

PROCEEDINGS
OF THE
SEMINAR FOR ARABIAN STUDIES

VOLUME 45
2015

Papers from the forty-eighth meeting of the
Seminar for Arabian Studies
held at the British Museum, London,
25–27 July 2014

SEMINAR FOR ARABIAN STUDIES

ARCHAEOPRESS
OXFORD

Orders for copies of this volume of the *Proceedings* and all back numbers should be sent to
Archaeopress Publishing Ltd, Gordon House, 276 Banbury Road, Oxford OX2 7ED, UK.

Tel +44-(0)1865-311914 Fax +44(0)1865-512231

e-mail info@archaeopress.com

http://www.archaeopress.com

For the availability of back issues see The British Foundation for the Study of Arabia's website:

http://www.thebfsa.org/content/seminar-proceedings

Seminar for Arabian Studies

c/o the Department of the Middle East, The British Museum

London, WC1B 3DG, United Kingdom

e-mail seminar.arab@durham.ac.uk

The British Foundation for the Study of Arabia: www.thebfsa.org

The Steering Committee of the Seminar for Arabian Studies is currently made up of sixteen academic members. The Editorial Committee of the *Proceedings of the Seminar for Arabian Studies* includes seven additional members as follows:

STEERING COMMITTEE

Dr Derek Kennet (Chairman)

Dr Robert Wilson (Treasurer)

Prof. Robert G. Hoyland

Ms Sarah Morriss (Secretary)

Dr Mark Beech

Dr Rob Carter

Dr Nadia Durrani

Dr Orhan Elmaz (editor of PSAS)

Dr Julian Jansen van Rensburg

Mr Michael C.A. Macdonald

Dr Harry Munt

Dr Venetia Porter

Dr St John Simpson

Dr Janet C.M. Starkey

Dr Lucy Wadson

Prof. Janet C.E. Watson

EDITORIAL COMMITTEE: ADDITIONAL MEMBERS

Prof. Alessandra Avanzini

Prof. Soumyen Bandyopadhyay

Dr Ricardo Eichmann

Prof. Clive Holes

Prof. Khalil Al-Muaikel

Prof. Daniel T. Potts

Prof. Christian Robin

Opinions expressed in papers published in the *Proceedings* are those of the authors and are not necessarily shared by the Editorial Committee.

The *Proceedings* is produced in the Times Semitic New font, which was designed by Paul Bibire for the Seminar for Arabian Studies.

© 2015 Archaeopress Publishing, Oxford, UK.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of the publisher.

ISSN 0308-8421

ISBN 978-1-78491-145-4

Contents

Editors' Foreword	v
<i>In memoriam</i> Nigel Groom (1924–2014)	vii
<i>In memoriam</i> Professor Tony Wilkinson (1948–2014)	xi
Alessio Agostini, <i>The excavation of the temple of ʿAthtar dhu-Qabḍ in Barāqish. Stratigraphic data and historical reconstruction</i>	1
Eleonora Bavutti, Federico Borgi, Elena Maini & Jonathan Mark Kenoyer, <i>Shell fish-hook production at Ras al-Hadd HD-5, Sultanate of Oman (fourth millennium BC): preliminary archaeological and experimental studies (poster)</i>	15
Stéphanie Bonilauri, Tara Beuzen-Waller, Jessica Giraud, Marion Lemée, Guillaume Gernez & Eric Fouache, <i>Occupation during the Lower and Middle/Late Palaeolithic period in the Sufrat Valley (Adam region, Sultanate of Oman)</i>	21
John P. Cooper, Dionisius A. Agius, Tom Collie & Faisal al-Naimi, <i>Boat and ship engravings at al-Zubārah, Qatar: the dāw exposed?</i>	35
William M. Deadman, Derek Kennet & Khamis al-Aufi, <i>Hafit tombs and the development of Early Bronze Age social hierarchy in al-Batinah, Oman (poster)</i>	49
Michele Degli Esposti & Anne Benoist, <i>More on Masafi ancestors: the Late Bronze Age site of Masafi-5</i>	57
Liam Delaney, Richard T.H. Cuttler, Faisal al-Naimi, Othmane Bouhali, Ali Sheharyar, Yasser al-Hamidi & Emma Tetlow, <i>Re-presenting Qatari history: 3D digitizing of human remains of the Neolithic Age from Wadi Debayan (poster)</i>	75
Stephanie Döpfer, <i>The reuse of tombs in the necropolis of Bat, Sultanate of Oman</i>	83
Bleda S Düring & Eric Olijdam, <i>Revisiting the Ṣuhār hinterlands: the Wādī al-Jīzī Archaeological Project</i>	93
Guillaume Gernez & Jessica Giraud, <i>Protohistoric graveyards in Adam (Oman). Preliminary report on the 2013 and 2014 seasons of the French Archaeological Mission to Adam</i>	107
Martin S. Goffriller, Ma Hongjiao, Soumyen Bandyopadhyay & Julian Henderson, <i>Chinese porcelains and the decorations of Omani mihrabs</i>	123
María del Carmen Hidalgo-Chacón Díez, <i>The distribution of the Dadanitic inscriptions according to their content and palaeographical features</i>	139
Ahmed Hilal, Derek Kennet & Liz Humble, <i>Towards a heritage management strategy for Ras al-Khaimah (UAE)</i> ...	149
Áurea Izquierdo Zamora, Richard T.H. Cuttler & Faisal A. al-Naimi, <i>Prehistoric and pre-Islamic burial archaeology in Qatar: new results and perspectives</i>	159
Sterenn Le Maguer, <i>The incense trade during the Islamic period</i>	175

Stephen McPhillips, Sandra Rosendahl & Victoria Morgan, <i>Abbasid rural settlement in northern Qatar: seasonal tribal exploitation of an arid environment?</i>	185
Vitaly Naumkin & Leonid Kogan <i>Dual principles and binary oppositions in Soqotri social and oral traditions</i>	199
Eric Olijdam, <i>Archival practices in Early Dilmun Bahrain as indicated by glyptic evidence from domestic and institutional contexts (poster)</i>	205
Robyn Pelling, Richard T.H. Cuttler, Faisal A. al-Naimi, Antonio O. Reis & Liam Delaney, <i>A re-examination of the petroglyphs of Qatar</i>	217
Timothy Power, Nasser al-Jahwari, Peter Sheehan & Kristian Strutt, <i>First preliminary report on the Buraimi Oasis Landscape Archaeology Project</i>	233
Anjana Reddy, <i>Sourcing Indian ceramics in Arabia: actual imports and local imitations</i>	253
Claire Reeler & Nabil Āl Shaikh, <i>A discussion of Neolithic settlement patterns in Saudi Arabia and Bahrain during the Holocene Pluvial Period</i>	273
Marielle Risse, <i>Generosity, gift giving, and gift avoiding in southern Oman</i>	289
Jérôme Rohmer & Guillaume Charloux, <i>From Lihyān to the Nabataeans: dating the end of the Iron Age in north-west Arabia</i>	297
Abdul Rahman al-Salimi & Eric Staples, <i>Reflections of a Muslim-Portuguese maritime world in a sixteenth-century Portuguese source</i>	321
Julie E. Scott-Jackson, Jeffrey I. Rose, William Scott-Jackson & Faisal al-Naimi, <i>Found: the Palaeolithic of Qatar (poster)</i>	329
Peter Sheehan, Timothy Power, Omar Al Kaabi, Mohamed Khalifa, Mohamed al-Dhaheri, Bakheeta al-Mansoori, Leqa al-Zaabi, Myriam al-Dhaheri & Rifaa al-Mansoori, <i>Rediscovering a ‘lost’ village of al-^cAyn: archaeology and communal memory in the oasis (poster)</i>	337
Peter Spencer, Faisal al-Naimi, Richard T.H. Cuttler & Talfan Davies, <i>Between the desert and the sea: the prehistoric landscape of north-western Qatar</i>	347
Rachael Sycamore, <i>Social structure and everyday life at the Early Dilmun settlement of Saar, Bahrain (poster)</i>	363
Walid al-Tikriti, Mohamed al-Neyadi, Diaeddin Tawalbeh, Abdul Rahman al-Nuaimi, Abdullah al-Kaabi & Waleed Oma, <i>Filling a blank: new excavations at an early Islamic site at Oud Al Toba/Muataredh in al-^cAyn, UAE</i>	371
Francelin Tourtet & Friedrich Weigel, <i>Taymā’ in the Nabataean kingdom and in Provincia Arabia</i>	385
T. Van de Velde, <i>Digging into the ^cUbaid period bitumen from Dosariyah</i>	405
Julian Jansen van Rensburg & Peter De Geest, <i>Rock art from Dahaisi cave, Socotra, Yemen: a preliminary report</i>	417
Titles of papers read at the Seminar for Arabian Studies held at the British Museum, London, on 25–27 July 2014	431

Sourcing Indian ceramics in Arabia: actual imports and local imitations

ANJANA REDDY

Summary

Excavations in south and south-east Arabia are progressively revealing the participation of the region in the network of international trade and exchange across the Indian Ocean in the late pre-Islamic period (*c.* third century BC–*c.* fourth century AD). The position of the Oman peninsula within this Indian Ocean network is highlighted in part by the Indian pottery repertoire at sites like Mleiha, Ed-Dur, Suhar, Khor Rori, and Qana. This paper examines the evidence from specific Indian vessel forms and fabric based on archaeological data, visual (microscopic) examination, and results from petrographic analysis of pottery samples. The main objective of this paper is to identify distinguishing features between ‘actual imports’ and ‘local imitations’ of Indian ceramics in Arabia based on data from morphological and fabric analysis. This includes first, a discussion on imported wares in Arabia relating to source or production areas in India. Second, evidence is presented for ceramics most likely produced in Arabia by adopting similar techniques as attested in the Indian subcontinent, but using local clays. Alternatively, imports or pottery styles from Egypt or Arabia that were introduced into the subcontinent are discussed, suggesting a hypothetical transfer of technology linked to the movement of people between India and Arabia.

