).

	Rom	Isl	L. Isl
Cereal grain			
Barley, <i>Hordeum vulgare</i>	√√√	√√√	√√
Durum wheat, <i>Triticum durum</i>	√√	√√√	√√
Rice, <i>Oryza sativa</i>	√	√	√
Emmer wheat, <i>Triticum dicoccum</i>	.	√	.
Sorghum, <i>Sorghum bicolor</i>	.	√	√√
Pearl millet, <i>Pennisetum glaucum</i>	.	√√	+
Cereal Chaff			
Barley, <i>Hordeum vulgare</i>	√√√	√√√	√√√
Durum wheat, <i>Triticum durum</i>	√√√	√√√	√√√
Rice, <i>Oryza sativa</i>	√	√	√
Emmer wheat, <i>Triticum dicoccum</i>	.	√	.
Sorghum, <i>Sorghum bicolor</i>	.	√√	√√
Pearl millet, <i>Pennisetum glaucum</i>	.	√	.
Cereals/Large grasses, culm nodes	√√√	√√√	√√√
Infected rachis (smut)	√	√√	√
Pulses			
Lentil, <i>Lens culinaris</i>	√√	√	√
Termis bean, <i>Lupinus albus</i>	√√	√	.
Pea, <i>Pisum sativum</i>	√	√	√
Vetch, <i>Lathyrus cicera/sativus</i>	√	√	.
Fava bean, <i>Vicia faba</i>	√	√√	√√
Chickpea, <i>Cicer arietinum</i>	√	√√	√√
Mung bean, <i>Vigna radiata</i>	+	+	.
Black-eyed bean, <i>Vigna unguiculata</i>	.	√	+
Fruits			
Date, <i>Phoenix dactylifera</i>	√√	√√√	√√
Dom, <i>Hyphaene thebaica</i>	√√	√	√
Grape, <i>Vitis vinifera</i>	√√	√√	√

	Rom	Isl	L. Isl
Olive, <i>Olea europaea</i>	√√	√	.
Sebesten, <i>Cordia myxa</i>	√√	+	.
Fig, <i>Ficus carica</i>	√√	√	√
Watermelon, <i>Citrullus lanatus</i>	√√	√√	√√
Colocynth, <i>Citrullus colocynthis</i>	√	√	+
Cucumber/Melon, <i>Cucumis spp.</i>	√	√√	√
Christ's thorn, <i>Zizyphus spina-christi</i>	√	√	+
Pomegranate, <i>Punica granatum</i>	√	√	√
Caper, <i>Capparis spinosa</i>	√√	√√	√
Apple, <i>Malus domestica</i>	+	√	.
Persea, <i>Mimusops laurifolia</i>	√	.	.
Peach, <i>Prunus persica</i>	+	√	+
Plum, <i>Prunus domestica</i>	+	.	.
Cherry plum, <i>Prunus cf. cerasifera</i>	+	.	+
Carob, <i>Ceratonia siliqua</i>	.	√	+
Citron, <i>Citrus cf. medica</i>	√	√	.
Lime, <i>Citrus cf. x aurantifolia</i>	.	√	.
Sumac, <i>Rhus coriaria</i>	.	√√	.
Apricot, <i>Prunus armeniaca</i>	.	.	+
Mahaleb cherry, <i>Prunus mahaleb</i>	.	√	+
Banana, <i>Musa sp.</i>	.	√	.
Sugardate, <i>Balanites aegyptiaca</i>	.	√	+
Nuts			
Hazelnut, <i>Corylus avellana</i>	√	√√	√
Walnut, <i>Juglans regia</i>	√	√	.
Almond, <i>Prunus amygdalus</i>	√	√	√
Coconut, <i>Cocos nucifera</i>	√	√	√
Pine nut, <i>Pinus pinea</i>	√	+	.
Pistachio, <i>Pistacia vera</i>	.	√	+
Oilseeds			
Safflower, <i>Carthamus tinctorius</i>	√	√√	√
Sesame, <i>Sesamum indicum</i>	√	√	+
Linseed, <i>Linum usitatissimum</i>	√	√	+
Bentree, <i>Moringa peregrina</i>	+	√	.

TABLE 11.3 Food plant recovered at Quseir al-Qadim (desiccated remains only) (cont.)

	Rom	Isl	L. Isl
Hemp, <i>Cannabis sativa</i>	.	+	√
Poppy seed, <i>Papaver somniferum</i>	.	√	.
Herbs and spices			
Coriander, <i>Coriandrum sativum</i>	√√	√√√	√√
Fennel, <i>Foeniculum vulgare</i>	√√	√√	√
Black pepper, <i>Piper nigrum</i>	√	√√	√
Cumin, <i>Cuminum cyminum</i>	√	√√	.
Black cumin, <i>Nigella sativa</i>	√	√	+
Ammi, <i>Trachyspermum copticum</i>	√	+	.
Black mustard, <i>Brassica nigra</i>	√√√	√√	√
Fenugreek, <i>Trigonella foenum-graecum</i>	+	√	+
Dill, <i>Anethum graveolens</i>	√	√	.
Aniseed, <i>Pimpinella anisum</i>	√	√	.
Tamarind, <i>Tamarindus indica</i>	+	√	+
Belleric myrobalan, <i>Terminalia belirica</i>	+	√	.
Bay leaf, <i>Laurus nobilis</i>	.	+	+
Basil, <i>Ocimum basilicum</i>	.	√	.
Caraway, <i>Carum carvi</i>	.	√	.
Fagara, cf. <i>Tetradium ruticarpum</i>	.	√	.
Cardamom, <i>Elettaria cardamomum</i>	.	√	.
Ginger, <i>Zingiber officinale</i>	.	√	.
Turmeric, <i>Curcuma</i> sp.	.	+	.
Black myrobalan, <i>Terminalia chebula</i>	.	√	√
Betelnut, <i>Areca catechu</i>	.	+	.
Vegetables			
Onion, <i>Allium cepa</i>	√√	√√	√
Garlic, <i>Allium sativum</i>	√√	√√	√
Cabbage/turnip, <i>Brassica</i> spp.	√	√	√
Leaf beet, <i>Beta vulgaris</i>	√	√	√
Cress, <i>Lepidium sativum</i>	√	√√	√
Bottle-gourd, <i>Lagenaria siceraria</i>	√	√	.
Artichoke, <i>Cynara cardunculus</i>	√	.	.
Lettuce, <i>Lactuca sativa</i>	.	√	√
Endive/chicory, <i>Cichorium endivia/intybus</i>	.	+	.

	Rom	Isl	L. Isl
Purslane, <i>Portulaca oleracea</i>	.	+	√
Aubergine, <i>Solanum melongena</i>	.	√	.
Taro, <i>Colocasia esculenta</i>	.	√	.
Sugarcane, <i>Saccharum</i> sp.	.	√	.
Other			
Cotton, <i>Gossypium</i> sp.	.	+	.
Mangrove, <i>Avicennia marina</i>	√√	√	+
Acacia, <i>Acacia</i> sp.	+	√	√
Nile acacia, <i>Acacia nilotica</i>	+	√	.
Tamarisk, <i>Tamarix</i> sp.	√	√	√
Dyer's oak/gall oak, <i>Quercus infectoria</i>	+	.	.
Myrtle, <i>Myrtus communis</i>	.	√	.
Rose, <i>Rosa</i> sp.	.	√	+
Toothbrush shrub, <i>Salvadora persica</i>	.	+	.
Sea clubrush, <i>Bolboschoenus maritima</i>	.	+	.
cf. Bamboo, genus indeterminate	.	+	.
Total no. of species	60	89	55

A full account of the foods found at the ports is outside the scope of this chapter,¹⁵ but in the context of a discussion on food globalisation it is worth highlighting here that there are marked differences between the Roman and Islamic periods in the range of foods consumed by the people living and working in the port. Not only do we find a wider range of imported spices and introduced crops originating from the East during the Islamic period (see below), we also see evidence of distinctly different choices between the two periods within each of the food categories. For example, when we look at the pulses (Figure 11.3), we see that in each period six different pulses are present, and that five of these occur in both periods. But the numerical abundance of the different pulses highlights that in the Roman period people preferred lentils, and to a lesser extent lupin, pea and vetch, while in the Islamic period this had changed. Now chickpea and fava bean are favoured, with

¹⁵ For full details, see Van der Veen, "Consumption" (2011).

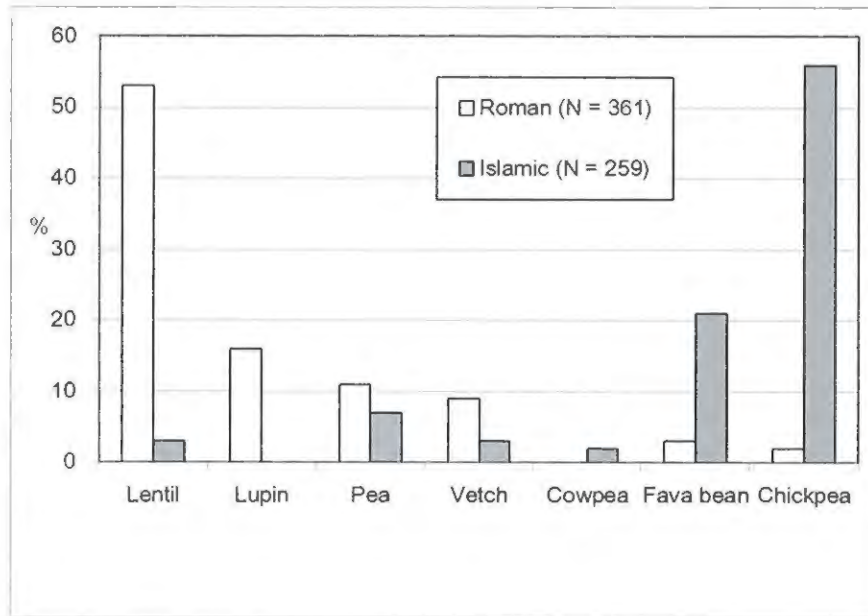


FIGURE 11.3 *Relative proportion of different pulses at Quseir al-Qadim within each phase of occupation (after Fig. 4.5 in Van der Veen, "Consumption" 2011).*

lentil, pea, vetch and cowpea occurring much more rarely. A similar picture can be seen in the fruits (Figure 11.4). Thirteen fruits occur regularly enough to be plotted on the graph and of these ten were found in Roman and 11 in Islamic deposits. While most species occur in deposits of both periods, grapes, figs, capers, olives and sebesten are the more frequent species in the Roman period, as against date, watermelon, sumac, cucumber or melon and carob in the Islamic period. In both of these examples there is no environmental reason for the shift in preference and most were cultivated in Egypt in both periods; the pattern appears to be one of cultural preference. We will come back to that in the discussion section.

Apart from the extraordinary preservation of the food remains and the rich variety of crops recovered, the assemblage is best known for the wide range of food plants originating from South and South-East Asia, and to a lesser extent Africa, with many of these foods unknown from any earlier archaeological contexts in the West. The full range of imported and introduced food plants is given in table 11.4.

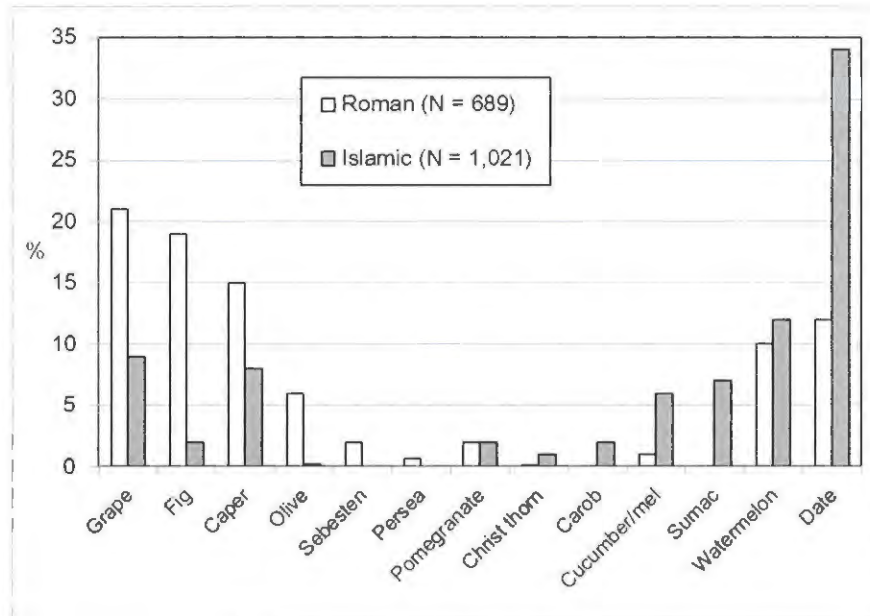


FIGURE 11.4 Relative proportion of different fruits at Quseir al-Qadim within each phase of occupation (after Fig. 4.6 in Van der Veen, "Consumption" 2011).

The taxa have been classified as either imports or introduced crops. Imports concern foods that were commodities and arrived at the port through trade. In contrast, introduced crops are plants that, while originating in the East or in sub-Saharan Africa, became incorporated into the local agricultural systems and were cultivated in Egypt and other parts of North Africa and the Middle East, rather than acquired through repeated importation. What distinguishes these crops from the imports, mostly spices, is that, given certain circumstances, these crops can be cultivated in parts of the Middle East, unlike plants such as black pepper and cardamom, which cannot.

The evidence from Quseir al-Qadim indicates that five imports were regularly brought to the ports during the Roman period, with this figure increasing to ten by the Islamic period (table 11.3). Note that the number of samples available for the later Islamic period at Quseir (fourteenth and fifteenth centuries) is very low, and the results for this latest phase of occupation should thus not be taken as representative of the imports moving through the port during this time. In the Roman deposits black pepper (*Piper nigrum*) is by far the most common import, followed by rice (*Oryza sativa*) and coconut (*Cocos nucifera*). Additionally, there are rare occurrences of mung bean (*Vigna*

TABLE 11.4 Presence/absence of imports and introduced foods at Quseir al Qadim and Berenike by phase of occupation (after Table 6.1 in Van der Veen, "Consumption" 2011 and Cappers, "Food Prints" 2006).