Keywords: Indian pottery, imitation wares, south-east Arabia, South Arabia, late pre-Islamic period

Introduction

Pottery provides tangible archaeological evidence for the study of trade and contact in the Indian Ocean world. A large amount of imported ceramics, including Indian pottery, has been found during the excavations of several important Indian Ocean trade sites in the Red Sea Region, East Africa, Arabia, and India in the late pre-Islamic period (*c.* third century BC–*c.* fourth century AD), which have been the subject of documentation and analysis (Begley & Tomber 1999; Tomber 2000*a*; 2000*b*; 2002; Tomber, Cartwright & Gupta 2011; Rutten 2006; Haerinck 2001; 2003; De Paepe et al. 2003; Mouton 2008; Mouton & Cuny 2012; Mouton et al. 2012; Kennet 2004; Reddy 2014; Reddy, Attaelmanan & Mouton 2012; Sedov & Benvenuti 2002; Avanzini 2008; Pavan 2011; Pavan & Schenk 2012; Kervran 1996; 2004; Davide & Petriaggi 1998; Davide, Petriaggi & Williams 2004; Salles & Sedov 2010). The issue of Indian pottery is complex and problematic, beginning with its definition. The term ‘Indian pottery’ is used for materials of great diversification in fabric and form, and is widespread in the sub-continent as well as in different sites in the Indian Ocean world. Less attention had been reserved, therefore, for a comprehensive study of Indian ceramic evidence — Indian pottery served as containers for food and subsistence items, as necessary ballast for seaworthy

ships, and sometimes as a trade item in its own right or as a personal possession or gift (Tomber 2008: 38). Indian vessels have also been shown to provide evidence for the distribution of prevailing styles, as well as imitation of these pottery shapes outside their region of origin.

This paper examines the evidence of specific Indian vessel forms and fabric in Arabia based on archaeological data and visual examination. This is specifically with reference to distinguishing ceramics that are actual imports related to source or production centres from India from those that are local Arabian imitations of Indian pottery. This would help to identify manufacturing centres outside India that employ the same pottery techniques as attested in the subcontinent, but using locally available clay.

Selection of sites and recording protocol

The selection of sites for this study is based on results of the distribution of Indian ceramic data from excavations and surveys. From the Arabian Gulf three sites were selected: Mleiha (Malīḥah, Emirate of Sharjah) and Ed-Dur (al-Dawr, Emirate of Umm al-Quwayn) in the UAE, and Suhar (Ṣuḥār) in the Sultanate of Oman. Moving on to South Arabia the selection of sites comprises Khor Rori (Khawr Rawrī) in the Dhofar (Zufār) region of Oman and Qana (Qanā, present-day Bīr [orig. Bīʿr] ʿAlī) in Yemen

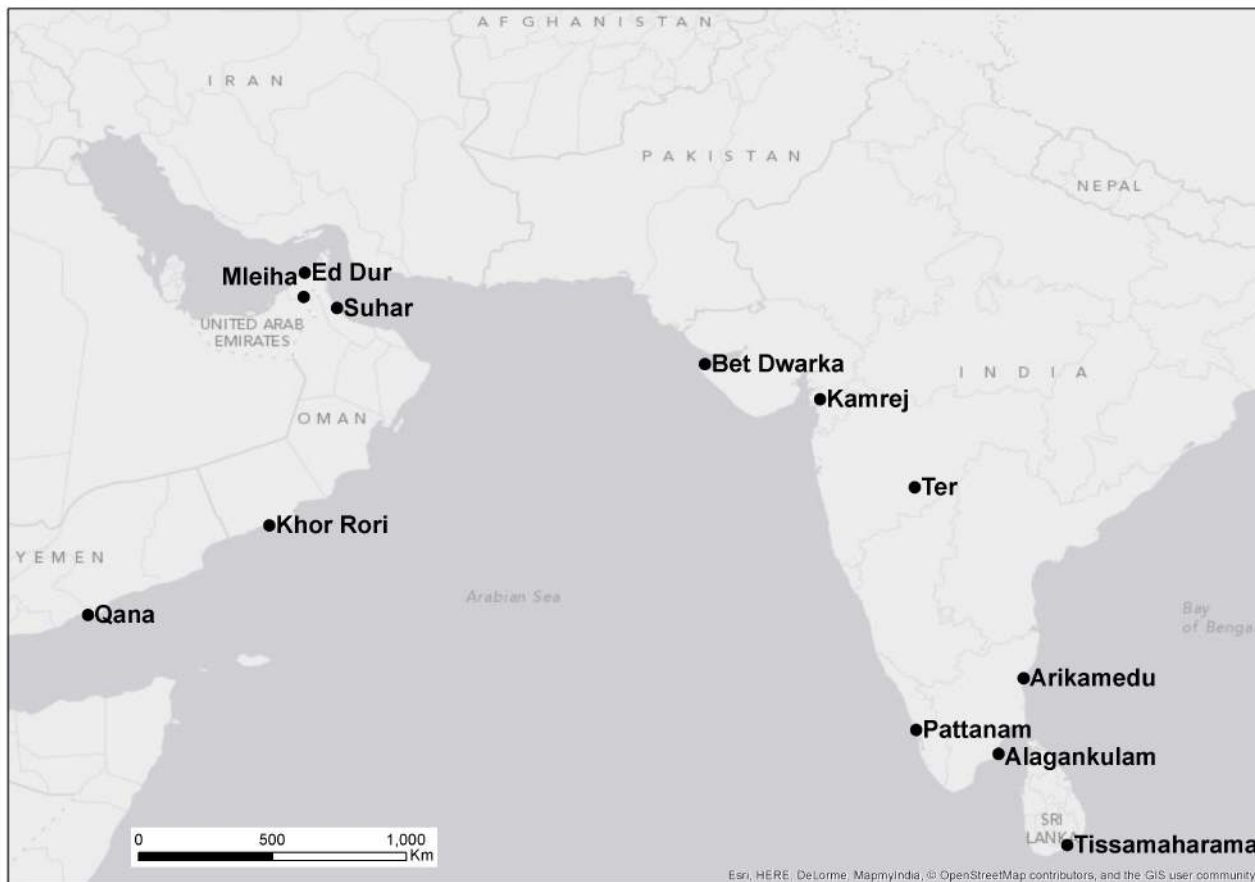


FIGURE 1. *The locations of archaeological sites in Arabia and India in the late pre-Islamic period mentioned in this study (Esri ArcGIS 10.2.2/Basemap ArcGIS Online_World Light Gray Canvas).*

(Fig. 1), from where notable quantities of Indian pottery have been retrieved. India, on the other hand, presents the greatest challenge because of its geographical diversity and the absence of a proper chronological sequence of early historic sites. The present study focuses mainly on the comparative pottery from the regions of western India, including Gujarat and the coastal area of Maharashtra, the Deccan, and ‘Tamilakam’, comprising sites in southern India and Sri Lanka.

The recording protocol for Indian forms varies slightly, based on the individual sites in Arabia. On the whole the information that was recorded includes sherd number, context, description, rim diameter, etc. Additional recording procedures included pottery drawing, photographic documentation, and cross-referencing with ceramics from Indian sites. The second step in the

recording process was fabric analysis and particular attention was paid to this. This involved the study of the core and surface of several samples using the Dino-Lite microscope with a magnification range of 10–200X. Images were recorded and inclusions were measured in mm or microns. Based on the fabric variations, sub-groups or sub-classes of fabric were created. In terms of additional evidence to prove its import or imitation status, results from petrographic analysis were used.

Based on the morphological and fabric study, three vessel forms — cooking pots, oil lamps, and rouletted ware — and two fabric types — fine red ware and shell-tempered ware — were selected for this study. A summary of data relating to the distribution, dating, fabric, and petrographic study of the above select Indian wares from Arabian contexts has been tabulated in Figures 2 and 3.

	Indian cooking pots				Lamp lid/oil lamp			Routletted ware	
	Mleiha	Ed-Dur	Khor Rori	Qana	Suhar	Mleiha	Khor Rori		Qana
Distribution	Building H, Areas CW & DA	Areas BS, BO and BQ – Evidence of kitchen and dining areas	Area A, Trench A13, Area B and Area F (BF3 and Square A20, street A29 & A48	Lower (BA-I) context – Area VI room 1a and 5a 'Middle' (BA-II) context – Area VI (rooms 1, 10, and 12)	Various sectors: ED5, Suhar Moat I & IV, Suhar Town 1986, above well 148, oven 309, Squares BCD, and PQR etc.	H, CW, DA	e.g. Areas A and F (Sedov 2008a; 2008b)	'Middle' (BA-II) period (Sedov 1992; fig. 3/6-7; 1996; fig. 6/11-12)	Khor Rori Most ancient layers at Khor Rori c. 3rd-1st cent. BC
Dating	PIR, D phase 2nd-mid-3rd cent. AD	c. 1st-2nd cent. AD	3rd-1st cent. BC & 4th-5th cent. AD	BA-I period – 1st cent. BC/1st cent. AD; BA-II period – 2nd & 5th cent. AD	Levels I to VIII	PIR, D phase	2nd/3rd phases (1st cent. AD & 3rd & late 4th-early 5th cent. AD	BA-II period	c. 1st century BC
Fabric	Indian micaceous ware (MICA) Indian sandy ware (SANDY) shell-tempered ware (SHELL)	fine red slipped (FRS) coarse red slipped (CRS) coarse vegetal reddish-black (CVRB) coarse brown slipped (CBS)	E.g. coarse red slipped (CRW), black burnished wares (BBW), rice-tempered, shell-tempered, fine red, etc.	e.g. 1. dark red medium fabric with red slip & burnishing (Salles & Sedov 2010: 215) 2. Medium compact red paste, dark red slip & burnishings (2010: 267), etc.	Coarse wares (red, blackish, pinkish) and fine wares (fine red, pink and orange-red)	SANDY	Coarse red ware (mica, straw, grit-tempered) with slip; reddish brown to brownish medium compact with white & dark inclusions, mica, etc.	e.g. fairly coarse fabric of Nubian origin (Inv. 124/4; 5YR 3/2) Daviddle et al. 2004: 94	True rouletted ware (RW) – fine grey paste Imitation RW – change in colour and high temper content
Petrographic analysis	Indian coarse ware samples from Mleiha using XRF (Reddy et al. 2012)	N/A	Rice-tempered wares from Khor Rori (Lippi et al. 2011) using SEM & thin-section	Petrographic analysis on samples of Indian coarse wares including cooking vessels (Inv. 111 & Inv. 3.8) (Daviddle et al. 2004: 97 figs 8-9)	N/A	N/A	N/A	Petrographic analysis of oil lamp sample from Qana (Inv. 124/4) – Nubian origin (Daviddle et al. 2004: 94, fig. 7)	XRD analysis (Gogate 1997; 2001) – origin in Ganges delta (Magee 2010) – Group A: south-eastern India; Group B: Sri Lanka

FIGURE 2. A summary of select Indian pottery-form data from south and south-eastern Arabia.

	Fine red ware				Shell-tempered ware	
	Ed-Dur	Khor Rori	Qana	Suhar	Mielha	Khor Rori
Distribution & Dating	c. first centuries AD	1st–2nd centuries AD (Sedov & Benvenuti 2002: 187)	Lower (BA-I) & Middle (BA-II) periods	Periods III–IV dating from the 4th/5th–5th/7th centuries AD (Mouton 1992: 181)	2nd–mid-3rd century AD (PIR.D level)	Sedov & Benvenuti 2002: 189; pl. 15 nos. 4–6)
Fabric	Fine red slipped (FRS), fine reddish brown & grey slipped (FRBG)	e.g. Red to reddish-brown fine compact paste to a sandy/silty fabric	E.g. Red paste with dark and white inclusions (Salles & Sedov 2010: 199)	E.g. Fine red, coarse pinkish, very fine orange fabric etc. (Kervran 2004: 280)	SHELL Fabric 3(A) & 3(B)	Local buff wares with crushed shell & grit temper
Petrographic analysis	(Limitation RPW or fine red slipped wares) subject to thin-section petrography, chemical analysis, and study of plant phytoliths (De Paepe et al. 2003: 215–216)	N/A	N/A	N/A	N/A	Samples of local pottery from Khor Rori analysed through X-ray diffractometer and the optical polarization microscope (Pallecchi & Pavan 2011: figs. 7, 8)
Morphology (forms)	FRS – V-shaped bowls, carinated dishes, globular cooking vessels, etc. FRGB – bowls, bases, and high-necked globular vessels, ‘sprinkler’/spout, etc. (Rutten 2006; Reddy 2014)	Table jars and bowls with beaked or beaded out-turned rim varying from 11–16 cm to 23–26 cm diameter (Sedov & Benvenuti 2002)	Bowls, lids, small table-jars, etc. (Sedov 2007: fig. 4/11 nos. 3–9)	Jars, pot with handle, cooking pots (with or without carination), etc. (Kervran 2004: fig. 12 nos. 13, 14, 18, 19)	Cooking pots and carinated (<i>handfi</i>) vessels with everted rims	e.g. cooking vessels with out-turned beaked rims, an elongated body and carination in the lower part, with white inclusions of lime bits or crushed shells (Sedov & Benvenuti 2002: 15 nos. 4–6)
Parallels	Closed shapes of FRS fabric comparable to RPW. Distinctive open forms not represented in Gujarat RPW repository.	Morphological parallels from India: Arikamedu (Wheeler et al. 1946: fig. 28, Type 69), Amreli (Rao 1966: fig. 15/1–2, 9, 18, 24; fig. 16/28, 29), Ahar (Sankalia et al. 1969: fig. 94/1271, 1272).	Fine red slipped ‘Indian’ pottery – similarities to RPW, RW & BRW in BA-I period (Sedov 2007; Salles & Sedov 2010: fig. 86 nos. 832–833)	‘less fine Indian imported ware’, identified by vessel morphology and micaceous temper in its fabric (Kervran 2004)	Shell-tempered Dark Grey fabric (ShDG) from Ras Hafun (Somalia) (Smith & Wright 1988: 122)	Dhofari group (local shell-tempered ware)

FIGURE 3. A summary of select Indian pottery-fabric data from south and south-eastern Arabia.

Indian cooking vessels

The types of Indian pottery traded in the late pre-Islamic period from the Arabian context consist predominantly of cooking vessels. The Indian cooking vessel or *handi* is identified by its familiar shape, which includes a prominent flanged rim, a carination at the shoulder, and a rounded base, which is often sooted, thereby confirming its use as a vessel for cooking. The *handi* shape is widespread in most Indian sites, referred to by other names such as *chatti* in South India. It can be dated from the first century BC to the eleventh century AD (Begley & Tomber 1999: 172).

Indian cooking vessels have been recorded from various phases at a number of different sites in south and south-eastern Arabia in the late pre-Islamic period including Qana (Sedov 1992; Salles 1996; Salles & Sedov 2010), Khor Rori (Sedov & Benvenuti 2002; Avanzini 2008), Mleiha (Cuny & Mouton 2009; Mouton & Cuny 2012; Reddy 2014), Ed-Dur (Rutten 2006), and Suhar (Kervran 1996; 2004) (Fig. 2). Beyond Arabia and looking into the context of the Red Sea and African ports, Wheeler Type 24s is recorded among the Indian pottery assemblages at both Berenike (Baranīs, present-day Madīnat al-Ḥaras; Begley & Tomber 1999) and Quseir al-Qadim (al-Quṣayr al-Qadīm; Tomber 2000a; 2000b) from the first century BC/AD to the first/second century AD; and Ras Hafun (Ra's Ḥāfūn), Somalia (Smith & Wright 1988) from levels dating between the first century BC to the first century AD. Further east, in south-east Asia, at the site of Sambor Prei Kuk in Cambodia, as well as Changsen and Dvaravati in Thailand, carinated pots with hemispherical and globular bodies influenced from India have been reported (Bong 2003: 101, 114–115, 119).

A number of fabric classes have been identified to this vessel group in south and south-eastern Arabia (Fig. 2). For example, based on first-hand study, *handi* and other typical Indian cooking vessels at Mleiha are represented by Indian micaceous ware (MICA), Indian sandy ware (SANDY), and shell-tempered ware (SHELL) (Mouton & Cuny 2012: 176; Reddy 2014: 39–45). MICA fabric has several variations/sub-classes: fabric 2(A) comprises a red ware tempered with predominantly mica particles and infrequent inclusions of clay pellets; fabric 2(B) represents a light grey fabric with a thin red 'strip-burnished' slip. The inclusions comprise clusters of irregularly sized white limestone and quartz/quartzite grains with vegetal temper and some mica; fabric 2(C) consists of grit or grain-sized white inclusions in

combination with mica particles and grains of red quartz/quartzite and iron oxide (Reddy 2014: 43). At Ed-Dur, the Indian cooking vessels are recorded mainly under the following fabric classes: fine red slipped, coarse red slipped, coarse vegetal reddish-black, and coarse brown slipped (Rutten 2006).

Petrographic analyses were conducted on samples of Indian coarse wares including cooking vessel samples. These included the source identification of rice-tempered wares from Quseir/Berenike (Tomber, Cartwright & Gupta 2011) and Khor Rori (Lippi, Gonnelli & Pallecchi 2011). The identification of rice husk and chaff, attributed to rice (*Oryza* sp.), indicates that India and, more specifically, Gujarat as the possible area of origin of this type of ceramic. A more recent study by the present author involved the sourcing of Indian coarse wares from Mleiha (including samples of carinated cooking pots) using X-Ray fluorescence (XRF) spectrometry analysis (Reddy, Attaelmanan & Mouton 2012). The results indicate that two sherds, ML 2280 and ML H5004 R, (out of a total of seven) from Mleiha have strong correlations of chemical/elemental composition with thirteen sherd samples from sites in Maharashtra and Gujarat, indicating more than a 90% probability that they are from the same environment (2012: 4). It is also important to point out that sample ML H5004 R belongs to a carinated *handi*-type vessel very well represented at Mleiha.

From the data presented up to this point, some examples of cooking vessels that count as genuine imports from the Indian subcontinent are summarized. Results based on visual examination indicate that the MICA fabric from Mleiha resembles micaceous red slipped pottery from India. This fabric is part of a long tradition from Gujarat in the Chalcolithic and early historic period. The sub-groups or sub-classes noted in the Mleiha MICA fabric could indicate more than one manufacturing area for this fabric. Observed surface treatment such as the horizontal or 'strip burnishing' technique on the Mleiha vessels is widely noted on red slipped pottery from Gujarat. Additionally, working techniques like 'internal wiping' using bamboo/organic tools (recorded from Berenike/Quseir and more recently at Mleiha) are identical to those used by potters today in Kerala and North India (Tomber 2008: 47). Results from petrographic assessment carried out previously on rice-tempered wares from Khor Rori (Lippi, Gonnelli & Pallecchi 2011) and more recently on coarse wares from Mleiha (Reddy, Attaelmanan & Mouton 2012), indicate at least one source in western India (i.e. Gujarat/Maharashtra) for the Indian cooking vessels found in south and south-east Arabia.

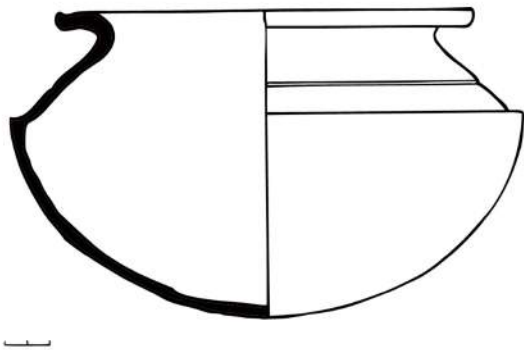


FIGURE 4. A carinated (*handi*-type) cooking pot from Mleiha in shell-tempered fabric (photograph courtesy of the French Archaeological Expedition at Mleiha; pottery drawing V. Bernard/French Archaeological Expedition at Mleiha).

The question concerning local imitations of typical Indian cooking vessels is more complex. The forerunners in this category are the carinated *handi* vessels from Mleiha, in a shell-tempered fabric (SHELL) (Fig. 4). So far, there are no known pottery traditions in India that employ medium to large fragments of crushed shell as temper. Although shell is occasionally present naturally in clay sources from coastal/riverine sites in India, these handmade carinated *handi* appear to have large quantities of shell intentionally added as a tempering agent. The closest parallels can be recorded from the Dhofar region in Oman in terms of ceramics, where associated material appears to be primarily either grit- or shell-tempered, with evidence of local buff wares with ‘crushed shell temper’ and applied punctuate design (Zarins 1997; 2001: 87) (see section on shell-tempered ware).

Cooking pots representing Indian vessel forms were also noted in a special ‘fine ware’ fabric (Fig. 5). Previously, nearly all Indian cooking vessels from the Dhofar region (Khor Rori, Ain Humran [‘Ayn Ḥumrān], Shisr [Shiṣr], etc.) were attributed to the red polished ware (RPW) tradition (see Yule & Kervran 1993; Avanzini et al. 2000; Zarins 2001). It is more likely, however, that these represent a number of red slipped vessels and fine red wares originating from various sources in South Asia, while some of them could also have been locally produced. A reassessment of fine Indian pottery at Khor Rori by Sedov and Benvenuti (2002) led to their identification as ‘Indian cooking pots’ or ‘Indian-style tablewares’. Similarly at Ed-Dur, ‘Indian’ cooking pots, represented in fine red slipped fabric, were originally thought to be red polished ware but, as De Paepe et al. (2003: 214) have pointed out, these are most likely imitations of the finer Indian ware, possibly imported from around the area of the Indus (see section on fine red ware).