	Region of Origin	Foodstuffs	Roman 1–3 C. AD Quseir	Roman 1–2 C. AD Berenike	Roman 4–6 C. AD Berenike	Islamic 11–13 C. AD Quseir	Islamic 14–15 C. AD Quseir
Imports	South/South-East Asia	Black pepper— <i>Piper nigrum</i>	✓	✓	✓	✓	✓
		Rice— <i>Oryza sativa</i>	✓	✓	✓	(=)	(=)
		Coconut— <i>Cocos nucifera</i>	✓	✓	✓	✓	✓
		Mung bean— <i>Vigna radiata</i>	✓	✓	.	✓	.
		Emblic myrobalan (amla)— <i>Phyllanthus emblica</i>	.	✓	.	.	.
		Belleric myrobalan— <i>Terminalia bellirica</i>	✓	.	.	✓	.
		Black myrobalan— <i>Terminalia chebula</i>	.	.	.	✓	✓
		Ginger— <i>Zingiber officinale</i>	.	.	.	✓	.
		Turmeric— <i>Curcuma</i> sp.	.	.	.	✓	.
		Cardamom— <i>Elettaria cardamomum</i>	.	.	.	✓	.
		Fagara—cf. <i>Tetradium ruticarpum</i>	.	.	.	✓	.
		Betel nut— <i>Areca catechu</i>	.	.	.	✓	.

Region of Origin		Foodstuffs	Roman 1–3 C. AD Quseir	Roman 1–2 C. AD Berenike	Roman 4–6 C. AD Berenike	Islamic 11–13 C. AD Quseir	Islamic 14–15 C. AD Quseir
Introduced crops	South/South-East Asia	Citron— <i>Citrus</i> cf. <i>medica</i>	✓	.	.	✓	.
		Rice— <i>Oryza sativa</i>	.	.	.	✓	✓
		Lime— <i>Citrus</i> cf. <i>aurantifolia</i>	.	.	.	✓	.
		Banana— <i>Musa</i> sp.	.	.	.	✓	.
		Aubergine— <i>Solanum melongena</i>	.	.	.	✓	.
		Sugar cane— <i>Saccharum</i> sp.	.	.	.	✓	.
		Taro— <i>Colocasia esculenta</i>	.	.	.	✓	.
		Cotton— <i>Gossypium</i> sp. (+)	(*)	(*)	(*)	✓	.
	Africa	Cotton— <i>Gossypium</i> sp. (+)	(*)	(*)	(*)	✓	.
		Watermelon— <i>Citrullus lanatus</i>	(✓)	(✓)	(✓)	✓	✓
		Sorghum, race bicolor— <i>Sorghum bicolor</i>	(*)	(*)	✓	✓	✓
		Sorghum, race durra— <i>Sorghum bicolor</i>	.	.	.	✓	✓
		Pearl millet— <i>Pennisetum glaucum</i>	(*)	(*)	(*)	✓	✓
		Cowpea/black-eyed bean— <i>Vigna unguiculata</i>	.	.	.	✓	✓

(✓) already present in Pharaonic (New Kingdom) Egypt, but a new cultivar may have been introduced in the Islamic period.

(*) found in Roman Egypt, but not in Roman Quseir or Roman Berenike (except in poorly dated contexts).

(+) introduced from either Africa or the Indian Subcontinent.

(=) by this period cultivated in Egypt.

radiata) and belleric myrobalan (*Terminalia bellirica*). The evidence from Berenike corroborates this pattern; here also black pepper, rice and coconut were the regular imports, with mung bean and another species of myrobalan, emblic myrobalan or amla (*Phyllanthus emblica*), occurring in very small quantities. Black pepper continues to be the most common import in the Islamic period, followed by coconut and rice, though the latter had by then become an introduced crop (see below). Additionally, the Islamic deposits produced evidence for six further spices: ginger (*Zingiber officinale*), turmeric (*Curcuma* sp.), cardamom (*Elettaria cardamomum*), fagara (cf. *Tetradium rutilicarpum*), betel nut (*Areca catechu*) and black myrobalan (*Terminalia chebula*).

Not all of these are spices in the modern culinary sense, of course, but spices had a much wider utility in the past, including in medicinal applications and perfumery, and, together with incense, in religious sacrifice and funerary rites.¹⁶ Two of the imports, coconut and mung bean may, in fact, represent foods taken on the journey back from India; they may never have been intended as commodities for onward transport. Certainly, no archaeological record of either species occurs in the West outside these two ports, with the exception of the find of coconuts in an eighteenth-century shipwreck carrying Chinese porcelain, coffee, aromatic resin and spices, recovered at Sadana Island in the Red Sea.¹⁷ Coconut fibre will additionally have been used on the ships as caulking material and to make ropes.¹⁸ It is worth noting that in Roman times rice was rarely used in cooking, and then only, as far as we can tell from surviving recipes, as a binding agent in sauces. It did, however, play a role in medicine, due to the fact that it can be easily digested. Its consumption was recommended in cases of upset stomachs and intestinal problems.¹⁹ The three types of myrobalan all featured in a variety of medicinal applications, especially during the

¹⁶ M. Van der Veen and J. Morales, "The Roman and Islamic Spice Trade: New Archaeological Evidence", *Journal of Ethnopharmacology* 167 (2005): 54–63. doi:10.1016/j.jep.2014.09.036.

¹⁷ C. Ward, "The Sadana Island shipwreck: an eighteenth-century AD merchantman off the Red Sea coast of Egypt", *World Archaeology* 32, 3 (2001): 368–382.

¹⁸ H. C. Harries, H. C. "Coconut: *Cocos nucifera* L. (Palmae)", in *Evolution of Crop Plants*, eds. J. Smartt and N. W. Simmonds. Second ed. (Harlow: Longman, 1995), pp. 389–394.

¹⁹ Dioscorides *De Materia Medica* 11.117. Translation by T. A. Osbaldeston and R. P. A. Wood. (Johannesburg: Ibis Press, 2000); A. Dalby, *Empire of Pleasures: Luxury and Indulgence in the Roman World* (London: Routledge, 2000); H. Koenen, "Reis im Imperium Romanum: Bemerkungen zu seinem Anbau und seiner Stellung als Bedarfs- und Handelsartikel in der Römischer Kaiserzeit", *Münstersche Beiträge zur Antiken Handelsgeschichte* 18 (1999): 23–47.

Islamic period,²⁰ while betel nut was a common masticatory and stimulant, but also plays an important role in Hindu religious ceremonies.²¹

Apart from these imports, a further 13 food plants could be classified as introduced crops, originating from either South and South East Asia or Africa (table 3). Of these, the citron (*Citrus* cf. *medica*) was already widely cultivated across Egypt and the Mediterranean during the Roman period. It was the first citrus fruit to arrive in the Mediterranean and it probably arrived from India via the Persian Empire.²² It was known by several classical writers, including Theophrastus, Dioscorides and Pliny,²³ who describe its cultivation and uses. Citron fruits contain a small sour pulp which is very acid and not eaten raw, but a rind that is highly aromatic and rich in essential oils. It was consequently mostly used in medicine, including in antidotes for poisons, and in perfumery. All the other introduced crops from South or South East Asia were found in Islamic period deposits only. They include rice, lime (*Citrus* cf. *x aurantifolia*), banana (*Musa* sp.), aubergine (*Solanum melongena*), sugar cane (*Saccharum* sp.), taro (*Colocasia esculenta*) and cotton (*Gossypium* sp.).

While rice was imported into Roman Egypt, it had, on current evidence, started to be cultivated in Egypt by the Islamic period.²⁴ The history of cotton—not a food, but relevant as another introduced crop—is more complex. There are two Old World species of cotton, one originating in Africa (*Gossypium herbaceum*) and one in the Indian Subcontinent (*Gossypium arboreum*). The seeds of these two species cannot be distinguished on morphological

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- 20 A. Dietrich, "Afawih", in P. Bearman, T. Bianquis, C. E. Bosworth, E. van Donzel and W. P. Heinrichs (eds.) *Encyclopaedia of Islam*, Second Edition (Leiden: Brill, Brill Online 2008) (<http://www.brillonline.nl/subscriber/entry?entry=islam> retrieved 17 September 2008); E. Lev, "Eastern mediterranean pharmacology and India trade as a background for Yemeni medieval medicinal plants", in *Herbal Medicine in Yemen. Traditional Knowledge and Practice and their Value for Today's World*, eds. I. Hehmeyer and H. Schöning (Leiden: Brill, 2012), pp. 21–42.
- 21 S. Williams, A. Malik, S. Chowdhury and S. Chauhan, "Sociocultural aspects of areca nut use", *Addiction Biology* 7 (2002): 147–154.
- 22 A. C. Andrews, "Acclimatization of citrus fruits in the Mediterranean region", *Agricultural History* 35, 1 (1961): 35–46.
- 23 Theophrastus *Enquiry into Plants* IV.4.2. Trans. A. F. Hort [The Loeb Classical Library] (London/New York: Heinemann/Putnam, 1916). Dioscorides *De Materia Medica* 1.166; Pliny *Natural History* XV.47, ed. H. Rackham, Vol. iv: Libri XII–XVI. [The Loeb Classical Library, 370] (Cambridge, Mass./London: Harvard University Press, 1945).
- 24 M. Canard, "Rice in the Middle East in the first centuries of Islam", in *Production and the Exploitation of Resources*, ed. M. G. Morony, transl. G. Goldbloom [The Formation of the Classical Islamic World, Volume 11] (Aldershot: Ashgate Variorum, 2002), pp. 153–167.

grounds, leaving it open whether the cotton found at Quseir al-Qadim was of African or Indian origin. While the trade links with India seem to favour an Indian origin, ancient DNA analysis of early first millennium AD cotton seeds from Qasr Ibrim, in Egyptian Nubia, has identified those seeds as of African origin,²⁵ thus leaving both possibilities open for the Quseir seeds.

The five introduced crops from Africa, or six when including cotton, are watermelon (*Citrullus lanatus*), sorghum (*Sorghum bicolor*, race bicolor and race durra), pearl millet (*Pennisetum glaucum*) and cowpea or black-eyed bean (*Vigna unguiculata*). Watermelon is a case apart. It is an African species, known in Egypt from ca. 1500 BC, but a new variety or cultivar was introduced by the eleventh/twelfth century.²⁶ With the exception of sorghum race durra and cowpea, these crops all have sparse records from Roman Egypt, though not from Quseir al-Qadim or Berenike (table 11.2). The extent of their cultivation in Roman Egypt is somewhat uncertain. The sparse records and rare textual mentions suggest that they were more common in southern than in northern Egypt, and that their cultivation may not have become a significant component of the agricultural landscape until later (see below).

These results highlight that there was a marked increase in the range of imported and introduced food plants from the Roman to the Islamic period. Here this evidence is reviewed under the headings of trade, agriculture and food globalisation.

11.4 Trade—Spices

The trade in spices—and other luxury goods from the East—was the rationale for the ports, so it may seem surprising that only three imports were regularly recovered from the Roman deposits at Quseir al-Qadim, and that only one of them was a spice in the culinary sense (black pepper). Spices were expensive, however, and a consideration of their availability and uses helps us understand why so few are found in the Roman, compared with the Islamic port. Firstly, the imports at Roman Quseir al-Qadim were found largely associated with areas and buildings related to trade, that is, the area where the commodities

25 S. A. Palmer, A. J. Clapham, P. Rose, F. O. Freitas, B. D. Owen, D. Beresford-Jones, J. D. Moore, J. L. Kitchen and R. G. Allaby, "Archaeogenomic evidence of punctuated genome evolution in *Gossypium*", *Molecular Biology and Evolution* 29, 8 (2012): 2031–2038. doi:10.1093/molbev/msso70.

26 Van der Veen, "Consumption" (2011), 106–108; Watson, A. M. *Agricultural Innovation in the Early Islamic World* (Cambridge: Cambridge University Press, 1983), p. 59.

were off-loaded from the ships onto the animal caravan, rather than with domestic and residential areas.²⁷ This indicates that they represent spillage during transshipment, rather than local consumption. A similar picture was observed at Berenike.²⁸ The fact that the same restricted range of imports was found at Roman Berenike, where excavations and botanical sampling were on a larger scale than at Quseir al-Qadim, suggests that the evidence from Quseir al-Qadim is robust. While the ancient texts mention the trade in spices such as pepper, cinnamon, ginger and cardamom, what we see at the port is evidence for the volumes shipped. The larger the quantities of a particular spice transhipped at the port, the more likely the chance of spillage and thus the chance of some remains being lost and entering the archaeological record. In contrast, the more precious and expensive the commodity and the smaller the quantities traded, the more effort would have been exerted to avoid accidental loss. Thus, the archaeobotanical data suggest that black pepper was traded in much larger quantities than any of the other spices. Historical evidence confirms this; it was the most important spice in terms of volume shipped in both Roman and medieval times, and it preserves that position even today.²⁹ Thus, what the archaeobotanical data give is an indication of the *scale* of the trade, rather than a reflection of all goods traded through the port.

The marked increase in the range of spices found in the Islamic deposits at Quseir al-Qadim highlights that by this period more spices were traded in quantity and that access was more widespread. While black pepper is still the most frequently occurring spice, ginger, cardamom, turmeric, fagara, two types of myrobalan, as well as betel nut now feature too. This increase in range (and quantity)³⁰ and a change in the contexts in which the spices were recovered at the port, both point to changes in the trade from the Roman to the Islamic period. In the Islamic levels we find many of the spices in domestic contexts, associated with other food waste, suggesting that by this period they are not just traded through the port, but also consumed in the port. This is the case for pepper, as well as for ginger, turmeric, cardamom, fagara, betel nut and the

27 Van der Veen, "Consumption" (2011), chapter 4.5.

28 Cappers, "Roman Food Prints" (2006), pp. 111–119.

29 L. Casson, L. *The Periplus Maris Erythraei: Text with Introduction, Translation, and Commentary* (Princeton: Princeton University Press, 1989); J. I. Miller, *The Spice Trade of the Roman Empire: 29BC to AD641* (Oxford: Clarendon Press, 1969); P. Spufford, *Power and Profit: The Merchant in Medieval Europe* (London: Thames, 2006); E. H. Warmington, *The Commerce between the Roman Empire and India* (Cambridge: Cambridge University Press, 1928) [1995 reprint, New Delhi: Munshiram Manoharlal Publishers].

30 See Van der Veen, "Consumption" (2011).

myrobalan. They must thus have become sufficiently widely available to be within reach of some of those working and residing in the port (see also below).

11.5 Agriculture—Introduced Crops

One of the more significant results coming out of Quseir al-Qadim is the evidence for the range of introduced crops from South and South-East Asia and Africa. For five of these crops (banana, taro, aubergine, lime and sugarcane) these finds represent the only or earliest archaeological record of these species outside their area of origin. Several are found in the form of seeds (aubergine, cotton, citron, lime, rice, sorghum, millet, cowpea), but others as stem fragments (sugarcane), calyxes (aubergine), or skin fragments (banana, lime, taro, citron), with the latter two (calyxes and skin fragments) bearing witness to the exceptional preservation conditions at the site (Figure 11.2). An extensive programme of radiocarbon dating was implemented to establish the earliest occurrences of all these crops (and the spices) and to ensure their authenticity. All C14 dates confirm the archaeological evidence, that is, citron and watermelon are already present in Roman times, but all other introduced crops recovered at Quseir al-Qadim date to the Islamic period, with most of them present from the eleventh century onwards.³¹

All of these plants must originally have been imported into Egypt, as none are native to the region, but the exact timing of their introduction into Egypt, as well as North Africa and the Middle East more widely, has been the topic of much discussion. Watson³² was the first to carry out a full review of the evidence. He concluded that the early centuries of Islam (AD 700–1000) were a key period of innovation, seeing the diffusion of new crops and the introduction of new farming techniques. He argued that while several of these crops, e.g. sorghum, cotton and rice, were grown in the West prior to the Islamic period, their cultivation was initially limited, and that their application over a wider area took place during the early Islamic period, in combination with a series of agricultural changes. Since then much new archaeobotanical evidence has come to light, including further evidence that some of these crops were known in the Middle East and parts of the Mediterranean prior to the Islamic period.³³

³¹ See Van der Veen and Hamilton, “Chronology” (2011) for full details.