Oil lamps (lamp or lid type)

The shape of oil lamps is in the form of a concave shallow vessel with a round bottom, oblique walls, a thickened rim, and a round concavity in the centre. Its use as a lid is well attested at sites in south-east and southern Arabia (Mleiha, Qana, and Khor Rori). Evidence from these sites indicates that these were often reused as lamps, with the central cavity serving as an oil container; the edge of the reservoir is usually slightly burnt. From the Indian context, this form is referred to as Type 38, described by Wheeler as a ‘cup-and-saucer’-shaped lid or lamp as reported from Arikamedu (Wheeler, Ghosh & Deva 1946: 67, fig. 23). Cup-and-saucer-shaped lids have also been recorded from Red Sea contexts (Tomber 2000a: 628).

In India the type is known from the first century AD up to medieval times (Begley & Tomber 1999: 171). From Arabian sites (Mleiha, Qana, Khor Rori) this form seems to occur within late second-(?)–third-century AD contexts. Oil lamps from Shabwah date to the second–fourth century AD (Badre 1992) and to the fourth–seventh century AD along the Nile in Nubia (Bietak & Schwartz 1987: 171–172). An oil lamp, from a poorly dated context at Berenike, is likely to date to the first or second century AD (Tomber 2000a: 628). A further example from Ras Hafun dates to the second–fifth century AD (Smith & Wright 1988: 136). From India this form has been reported from Bet Dwarka as lid type 12 (Gaur, Sundaresh & Vora 2005: fig. 39), type 34H at Ter

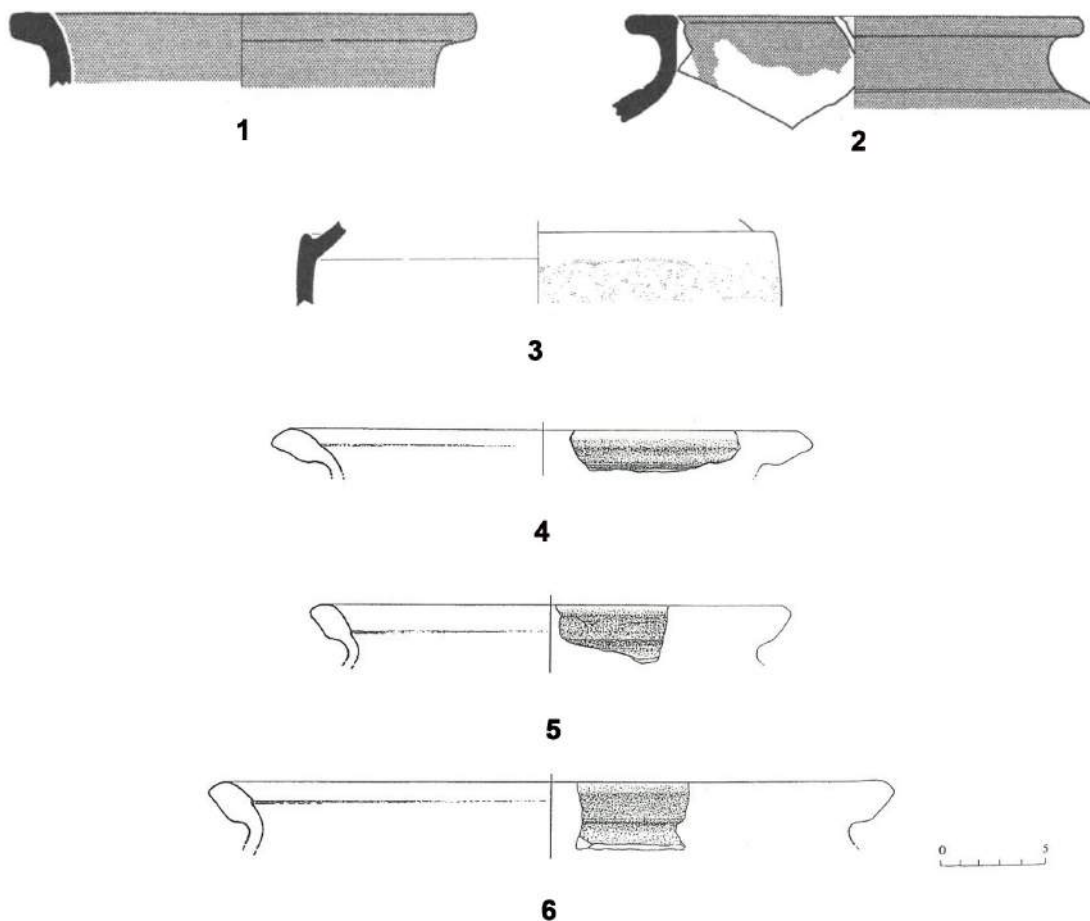


FIGURE 5. A selection of cooking and Indian-style table jars from Ed-Dur and Khor Rori in fine red ware. 1–3. Indian cooking vessels from Ed-Dur (after Rutten 2006); 4–6. Indian-style table jars (after Sedov & Benvenuti 2002: pl. 12).

(Chapekar 1969: type 34H, fig. 18), and type XXXIV at Kamrej (Gupta 2004: fig. 6), among other sites.

The lamp-lid form adopted different functions/uses depending on the site. From the Egyptian and Arabian sites, these are mostly recorded as oil lamps (with wick nozzles and evidence of burning in the central concavity). Traces of bitumen were coated along the edges of the rim and central cup, for example at Mleiha. This form was used mostly as a lid in Indian and south-east Asian contexts, with form variations that functioned as ‘jar stoppers’, for instance at Kamrej, Gujarat (observed by the present author) and as ‘lids with a central knob and gripping-hole’ in the place of the concavity at Oc-Eo, Vietnam (G. Epinal, personal communication).

The fabric classes that represent oil lamps belong to several clay sources. A description of the fabric of

oil lamps from the Arabian sites (Mleiha, Khor Rori, and Qana) is provided in Figure 2. As part of this study, samples of lamp-lid fabric from Kamrej in Gujarat were examined under a microscope. This revealed that one of the samples is made of rice-tempered or organic black/red ware (Reddy 2014: 214) (Fig. 6). Oil lamps with a similar fabric (with organic/rice inclusions) have been recorded at Berenike (Tomber 2008: 48) and at Ras Hafun, where the type is common and occurs in a ‘Limestone and Vegetal-tempered Red Fabric’ (Smith & Wright 1988: 122), which from the published description alone seems similar to the Berenike (and Kamrej) fabric (Tomber 2000a: 628). The other sample from Kamrej (Gupta 2004: fig. 6 no. XXXIV) of a lamp-lid form is a coarse reddish ware, well fired with white (quartzite and limestone) and red inclusions, mica, and vegetal temper (Fig. 6). This

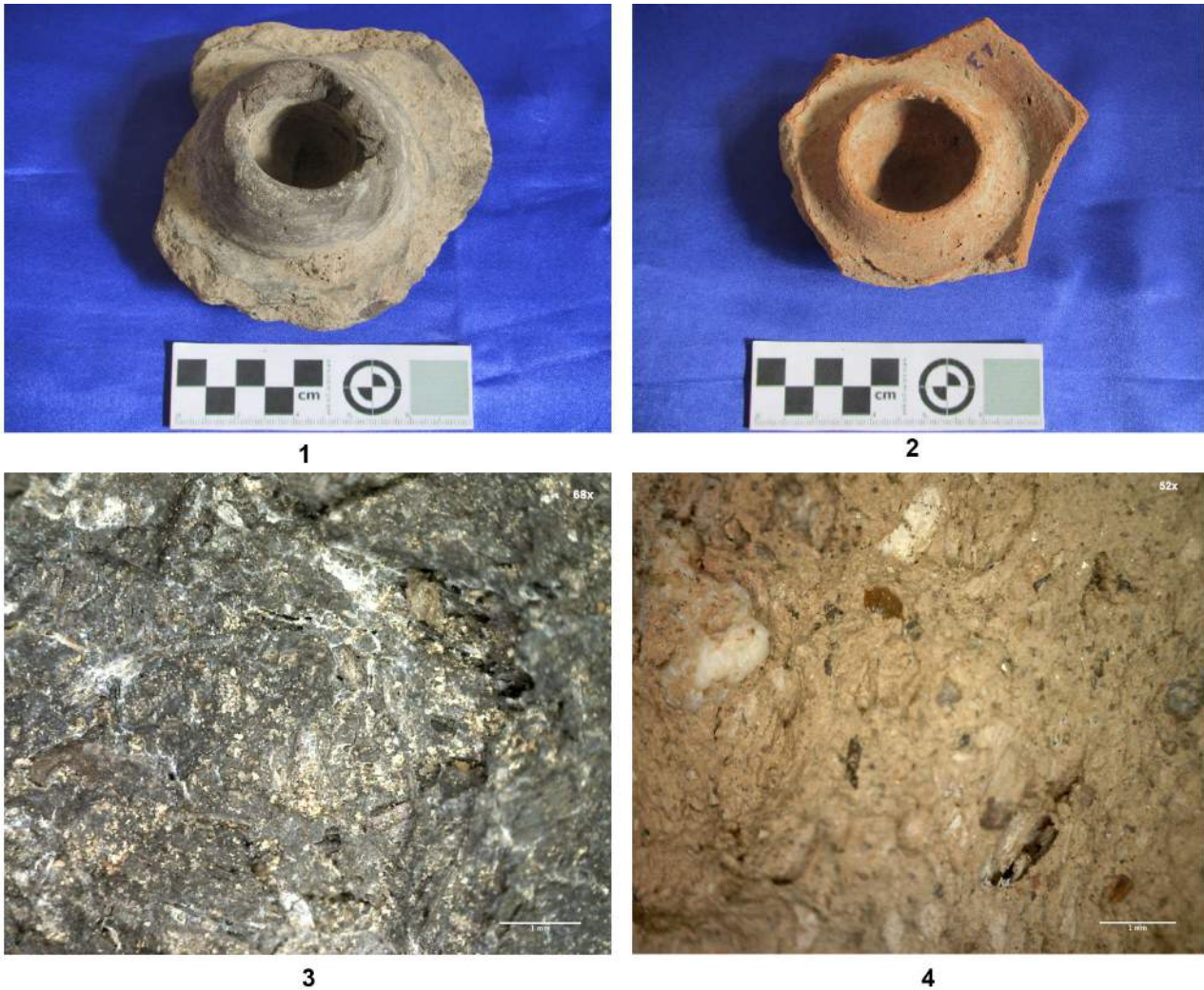


FIGURE 6. *The Kamrej lamp-lid type. 1. A Kamrej lamp-lid form in organic black fabric ware (Indian Archaeological Society; photograph A. Reddy); 2. a Kamrej lamp lid in coarse red ware (Indian Archaeological Society; photograph A. Reddy); 3. an organic black (rice-tempered) ware sample of a lamp lid from Kamrej; 4. a coarse red ware fabric sample from Kamrej.*

sample has close parallels with one variety of lamp-lid fabric found at Mleiha and Khor Rori, with nearly identical clay and inclusions (Reddy 2014: 217) (Fig. 7). Alternatively, fabric examination by thin-sectioning and petrographic microscope confirmed a Nubian origin for an oil lamp from Qana (Inv.124/4), based on ‘the range of inclusions in this fabric presumably derived from the basement formations of the region, which are composed of igneous and metamorphic rocks’ (Davidde, Petriaggi & Williams 2004: 94, fig. 7). A possible Indian

production (Inv. 35A) was noted from the Qana samples, but petrographic analysis for this sherd was not available to compare with the fabrics of Nubian type or with other Indian wares from Qana (2004: 94, fig. 7).

With evidence based on visual examination and preliminary petrographic analysis, it is evident that oil lamps or lamplids are presented in a variety of fabrics. The representative fabric groups indicate a wide range of sources for this vessel form. Based on chronology, it appears that from south-east Asia, the occurrence of

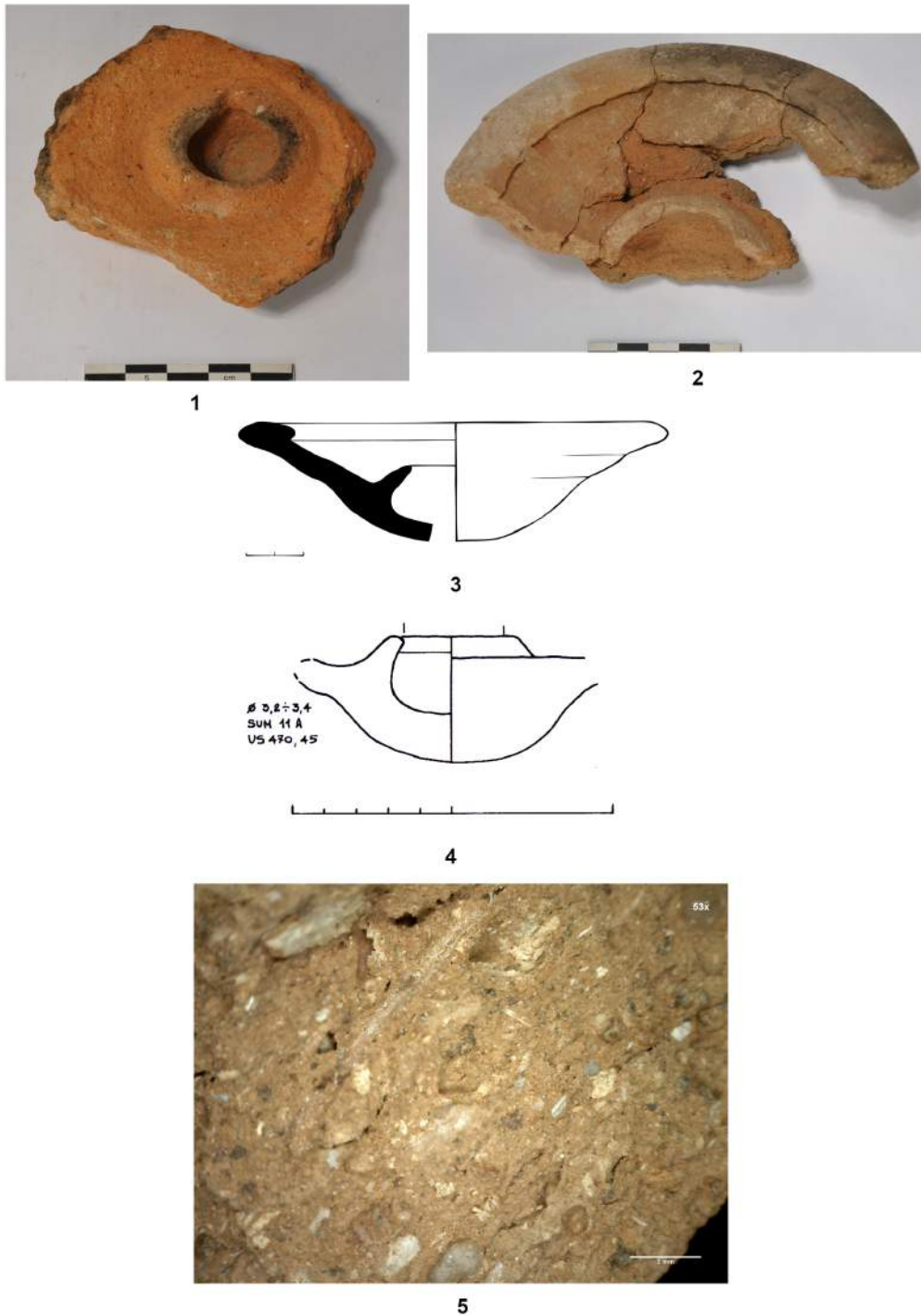


FIGURE 7. A selection of oil lamps from south-east and south Arabia. **1–3.** Oil lamps from Mleiha in coarse reddish-orange ware (French Archaeological Expedition at Mleiha; drawing V. Bernard); **4–5.** an oil lamp from Khor Rori (SUM11A US470, 45) (pottery drawing IMTO — Italian Mission to Oman).

these wares is from contexts dating between the fourth and second centuries BC at Khao Sam Kaeo in Thailand (Manguin 2002) and from the late first century BC to the third century AD at Oc-Eo, Vietnam (Malleret 1960). Based on the chronological sequence, it may be an oversimplification to suggest an eastern expansion of this vessel form (from south-east Asia) into India, Arabia, and possibly Nubia. The discovery of oil lamps from Shabwah (Badre 1992) and from sites along the Nile in Nubia (Bietak & Schwartz 1987: 171–172) could instead imply that this was a popular vessel form manufactured in and around southern Egypt and introduced into Arabia. A Nubian source can be suggested for at least one of the oil lamps from Qana based on the results from petrographic analysis (Davidde, Petriaggi & Williams 2004). The Indian subcontinent as a source is questionable, given that relatively few sherds have been recorded from early historic to medieval sites, but it is a likely source for some of the oil lamps in organic black fabric (rice-tempered ware) recorded from Berenike and Qana, as well as coarse reddish fabric examples from Mleiha and Khor Rori, similar to the samples from Kamrej that were examined in this study.

Rouletted ware (RW)

The most characteristic feature of distinctive rouletted ware (RW) fragments is bases with the eponymous decoration (two bands of rouletted, or better-named chattered, indentations applied on the inside of the base of the wheel-thrown dish). This part of the dish surface is commonly blackened with a grey core similar to NBP (northern black polished ware), whereas rim and wall sherds display a black-and-red ware (BRW) firing technique. Particular forms include a flat dish with the so-called beaked rim. A simple featureless rim also occurs (Schenk 2006: 127, 129). Falling into a different category are rim fragments that are of a shape identical to RW but have coarsely textured clay that contrasts markedly with the fine grey paste of the original. Moreover, the base fragments of coarser quality were never decorated. Imitation RW is a less refined local production from all over southern India and Sri Lanka where BRW tradition existed (Pavan & Schenk 2012: 194–195).

The origin of RW is still disputed, probably due to the failure in the past to differentiate between imported ‘true’ RW and the coarser imitations (Schenk 2006: 127). In the light of different material analyses, one must indeed accept that ‘Fine Grey Pottery’ (RW and Wheeler types 10 and 18) doubtless was not produced in southern India

and Sri Lanka (2006: 140). In the context of imitation RW pottery, the production of pottery in southern India and Sri Lanka was most probably decentralized and relied on clay from various sources (Pavan & Schenk 2012: 198). Recent research by Magee (2010) has identified one area where imitation RW was made (Fig. 3).

The distribution of rouletted ware is widespread and can be divided into sites outside South Asia and sites in South Asia (Bangladesh, India, and Sri Lanka) (Schenk 2006: 142, 146; figs 3 & 4). The distributional pattern of RW in South Asia shows a concentration along the eastern coast of peninsular India and Bangladesh, and includes sites alongside rivers such as Krishna, Godavari, and Kaveri used as natural transportation routes (2006: 132). For the Malabar Coast, recent investigations at Pattanam near the Periyar River revealed the first fragments of RW on the west coast (Shajan et al. 2004: 317). Sites outside South Asia include Quseir al-Qadim (Tomber 2002: 27; fig. 6), Berenike (2002: figs 4 & 5), and Coptos (Tomber 2000a: 630) in Egypt.

According to Pavan and Schenk (2012: 198), RW must have arrived in Khor Rori prior to the first century BC. The RW examples found at Khor Rori feature the parameters of the later variety of this pottery based on the typologies of Tissamaharama. The same pattern applies to the imitation RW found in Khor Rori.

This study involves the first-hand visual examination of samples of imitation RW from Khor Rori, in order to distinguish them from specimens of ‘true’ RW from Alangankulam in South India. The cross section of a sample (SUM 10C, US174, 78) of so-called imitation RW (fired in BRW technique) was examined under a hand-held digital microscope. The imitation RW fabric from Khor Rori belonged to a coarse red ware fired to a light grey colour. The inclusions comprised plant/vegetal temper and aplastic inclusions of sand, mica, and possibly feldspar. Some organic yellowish particles were also noted, but could not be presently identified. The imitation RW sample from Khor Rori was compared with samples of BRW (AGM_16 no. 87) and three samples of true RW from Alangakulam (Tamil Nadu), although no fabric parallels could be identified (Reddy 2014: 128–130, 219, 222) (Fig. 8).