³² A. M. Watson, *Agricultural Innovation in the Early Islamic World* (Cambridge: Cambridge University Press, 1983).

³³ For example, C. Bouchaud, M. Tengberg, and P. Dal Prà, “Cotton cultivation and textile production in the Arabian Peninsula during antiquity; the evidence from Madā’in Šālīh

It is clear that these crops did not arrive together as a “package”; their dispersal histories are long and complex, and different for each crop, something that Watson³⁴ already acknowledged and Decker³⁵ also demonstrated. Key in this debate is a definition of what is meant by “introduction”. Here, like Watson, we use the term to mean that a crop has become widely adopted and integrated into the agricultural system of the new region. Thus, we prefer to distinguish between *invention*, that is, the first manifestation of new ideas, new practices or new crops, and *innovation*, the successful application of that new idea, practice or crop, and its widespread adoption, i.e. the point in time when the adoption has reached critical mass.³⁶ On current evidence cotton and citron are definitely pre-Islamic introductions in our definition of the term, while sorghum and pearl millet are also early, but on present evidence largely restricted to southern parts of the region. For rice and lemon/lime the data are not entirely conclusive, while sugarcane, banana, taro, aubergine, and cowpea currently look to be Islamic period introductions.³⁷ Additionally, the evidence does suggest that, on balance, the African crops arrived earlier than their Asian counterparts.

The botanical remains from both Quseir al-Qadim and Berenike are significant in this context. At both sites the preservation conditions were excellent, as witnessed by the many vegetative parts of food plants recovered (Figures 11.1 and 11.2), but only three introduced crops—citron, rice and sorghum—were found in Roman, including late Roman, deposits. Of these, rice is thought to represent an import, sorghum is very rare until the Late Roman period and only found at Berenike, and citron is only recovered from Quseir al-Qadim. Considering the rich variety of foodstuffs found at both these Roman sites, the absence of these introduced crops suggests that their consumption was

(Saudi Arabia) and Qal'at al-Bahrain (Bahrain)”, *Vegetation History and Archaeobotany* 20 (2011): 405–417, DOI 10.1007/s00334-011-0296-0; E. B. Brite and M. Marston, “Environmental change, agricultural innovation, and the spread of cotton agriculture in the old world”, *Journal of Anthropological Archaeology* 32 (2013): 39–53; Decker, M. “Plants and progress: rethinking the Islamic revolution”, *Journal of World History* 20, 2 (2009): 187–206, DOI: 10.1353/jwh.0.0058; C. Pagnoux, A. Celant, S. Coubray, G. Fiorentino and V. Zech-Matterne, “The introduction of Citrus to Italy, with reference to the identification problems of seed remains”, *Vegetation History and Archaeobotany* 22, 5 (2013): 421–438, DOI 10.1007/s00334-012-0389-4; Van der Veen, “Consumption” (2011), table 3.7.

34 Watson, “Agricultural Innovation” (1983).

35 Decker, “Plants and progress” (2009).

36 M. Van der Veen, “Agricultural innovation: invention and adoption or change and adaptation?”, *World Archaeology* 42, 1 (2010): 1–12. DOI: 10.1080/00438240903429649.

37 See Van der Veen, “Consumption” (2011), chapter 3, for a fuller discussion.

not widespread in Roman Egypt. There is, in fact, remarkably little textual evidence for these crops too. Considering the vast archive of documents concerned with the agricultural economy of Roman Egypt, the tropical and subtropical crops are only sporadically mentioned. Most of the Roman-period texts are concerned with the introduction and management of temperate crops, such as peach, plum, myrtle, an expansion of viticulture, radish, turnip, an improvement in cabbage and garlic, with the construction of canals, reclamation works in the Fayyum, and with the cultivation of cash crops such as sesame, castor-oil, safflower and linseed. They also concern the running of large estates, owned by wealthy and often absentee landlords, and with taxation.³⁸ A few introduced crops do feature in some texts, however (cotton, rice, citron, sorghum and pearl millet), esp. in those from Doush (Kharga Oasis) and Kellis (Dakleh Oasis) dated to the third and fourth centuries AD, but the available data suggest that their production was modest.³⁹ In contrast, most Islamic period texts concerning agriculture discuss the cultivation of these tropical and subtropical crops, suggesting that their cultivation was more common by this time.⁴⁰

The hiatus in occupation at Quseir al-Qadim means that we are not able to use the evidence from this site to pin down the date of introduction for all these

38 See, for example: R. S. Bagnall, *Egypt in Late Antiquity* (Princeton, NJ: Princeton University Press, 1993); R. S. Bagnall (ed.), *The Kellis Agricultural Account Book (P. Kell. IV Gr. 96)* (Oxford: Oxbow Books, Oxbow Monograph 92, 1997); K. Blouin, "Environnement et fisc dans le nome ménésoien à l'époque romaine: réalités et enjeux de la diversification", *Bulletin of the American Society of Papyrologists* 44 (2007): 135–166; A. K. Bowman, *Egypt After the Pharaohs* (Oxford: Oxford University Press, 1990); A. K. Bowman, and E. Rogan (eds.), *Agriculture in Egypt: From Pharaonic to Modern Times*. (Oxford: The British Academy by Oxford University Press, 1999); D. P. Kehoe, *Management and Investment on Estates in Roman Egypt during the Early Empire* (Bonn: Rudolf Habelt, 1992); J. Rowlandson, *Landowners and Tenants in Roman Egypt: The Social Relations of Agriculture in the Oxyrhynchite Nome* (Oxford: Clarendon Press, 1996); Schnebel, M. *Die Landwirtschaft im Hellenistischen Ägypten. Band I: Der Betrieb des Landwirtschaft*. (München: Münchener Beiträge zur Papyrusforschung und Antiken Rechtsgeschichte 7, 1925).

39 Decker, "Plants and progress" (2009).

40 E. Ashtor, *A Social and Economic History of the Near East in the Middle Ages* (London: Collins, 1976); J. M. Carabaza, E. García, E. Hernández and A. Jiménez, *Árboles y Arbustos En Al-Andalus* (Madrid: Consejo Superior de Investigaciones Científicas, 2004); J. Keenan, "Fayyum agriculture at the end of the Ayyubid Era: Nabulsi's Survey", in Bowman and Rogan (eds.) 1999, pp. 287–299; D. Müller-Wodarg, "Die Landwirtschaft Ägyptens in der frühen 'Abbasidenzeit 750–969 n. Chr. (132–358 d. H): 3. Nutzpflanzen und Bäume", *Der Islam* 32 (1957): 14–78; Watson, "Agricultural Innovation" (1983).

crops. Instead, we can say that their introduction into Egypt must pre-date the eleventh century, because various lines of evidence point to the fact that the remains found at Islamic Quseir al-Qadim represent food items consumed at the port and obtained from the Nile Valley, rather than foodstuffs traded from the East. Firstly, in the port itself they are all found in domestic contexts, rather than exclusively in areas associated with the trade. In fact, banana, taro and sugarcane are only found in domestic contexts. Secondly, in several instances the remains concern food waste, discarded while the foodstuffs were being prepared for consumption (aubergine calyxes, taro skin fragments) or during consumption (banana skins), rather than items lost during transshipment from ship to animal caravan.