The examination of imitation RW samples from Khor Rori in this study indicates that both varieties of true and imitation RW were being imported into Arabia either from parts of southern India or from Sri Lanka. As Pavan and Schenk (2012: 200) state, in contrast to studies on true RW, only trespassing along the east coast of India from somewhere in the north, analysis of the southern

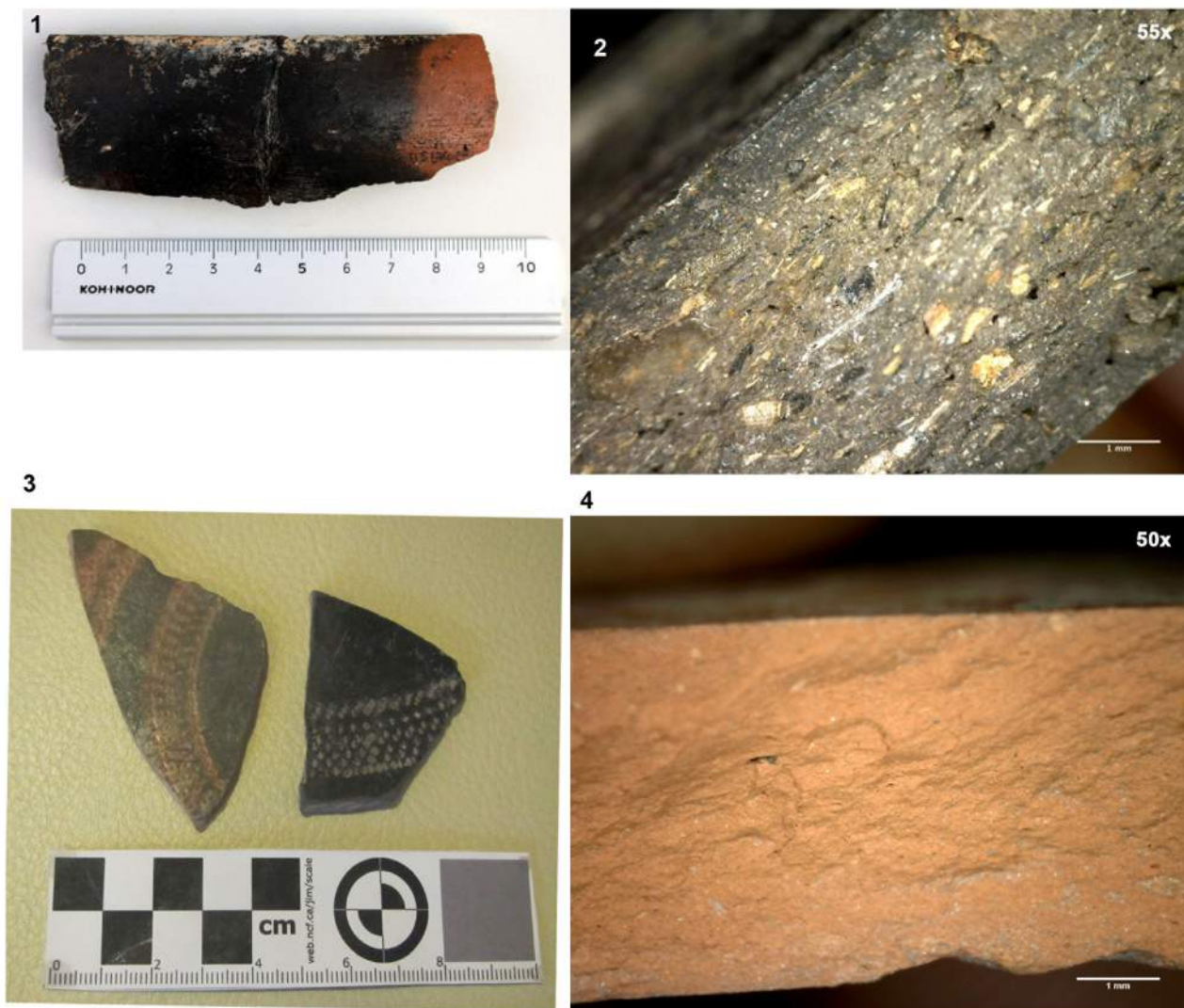


FIGURE 8. *Imitation and true rouletted ware. 1–2. Imitation rouletted ware from Khor Rori (photograph IMTO); 3–4. true rouletted ware from Alagankulam.*

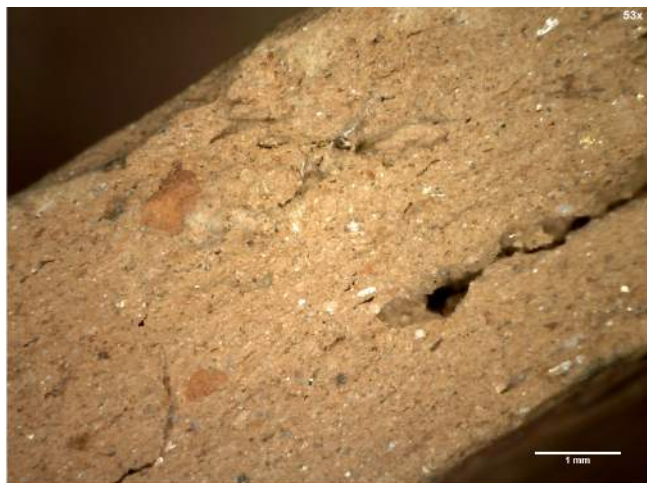
copy of RW might far better indicate the regions engaged in commerce at this time.

Fine red ware

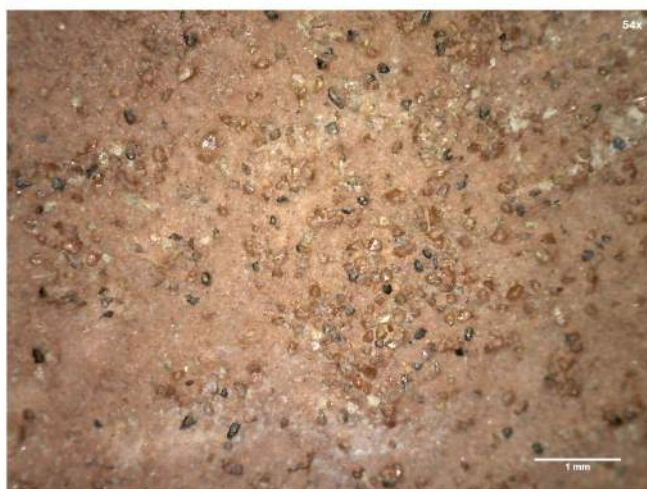
Fine red ware represents a class of wares nearly identical to vessels often identified as ‘Indian red polished wares’ (RPW), but due to the quality of the pieces, especially the rather weak treatment of the surfaces and the sometimes poor firing, they are instead referred to as Indian-style

table jars (Sedov & Benvenuti 2002: 187). The term ‘fine Indian red ware’ or FIRE was coined by Kennet (2004: 90), based on evidence from the site of Kush (Kūsh; Ras al-Khaimah/Ra’s al-Khaymah) and represents a number of different classes from South Asia and elsewhere. FIRE fabric is much coarser and has a weak slip that erodes and often flakes in places (2004: 90).

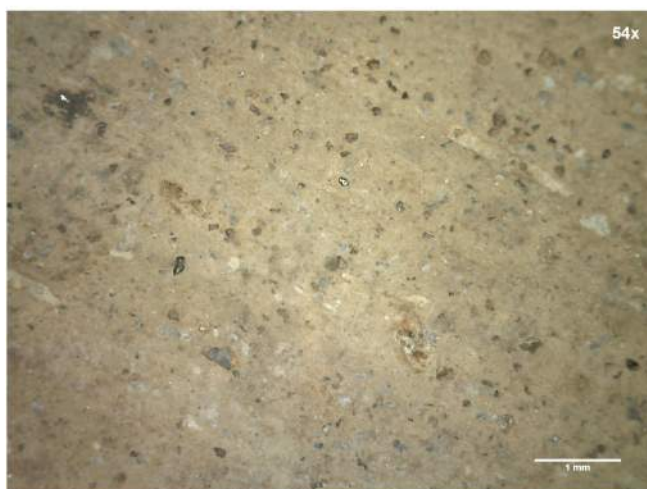
Fine red ware has been identified and categorized as a special class of Indian fine wares separate from RPW at numerous sites in the Gulf (see Fig. 3). First-hand



1



2



3

FIGURE 9. *A selection of fine red ware fabric from Khor Rori and Ed-Dur. 1. Fine red ware fabric from Khor Rori with sand, mica, and grog/clay pellets; 2. fine red slipped (FRS) ware from Ed-Dur with pink quartz and black volcanic rock; 3. fine reddish brown and grey slipped (FRBG) ware from Ed-Dur with vegetal temper, mica, and limestone.*

visual examination was made on samples of fine red wares of possible Indian origin from Khor Rori, Ed-Dur, and from later levels at Kush, where twenty-three FIRE sherds occurred throughout the sequence without any clear chronological pattern (2004: 90) (Fig. 9). Variations in fabric were noted in the samples from Khor Rori ranging from red to reddish-brown fine compact paste. The dark grey core in the section of most of the sherd fragments clearly testifies to the poor firing and the cross-sectional examination showed vegetal and grit temper and several aplastic inclusions such as mica, limestone, and quartzite (Reddy 2014: 127, 224). Microscopic examination of samples of fine red slipped and fine reddish-brown and grey slipped from Ed-Dur indicated that both wares belonged to the same petro-fabric (2014: 58–61) (Fig. 9). With reference to these fine red wares from Ed-Dur, petrographic analysis by De Paepe et al. (2003: 214) indicated that the sandy fabric, firing, surface finish, and shapes differ from the very fine Indian red polished ware. Ed-Dur fragments are most likely imitations of the finer Indian ware that originated to the west of the main production centres in Gujarat, in the Indus valley, and/or possibly Pakistani Baluchistan (2003: 224). On the other hand, evidence from Khor Rori of a bowl fragment with rouletting and dot-and-circle motif showed an Indian influence in the glossy burnished surface and chattered frieze, while the row of dotted circles is a purely local invention or a ‘local imitation of Indian RPW or Sigillata’ (Yule & Kervran 1993: 93).

Samples of fine Indian red ware and RPW from Kush were also examined from later levels. What is interesting is that the RPW from Kush, as Kennet points out, is from securely dated levels of the seventh–eighth century AD, when it was thought to have ceased production in India (Kennet 2004: 89). As part of this study, microscopic examination of the fabric revealed that RPW from Kush was much

coarser with a greater range of inclusions (like quartzite and vegetal temper), while samples of FIRE had smaller mineral inclusions in a fine sandy clay. The external slip and burnishing of the RPW, however, was of superior quality (Reddy 2014: 226–227). This fine red ware category could represent either imitations from the Gulf itself or actual imports from India. To determine this, a detailed study is required from the Indian contexts in order to classify ‘fine red wares’ as a separate category of wares from the red polished wares.

Shell-tempered ware

This category of coarse ware fabric has quantities of roughly crushed shell fragments in the clay. The fabric ranges from buff to reddish-brown and occasionally grey, while the shell inclusions are identified by their flat/lamellar (plate-like) or curved features. Based on evidence from Khor Rori, it is designated as part of the Dhofari tradition of wares, which are characterized by pottery with reddish/buff fabrics that usually employ crushed shells or calcareous microfossils as temper; they

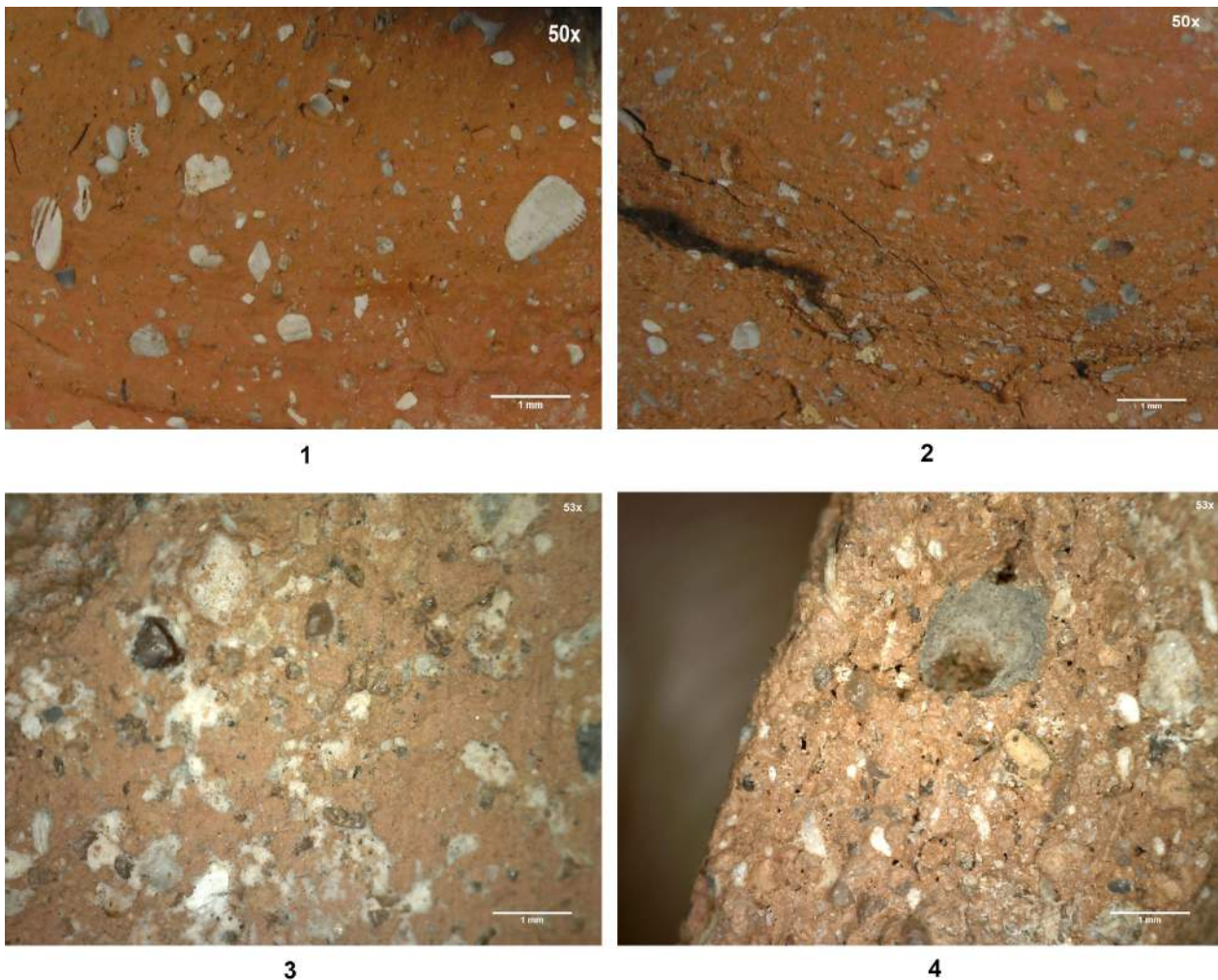


FIGURE 10. *Shell-tempered fabric from Mleiha and Khor Rori. 1. Mleiha SHELL fabric 3A; 2. Mleiha SHELL fabric 3B; 3. Khor Rori shell fabric sample; 4. Khor Rori shell fabric sample (cross section).*

measure up to 2–3mm in diameter and are never wheel-made (see Pallecchi & Pavan 2011: 85).

Shell-tempered ware is well attested as a local fabric during the late pre-Islamic and Islamic/medieval period from several sites in the Dhofar region, such as Khor Rori, Ayn Humran, Shisr, al-Balid (al-Balīd), Khor Mughsayl (Khawr al-Mughsayl), etc. (Zarins 1997; 2001); and Ghaydā' al-Kabīr and Hairidj (Ḥayrīj) in Yemen (Newton 2009). At the Islamic site of Al Balid (Dhofar, Oman), shell-tempered fabric was classified as 'local coarse wares 1 and 2' (Yule & Muhammed 2000). This demonstrates a long tradition of pottery manufacture where today the clay used by modern potters shows the presence of tiny inclusions, whitish in colour, recognized as limestone fragments, although according to the place of provenance, in some cases the temper was made with white shells (Pallecchi & Pavan 2011: 94).

In terms of identifying the source of shell-tempered wares, the recent work at Khor Rori carried out by the Italian Mission to Oman (IMTO) researched the local raw materials used in the manufacture of pottery and building materials (Pallecchi & Pavan 2011: 83). Samples of locally made Dhofari pottery indicated the presence of silicates, sub-angular quartz, feldspar, and micas. Its main components are microfossil calcareous fragments and shells (Pallecchi & Pavan 2011: 84–85, fig. 7; Reddy 2014: 124–126) (Fig. 10). On the other hand, no parallels could be cited for the shell ware from any particular ceramic industry in India.

It is the evidence of carinated cooking vessels or Indian *handis* with everted rims in shell-tempered fabric, particularly from Mleiha, that leads this present study to speculate about the possibility of 'Indian-influenced' imitation vessels. These vessels may have been manufactured for Indian residents/traders within Arabia, who for cultural reasons perhaps preferred to use their own familiar cooking vessel forms (see Kennet 2004: 96). Visual examination in this study of shell-tempered cooking vessel samples from Mleiha revealed two broad variations in fabric: fabric 3A, with buff to light brown clay, comprising primarily flat plate-like crushed shells in the temper, and fabric 3B with a reddish-brown clay and powdered or finely ground shell temper in combination with grit temper (Reddy 2014: 44) (Fig. 10).

The use of ground shell in the local pottery is also documented in sites outside Arabia; in East Africa a shell-tempered dark grey fabric (ShDG) from Ras Hafun (Somalia) has been reported with 'quantities of coarsely crushed shell fragments in the clay' (Smith & Wright 1988: 122). The typical carinated form and scalloping

seen on the examples from Hafun West are attested in South Asia, as well as more recently at Mleiha.

Evidence from the early Islamic site of Hairidj in Yemen, for example, indicates large amounts of Indian cooking vessels (Newton 2009: figs 43, 47), probably resulting from the use of this site as a starting point for India and the main harbour for departure to Socotra (2009: 253). The data from select wares from Hairidj indicates similar cooking-vessel forms made from red earthenware and shell temper (Type 2) and 'imitation RPW' using red earthenware with grit temper and burnished. The evidence of Indian-inspired vessel forms in local shell fabric from the Islamic period could indicate a similar influence in the production of shell-tempered cooking *handis* during the preceding late pre-Islamic period. Although it is tempting to ascribe these wares to the Dhofari tradition, the fabric samples (both ceramic and clays) collected from Mleiha and Khor Rori will have to be analysed further before the provenance of this ware can be ascertained.

Concluding remarks

This study has shown that based on the evidence of examined Indian pottery from Arabia there are several source areas for the imported Indian wares. Four key areas were established in this paper based on this ceramic evidence: Area 1 — comprising chiefly Gujarat and Maharashtra (western India); Area 2 — the Indus and Pakistan/Baluchistan regions (North-West Frontier, present-day Khyber Pakhtunkhwa); Area 3 — the southwestern or Malabar Coast; and Area 4 — eastern and southern India, and Sri Lanka.

In terms of imitation Indian wares, three preliminary categories were established in this study: firstly, wares produced in Arabia using local clays but adopting Indian manufacturing techniques (e.g. shell-tempered cooking vessels, fine red wares); secondly, Indian wares in Arabia, which are copies made in India or Sri Lanka but are from places other than the established source or production area (e.g. imitation rouletted wares); and thirdly, pottery styles introduced into India from Egypt or Arabia (e.g. oil lamps).

The collation of large quantities of Indian pottery from Arabian sites indicates that these were not just residual containers that belonged to traders. Trade of bulk goods items such as rice, grain, cloth, ghee, and sesame oil during the first century AD were mentioned in the *Periplus of the Erythraean Sea* (Casson 1989; PME 36). This could indicate that bulk goods were possibly more important to the Arabian economy than prestige goods from the Indian subcontinent. Local food production in

Arabia by the first century BC–first century AD had to be supplemented by an influx of food items from India and Roman Egypt. This was to cater to growing demands from the increased number of visiting South Asian and Roman traders. This study therefore proposes that much of the Indo-Arabian trade of the first–fourth centuries AD was probably based on these bulk goods networks,¹ and this is directly related to the growing quantities of Indian pottery in Arabia. Specific Indian vessel forms were clearly preferred by South Asian traders or residents, which probably led to the small-scale manufacture of imitation Indian vessels. This was probably a means for the local economy to adapt to the needs of the visitors/traders. These South Asian merchants also created information networks² with the introduction of pottery styles, possible adoption of new food items, and methods of food preparation from the subcontinent into Arabia. These trends might account for some of the variations in the socio-economic and cultural practices of south and south-eastern Arabia in the late pre-Islamic period.

¹The concept of ‘comparative world-systems perspective’ and networks of interaction derived from Chase-Dunn & Hall (1997) and Hall & Chase-Dunn (1999).