Thirdly, these foods barely feature in the surviving texts related to the Indian Ocean trade. For example, the Arabic documents from Quseir are mostly derived from the personal archive of Sheikh Abu Mufarrij, who was the owner of a prosperous transit warehouse at the port during the first half of the thirteenth century.⁴¹ Much of his business concerned grain, and the provisioning of the pilgrimage to Mecca, and the archive refers to these activities and to the supply of those living in the port. None of the introduced crops are mentioned in these texts, with the exception of lemon; the latter in shopping lists for local consumption, together with chickpeas, onions, carrots, butter, milk and chicken eggs, thus implying a foodstuff brought to the port from the Nile valley, rather than acquired through long-distance trade.⁴² The other large archive of documents is that recovered at the Cairo *geniza*, the storeroom of the Ben Ezra synagogue in Fustat, old Cairo.⁴³ Some 400 of the 200,000 documents in this archive relate to the Jewish mercantile community of the eleventh and twelfth centuries and their involvement in the India trade. But while these documents list many of the spices and other products brought back from India, they do not mention any of the introduced crops, with two exceptions: they do refer to the import of pickled lemons, and to rice, though in the latter case only in the context of foods to be taken (for consumption) on the journey back from India.⁴⁴ Again, this suggests that most if not all the introduced crops were already established in Egypt prior to the eleventh century.

41 Guo, "Commerce" (2004).

42 Guo, "Commerce" (2004), 39.

43 S. D. Goitein and M. A. Friedman, *India Traders of the Middle Ages: Documents from the Cairo Geniza. 'India Book'* (Leiden: Brill, 2008).

44 Goitein and Friedman, "India Book" (2008), 638.

Finally, there is plenty of historical evidence from Egypt that refers to the local cultivation of many of these crops by, at least, the tenth century. For example, al-Mas'ūdī (tenth century) refers to the Egyptians as the richest of all men in sugar and al-Idrīsī (twelfth century) describes the area around Cairo as one well-watered field of sugar cane. Rice is mentioned as growing in the oases and the Fayyum, sorghum and pearl millet in the very south, banana as cultivated in Egypt in the ninth century, while al-Maqrīzī (AD 1364–1442) mentions bananas as one of the most common fruits in Cairo in Mamluk times.⁴⁵ All the evidence combined suggests that the introduced crops recovered at Islamic Quseir al-Qadim represent not commodities brought to the port through trade, but, instead, food plants grown in Egypt, brought from the Nile valley to the port for local consumption.

Regardless of the actual date of their introduction, their significance comes from the fact that their introduction could only be achieved if accompanied by significant changes in agricultural practice. This is because they are all tropical or sub-tropical crops, unlike the temperate crops grown in the region before. The perennials among them (the citrus fruits, cotton, banana, sugar cane and taro) can only be grown in warmer regions, while the annuals (rice, sorghum, pearl millet, and aubergine) can be grown in a wider region provided they are grown in summer.⁴⁶ Both are usually referred to as “summer crops” or “warm-weather” plants. They require high temperatures, plenty of sunlight and large amounts of water during the growing season. They tend to be fast growing, have a short life-cycle and are adapted to the monsoon belt.⁴⁷ As a result, their introduction into North Africa and the Middle East was hampered by the lack of rainfall during the summer months in these regions; irrigation would thus be an essential component of their cultivation here, and with it the use of water-lifting devices, such as the water-wheel. Their adoption into the agricultural system thus required major changes in infrastructure, as well as a change to the annual rhythms of the farming year. In Egypt and most of North Africa and the Middle East the bulk of the crops cultivated had been temperate crops,

45 E.g. Canard, “Rice” (2002); Müller-Wodarg, “Landwirtschaft” (1957); Watson, “Agricultural Innovation” (1983).

46 D. Zohary, “The diffusion of South and East Asian and of African crops into the belt of Mediterranean agriculture”, in *Plants for Food and Medicine*, eds. H. D. V. Prendergast, N. L. Etkin, D. R. Harris and P. J. Houghton (London: The Royal Botanic Gardens, Kew, 1998), pp. 123–134.

47 G. Willcox, “Some differences between crops of Near Eastern origin and those from the tropics”, in *South Asian Archaeology 1989*, ed. C. Jarrige [Monographs in World Archaeology 14] (Madison WI: Prehistory Press, 1992: pp. 291–300).

grown during the autumn and winter months, when most of the rain falls. The summer represented the quiet season, during which fruit and vegetables and a few temperate summer crops were grown with the help of, often small-scale, irrigation, but the land otherwise lay fallow. The incorporation of (sub) tropical summer crops into this system meant investing in large-scale and permanent irrigation systems, the digging and maintenance of irrigation canals, the building and maintaining of waterwheels, the sharing of available water, the need for fertiliser (the fields were no longer lying fallow during the summer), but also devoting more time and labour to work the land. The agricultural season now lasted the whole year round, greatly increasing the farmers' workloads, as well as the labour needs of landlords. Thus, the introduction of these tropical and subtropical summer crops resulted, over time, in a radical alteration of the rhythms of the agricultural year and potentially in a doubling of the productive output of the land.⁴⁸

11.6 Food Globalisation

Modern globalisation and the impact of globe-spanning trade and communication on regional communities, economies and cultures has been the focus of much discussion since the 1990s.⁴⁹ In terms of food, the advantages of globalisation are obvious: an extensive range of foods from across the globe is now available at many local markets, removing or at least reducing seasonality in food supply, increasing availability of important nutrients throughout the year, offering greater variety of flavours and textures, as well as greater consumer choice (the latter a rather modern concern). Disadvantages include concerns that food production is more and more controlled by multinationals rather than local farmers and the effects this has on local social cohesion and environment, evidence of growing inequality, and fears that this food homogenisation is threatening cultural integrity.

⁴⁸ See Watson, "Agricultural Innovation" (1983) for a full discussion.

⁴⁹ For example, T. H. Eriksen, *Globalization—The Key Concepts* (Oxford: Berg, 2007); R. J. Foster, "Tracking globalization: commodities and value in motion", in *Handbook of Material Culture*, eds. C. Tilley, W. Keane, S. Küchler, M. Rowlands and P. Spyer (London: Sage, 2008), pp. 285–302; Hebron, L. and Stack, J. F. *Globalization: Debunking the Myths*, 2nd edition. (Boston: Longman, 2011); P. Jackson, "Local consumption cultures in a globalizing world", *Transactions of the Institute of British Geographers* NS 29, 2 (2004): 165–178; K. H. O'Rourke and J. G. Williamson, "When did globalisation begin?", *European Review of Economic History* 6 (2002): 23–50.

There is no agreement over when globalisation started. Many economists view the early nineteenth century as the starting point of globalisation, by regarding the integration of international commodity markets and the convergence of commodity prices as important, if not essential, prerequisites.⁵⁰ Others favour an early-sixteenth century starting date, with the European discovery of America (1492) and Vasco da Gama's discovery of the route around the Cape of Good Hope (1498) viewed as events that determined much of future world history.⁵¹ Historians and archaeologists recognise earlier antecedents, such as the development of farming and associated dispersal of crop plants outside their areas of origin, the Trans-Eurasian Exchange, the presence of long-distance trade between Eurasia and Africa, and the existence of previous world systems.⁵²

This is not the place to enter into a full debate of the definitions of globalisation or its exact starting date. What most would agree on, however, is that globalisation refers to something more than simply the presence of long-distance trade and the diffusion of crops. Important ingredients must also be the presence of societal impact of the trade and technological change. O'Rourke and Williamson⁵³ argue that pre-eighteenth-century long-distance trade between Europe and the Indian Ocean world was largely limited to so-called non-competing goods, with Europe importing luxuries such as spices and silk—and

50 For example, O'Rourke and Williamson, "Globalisation" (2002).

51 For example, J. H. Bentley, "AHR forum—cross-cultural interaction and periodization in world history", *American Historical Review* 101 (1996): 749–770; A. W. J. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT: Praeger, 2003); A. G. Frank, *ReOrient: Global Economy in the Asian Age* (Berkeley: University of California Press, 1998).

52 J. L. Abu-Lughod, *Before European Hegemony: The World System AD 1250–1350* (New York: Oxford University Press, 1989), Bentley, "AHR forum" (1996); N. Boivin, D. Q. Fuller and A. Crowther, A., "Old World globalisation and the Columbian exchange: comparison and contrast", *World Archaeology* 44, 3 (2012): 452–469; K. N. Chaudhuri, *Trade and Civilisation in the Indian Ocean: An Economic History from the Rise of Islam to 1750* (Cambridge: Cambridge University Press, 1985); K. N. Chaudhuri, *Asia before Europe: Economy and Civilisation of the Indian Ocean from the Rise of Islam to 1750* (Cambridge: Cambridge University Press, 1990); A. G. Frank and B. Gills, *The World System: Five Hundred Years or Five Thousand?* (London: Routledge, 1993); Hebron and Stack 2011; M. Jones, H. Hunt, E. Lightfoot, D. Lister and X. Liu, "Food globalisation in prehistory". *World Archaeology* 43, 4 (2011): 665–675; K. F. Kipple, *A Movable Feast. Ten Millennia of Food Globalization* (Cambridge: Cambridge University Press, 2007); A. Sherratt, "The Trans-Eurasian exchange: the prehistory of the Chinese relations with the West", in *Contact and Exchange in the Ancient World*, ed. V. Mair (Honolulu: Hawaii University Press, 2006), pp. 32–53.

53 O'Rourke and Williamson, "Globalisation" (2002).

later also coffee, tea, and sugar—that is, goods that were not available locally, while Asia imported items which were rare in that region (e.g. silver, linen and wool). The high cost of their long-distance transport was compensated for by their relative cheapness in the area of origin and the high prices the goods fetched in the importing markets. These goods are referred to as “non-competing” because their presence was not thought to impact on domestic production, and their presence or absence only affected the living standards of the very rich who could afford these expensive luxuries.⁵⁴ We would argue, however, that the impact of the goods traded to the West prior to the eighteenth century was far greater than O’Rourke and Williamson⁵⁵ acknowledge, especially when their potential impact is viewed in a broader perspective than a strictly economic one.

The plant remains from Quseir al-Qadim clearly highlight how much more complex the trade and its impact was. Firstly, the range of foodstuffs traded was much broader than “just” expensive luxuries, that is, it included crops such as aubergine, banana, sugarcane and taro. Secondly, the trade affected not just the living standards of the very rich, but increasingly also that of ordinary people (those working and living in the port, farmers growing the new crops, consumers in the towns), exactly because many foodstuffs were converted from commodities to introduced crops that could be grown locally. This then affected agricultural production, as the newly introduced crops demanded growing conditions rather different from those of the temperate crops cultivated in the region up to that point.

To start with the impact on agricultural production, the introduction of the summer crops resulted in a significant change of farming practices in large parts of the Middle East, North Africa and southern Spain, including changes in infrastructure, land ownership, labour relations, scale of production and output per unit of land, but also greater dependency on markets and exposure to taxation (the latter two important features of modern globalisation). Regional variation in the availability of sufficient water for irrigation, the essential ingredient in the adoption of these crops, will have led to marked dissimilarities between farmers in the extent to which they were able to participate in the new practices, and social differentiation in who could afford the newly needed investments, meaning that only certain individuals and regions could participate in the new economic prosperity, thus creating new, as well as increasing existing, inequalities.⁵⁶ This impact was not always immediate. As mentioned

54 Ibid., 27.

55 Ibid.

56 Watson, “Agricultural Innovation” (1983); Van der Veen, “Consumption” (2011), 231–3.

above, the new crops did not arrive as a package. Their sometimes slow and unequal uptake hints at the complexities involved in adapting the agricultural system for their large-scale production (and hence the need to distinguish between early but rare occurrences versus more frequent and numerous ones; that is, between invention and innovation, as discussed above).

Another example where the introduction of new crops caused significant changes in production is that of Roman Britain. Here too, the import and trade in exotics, in this case plants such as black pepper, grapes, olives and figs, was accompanied by many that were subsequently incorporated into British farming practice (e.g. domestic apple, plum, cherry, walnut, cabbage, leaf beet). This led to the rise of horticulture in Britain (and north-west Europe more widely) and thus to a significant broadening of the agricultural base, though this development was geographically restricted to areas of the country that saw periods of stability and prosperity under Roman rule. The northern and western parts of Britain, where a heavy military presence may have stifled economic development and where major towns were not able to develop as easily, did not participate in this transformation to the same degree.⁵⁷ Thus, here too, the introduced crops and their potential advantages were not accessible to all.

Diet and foodways also changed, as is evidenced by the plant remains from Quseir al-Qadim. While the hiatus in the occupation between the Roman and Islamic periods means that we currently cannot trace the *process* of change (only material from future excavations of sites dating to the intervening period can), we can trace *what* changed. The diet of those living and working in the Roman port consisted of basic staples such as durum wheat, barley, dates, lentils, onions and garlic, and fruits such as grapes, figs, olives, capers and sebesten (as well as the dates already mentioned), while black mustard, coriander, ammi and fennel were common seasonings. Other characteristic components were walnut, pine nut, hazelnut and sesame, as well as garlic, onion, artichoke and cabbage, and, as demonstrated by the ceramic evidence, wine, olive oil and fish sauce. The diet had a distinctly "Roman Mediterranean" flavour, with the classic Mediterranean triad of cereals, olives and grapes prominently present at the Roman port. There were Egyptian elements too, such as the dates (imported luxuries in Roman Italy), dom palm, ammi and sebesten. By the mid-eleventh century the diet had changed dramatically. In Islamic Kusayr the basic staples

57 M. Van der Veen, "Food as embodied material culture—diversity and change in plant food consumption in Roman Britain", *Journal of Roman Archaeology* 21 (2008): 83–109; M. Van der Veen, A. Livarda and A. Hill, "New Food Plants in Roman Britain: Dispersal and Social Access", *Environmental Archaeology* 13, 1 (2008): 11–36.

were durum wheat, barley, fava beans, chickpeas, dates, onions and garlic. The lentils and lupin or *termis* beans of the Roman port had been replaced by fava beans and chickpeas (Figure 11.3), suggesting that the popularity of these two pulses in Egypt today dates back to at least the eleventh century. There were changes in the fruits too (Figure 11.4): olives, figs and *sebesten* made place for watermelon, cucumber/melon and sumac, while pine nut was replaced by pistachio. Within the seasonings, *ammi* disappeared, caraway started to feature, and coriander and cumin increased in popularity. Remarkably, many of the new spices now became more widely available (pepper, ginger, cardamom, *fagara*), and other eastern foodstuffs too (banana, aubergine, lime, rice, sugarcane, taro). Several of the classic Mediterranean foods (wine, olive oil, figs, pine nuts) became rare, and others, e.g. fish sauce, disappeared.

In many ways we can see the food choices of Quseir al-Qadim's residents as expressions of identity, with those working in the Roman period expressing their identity as being part of the Roman Empire's cultural and economic sphere. Their choice of food was strongly focused on "Roman" foods, that is, on foods widely available in the Mediterranean at that time, combined with foods already common in Egypt prior to that. Eastern spices hardly featured, probably partly because of their expense and partly because these were, with the exception of black pepper, just a minor component of Roman cuisine. Thus, the diet in Roman Myos Hormos was firmly oriented towards the Mediterranean: the port was part of the Roman Empire and culturally looked north and west. In contrast, by the Islamic period the residents in the port had embraced most of the Eastern spices and other Eastern foodstuffs—the latter also now incorporated into Egyptian farming practice—and several Mediterranean foods had been dropped. The residents of the Islamic port had adopted foodways more characteristic of parts of the Middle East; the port had become part of the Islamic world. Thus, the changes we see in the archaeobotanical record are part of the geopolitical realignment of the Red Sea and its ports at that time. Importantly, we should regard these changes in diet, agriculture and trade not as passive outcomes or consequences of these geopolitical transformations, nor foodways as a mere reflection of certain identities, but, instead, as integral parts of making those transformations and identities real. What it is to be part of the Roman or Islamic world is connected to food related practices, that is, to the daily routines of procuring, growing and consuming food. These identities are created and maintained in part through food. In other words, geopolitics does not only concern high level political transformations, it changes the way people live their day-to-day lives; it is through these daily routines that these transformations become real.

While these impacts may not be regarded as evidence of globalisation in the modern, economic definition of the concept—no convergence of commodity prices or integration of international commodity markets—they do concern domestic production and the lifestyles of people other than the very rich. Thus, for Egyptian farmers adopting the cultivation of summer crops, it meant not just investing in new infrastructure; the agricultural year for these farmers now lasted all year round, greatly increasing farmers' workloads. Besides, many of the summer crops responded well to larger, plantation-scale production, which led to different labour relations, and thus societal change. Equally, for British farmers initiating the cultivation of fruit trees, herbs and vegetables, it meant not only a marked diversification of their output, but also an engagement with markets and consumers in the nearby towns and thus new day-to-day realities, in terms of time commitments, material settings, and social relationships.⁵⁸ For some consumers it meant more choice and more ways in which their elite distinction could be expressed, but for others it meant yet more areas of life in which inequalities in access and choice became visible. These types of impacts and effects would not, of course, have been envisaged by those initiating the trade and the translocation of the foodstuffs. The drivers of the trade would have been the desire for objects to display elite distinction, but also motivations such as curiosity, novelty value, appeal of the exotic and the wish to experiment. And it is true that some of these impacts would have been felt only in the longer term, but others, especially those that concerning consumer choice, or lack thereof, would have been fairly immediate. This resonates with recent studies concerning the "materiality" of plants and the impact that plants, and food plants in particular, have on the lives of those who produce them, as well as on those who consume them.⁵⁹

Modern concerns about globalisation have often focused on the perceived threat of homogenization and the loss of local identities, and while the increasing interconnectedness and compression of the world has resulted in growing similarities between discrete societies, there is also considerable evidence that this has sometimes resulted in a vitalisation of local cultural expressions.⁶⁰ Thus,

58 M. Van der Veen, M., "Arable farming, horticulture, and food: expansion, innovation, and diversity in Roman Britain", in *The Oxford Handbook of Roman Britain*, eds. M. Millett, L. Revell and A. Moore (Oxford: Oxford University Press, 2014b on-line). DOI: 10.1093/oxfordhb/9780199697713.013.046.

59 For example, M. Van der Veen, "The materiality of plants: plant/people entanglements", *World Archaeology* 46, 5 (2014a): 799–812. DOI: 10.1080/00438243.2014.953710.

60 Eriksen, "Globalization" (2007), 6.

local identities are expressed more strongly than before, exactly because they are seen to be under threat from globalisation, a process sometimes referred to as glocalisation. Indeed, diversity is a basic aspect of globalisation; globalisation involves the simultaneity of the universal and the particular.⁶¹ The Quseir evidence appears to corroborate this. While the residents of the Roman and Islamic ports were engaged in the Eastern trade and the translocation of many foodstuffs, this did not result in a convergence of their diet with those living on the other side of the Indian Ocean, nor did it result in identical foodways in Roman and Islamic Quseir itself. On the contrary, the selection of commodities varied over time and the selection of foodstuffs chosen as essential in the diet similarly differed. Here we see the global and the local interacting, but doing so differently in time and space. Thus, in both time periods the residents made choices related to local preferences and conditions, to the complexities of international trade, and to geopolitics. Residents in other parts of the Roman and Islamic worlds will have made similar but different choices, in each case integrating global transformations with their own local circumstances.

11.7 Summary and Conclusion

Excavations at the site of Quseir al-Qadim, located on the Red Sea coast of Egypt, have produced an extraordinary rich assemblage of botanical remains of food plants, which has offered new insights into early antecedents of food globalisation and our modern interconnected world. The archaeological site contained evidence for two ports, one Roman (Myos Hormos, first-early third centuries AD) and one Islamic (Kusayr, eleventh to fifteenth centuries AD). Both functioned as transport hubs, facilitating the Eastern trade in spices and other luxuries. This similarity of function, combined with similarity of climate, environment and preservation conditions, enabled a detailed comparison of the spice trade in the two periods, as well as of the diet and foodways of the people living and working in the ports. Marked differences were identified in the nature and scale of the trade, with a wider range of spices traded in volume through the port by the Islamic period. The botanical evidence highlights that it was not only spices that were brought back from the east, but other food plants too, including a group of so-called summer crops, some of which entered the agricultural system in Egypt, North Africa and the Middle

61 R. Robertson, *Globalization: Social Theory and Global Culture* (London: Sage, 1992), pp. 172–174.

East during the Roman period, while many others became incorporated during the early Islamic period. By the eleventh century many of the spices and introduced crops had become part of the diet of those working in the port. The impact of these plants was felt in agricultural production and in foodways. The agricultural system changed over time from one focused primarily on temperate crops grown during the winter, to one with temperate, sub-tropical and tropical crops grown across the seasons, aided by irrigation, extended water-lifting devices and new land tenure practices, though with marked regional variation in uptake. The impact on diet and foodways is clearly visible in the food remains discarded by the people living and working in the ports.

The results have highlighted the potential of archaeological research to further our understanding of the history of food globalisation, and of the role of the Red Sea ports and maritime trade in this history. We hope that future excavations at other Red Sea ports will soon start to fill the many gaps in our knowledge and offer detail into the processes of change. What is clear from the results so far is that rather than globalisation causing a homogenization of diet and foodways, it resulted in culturally specific choices, including different combinations of the global and the local. The geopolitical realignment of the Red Sea region was not just a political reality; it was a reality in everyday life. The residents of the Roman port expressed their identity as one of belonging to the Roman Empire, and those of the Islamic port as one of belonging to the Islamic world, thus highlighting the importance of food in the dynamics of identity and geopolitics.

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