² See n. 1.

Acknowledgements

This paper represents part of the author’s PhD research on analysis of the Indian pottery as a marker for trade relations between the subcontinent and south and south-eastern Arabia. The author would like to thank Dr Michel Mouton (CEFAS—Jeddah, KSA), Prof. Ernie Haerinck (Ghent University, Belgium), Dr Derek Kennet (Durham University, UK), and Dr Alexia Pavan (University of Pisa, Italy) for providing access to archaeological data and pottery samples from Mleiha, Ed-Dur, Kush, and Khor Rori, respectively. Acknowledgements also extend to Prof. Alessandra Avanzini and the Italian Mission to Oman (IMTO) for permission to visit and study the Indian pottery samples from Khor Rori. The author wishes to thank her PhD research supervisor, Prof. Vasant Shinde, and the Department of Archaeology, Deccan College Post-Graduate & Research Institute, Pune, India. Thanks are due to Dr K.N. Dikshit (Indian Archaeological Society, Delhi) and Dr Sunil Gupta (Allahabad Museum) for the opportunity to study the pottery from Kamrej, and to Dr S. Vasanthi and Mr Srikumar of the Department of Archaeology, Government of Tamil Nadu, for their kind assistance with the Alagankulam pottery. Special thanks to Dr Mark Beech (Abu Dhabi Tourism & Culture Authority) and Dr Timothy Power (Zayed University, Abu Dhabi) for providing useful comments on this paper.

References

- Avanzini A. (ed.).
2008. *A port in Arabia between Rome and the Indian Ocean (3rd C. BC–5th C. AD)*. (Khor Rori Report 2). Rome: ‘L’Erma’ di Bretschneider.
- Avanzini A., Buffa V., Lombardi A., Orazi R. & Sedov A. (eds).
2000. Excavations and Restoration of the Complex of Khor Rori: MID’s interim report (1999–2000). *Egitto e Vicino Oriente* 22–23: 189–228.
- Badre L.
1992. Le sondage stratigraphique de Shabwa. *Syria* 68: 229–334.
- Begley V. & Tomber R.
1999. Indian Pottery Sherds. Pages 161–182 in S.E. Sidebotham & W.Z. Wendrich (eds), *Berenike’97. Report of the 1997 Excavations at Berenike and the Survey of the Egyptian Eastern Desert, including excavations at Shenshef*. Leiden: Centre for Non-Western Studies.
- Bietak M. & Schwartz M.
1987. *Nag’ el-Scheima: eine befestigte christliche Siedlung und andere Denkmäler in Sayala–Nubien, Teil I. Die österreichischen Grabungen 1963–1965*. Vienna: ÖAW.
- Bong S.
2003. The ceramic chronology of Angkor Borei, Takeo Province, Southern Cambodia. PhD thesis, The University of Hawai’i. [Unpublished].

- Casson L.
1989. *The Periplus Maris Erythraei: text with introduction, translation and commentary*. Princeton, NJ: Princeton University Press.
- Chapekar B.N.
1969. *Report on the excavation at Ter*. Pune: Deccan College Post-Graduate and Research Institute.
- Chase-Dunn C. & Hall T.D.
1997. *Rise and Demise: Comparing World-Systems*. Boulder: Westview Press.
- Cuny J. & Mouton M.
2009. La transition vers la période sassanide dans la péninsule d'Oman: chronologie et modes de peuplement. Pages 91–127 in C.J. Robin & J. Schiettecatte (eds), *L'Arabie à la veille de l'Islam. Un bilan clinique*. (Orient et Méditerranée, 3). Paris: De Boccard.
- Davidde B. & Petriaggi R.
1998. Archaeological surveys in the harbour of ancient Kane. *Proceedings of the Seminar for Arabian Studies* 28: 261–270.
- Davidde B., Petriaggi R. & Williams D.F.
2004. New data on the commercial trade of the harbour of Kane through the typological and petrographic study of the pottery. *Proceedings of the Seminar for Arabian Studies* 34: 85–100.
- De Paepe P., Rutten K., Vrydaghs L. & Haerinck E.
2003. A Petrographic, chemical and phytolith analysis of Late Pre-Islamic ceramics from Ed-Dur (Umm al-Qaiwain, UAE). Pages 208–228 in D.T. Potts, H. al-Naboodah & P. Hellyer (eds), *Proceedings of the First International Conference on the Archaeology of the United Arab Emirates*. London: Trident Press.
- Gaur A.S., Sundaresh & Vora K.H.
2005. *Archaeology of Bet Dwarka Island: An Excavation Report*. New Delhi: Aryan Books International.
- Gogte V.
1997. The Chandraketugarh-Tamluk region of Bengal: source of the early Historic rouletted ware from India and Southeast Asia. *Man and Environment* 22/1: 69–85.
2001. XRD Analysis of the Rouletted Ware and Other Fine Grey Ware from Tissamaharama. Pages 197–202 in H.J. Weisshaar, H. Roth & W. Wijeyapala (eds), *Ancient Ruhuna. Sri Lankan–German Archaeological Project in the Southern Province*. i. (Materialien zur Allgemeinen und Vergleichenden Archäologie, 58). Mainz am Rhein: Philipp von Zabern.
- Gupta S.
2004. Pottery from Kamrej Excavations – 2003. *Journal of Indian Ocean Archaeology* 1: 34–66.
- Haerinck E.
2001. *Excavations at ed-Dur (Umm al-Qaiwain, United Arab Emirates)* ii. *The Tombs*. Leuven: Peeters.
2003. Internationalisation and Business in Southeastern Arabia during the Late First Century BC/First Century AD: Archaeological Evidence from Ed-Dur (Umm al-Qaiwain, UAE). Pages 195–206 in D.T. Potts, H. al-Naboodah & P. Hellyer (eds), *Proceedings of the First International Conference on the Archaeology of the United Arab Emirates*. London: Trident Press.
- Hall T.D. & Chase-Dunn C.
1999. The Chesapeake World-System: complexity, hierarchy and pulsations of long range interaction in prehistory. Paper presented at the annual meeting of the American Sociological Association, Chicago, August 10, 1999. <http://wsarch.ucr.edu/archive/papers/c-d&hall/asa99b/asa99b.htm>. Last accessed date 31 August 2014.
- Kennet D.
2004. *Sasanian and Islamic pottery from Ras al-Khaimah: classification, chronology and analysis of trade in the Western Indian Ocean*. (Society for Arabian Studies Monographs, 1). (British Archaeological Reports, International Series, 1248). Oxford: Archaeopress.
- Kervran M.
1996. Indian ceramics in southern Iran and eastern Arabia. Repertory, classification and chronology. Pages

- 37–58 in H.P. Ray & J-F. Salles (eds), *Tradition and Archaeology. Early Maritime Contacts in the Indian Ocean*. New Delhi: Manohar Publications.
2004. Archaeological research at Suhar 1980–1986. *Journal of Oman Studies* 13: 263–381.
- Lippi M., Gonnelli T. & Pallecchi P.
 2011. Rice chaff in ceramics from the archaeological site of Sumhuram (Dhofar, Southern Oman). *Journal of Archaeological Science* 38: 1173–1179.
- Magee P.
 2010. Revisiting Indian Rouletted Ware and the impact of Indian Ocean trade in Early Historic south Asia. *Antiquity* 84: 1043–1054.
- Malleret L.
 1960. *L'Archéologie du Delta du Mékong*. ii. *La Civilisation Matérielle d'Oc-Eo*. Paris: École Française d'Extrême Orient.
- Manguin P-Y.
 2002. From Funan to Sriwijaya: Cultural continuities and discontinuities in the Early Historical maritime states of Southeast Asia. Pages 59–82 in *25 tahunkerjasama Put Penelitian Arkeologi dan Ecole française d'Extrême Orient*. Jakarta: Pusat Penelitian Arkeologi/École Française d'Extrême Orient.
- Mouton M.
 1992. La Péninsule d'Oman de la fin de l'âge du fer au début de la période Sassanide (250av.–350 ap. JC). PhD thesis, Université de Paris I, Panthéon-Sorbonne. [Unpublished].
 2008. *La Péninsule d'Oman de la fin de l'âge du fer au début de la période sassanide*. (Society for Arabian Studies Monographs, 6). (British Archaeological Reports, International Series, 1776). Oxford: Archaeopress.
- Mouton M. & Cuny J.
 2012. The Oman Peninsula at the beginning of the Sasanian Period. Pages 171–185 in D.T. Potts & P. Hellyer (eds), *Fifty Years of Emirates Archaeology: Proceedings of the Second International Conference on the Archaeology of the United Arab Emirates*. Abu Dhabi: Ministry of Culture, Youth and Community Development.
- Mouton M., Tengberg M., Le Maguer S., Reddy A. et al.
 2012. Building H at Mleiha: New evidences on the late PIR.D phase in the Oman Peninsula (second–mid-third century AD). *Proceedings of the Seminar for Arabian Studies* 42: 205–222.
- Newton L.S.
 2009. *A landscape of pilgrimage and trade in Wadi Masila, Yemen: The case of al-Qisha and Qabr Hud in the Islamic period*. (British Archaeological Reports, International Series, 1899). Oxford: Archaeopress.
- Pallecchi P. & Pavan A.
 2011. Local raw materials used by craftsmen and in the development of the city of Sumhuram. Pages 81–95 in A. Avanzini (ed.), *Along the aroma and spice routes: The harbour of Sumhuram, its territory and the trade between the Mediterranean, Arabia and India*. Rome: 'L'Erma' di Bretschneider.
- Pavan A.
 2011. Sumhuram as international centre: the imported pottery. Pages 99–112 in A. Avanzini (ed.), *Along the aroma and spice routes: The harbour of Sumhuram, its territory and the trade between the Mediterranean, Arabia and India*. Rome: 'L'Erma' di Bretschneider.
- Pavan A. & Schenk H.
 2012. Crossing the Indian Ocean before the Periplus: a comparison of pottery assemblages at the sites of Sumhuram (Oman) and Tissamaharama (Sri Lanka). *Arabian Archaeology and Epigraphy* 23: 191–202.
- Rao S.R.
 1966. *Excavations at Amreli: A Kshatrpa-Gupta Town*. Baroda: Bulletin Museum and Picture Gallery.
- Reddy A.
 2014. Looking from Arabia to India: Analysis of the Early Roman 'India Trade' in the Indian Ocean during the Late Pre-Islamic Period (3rd century BC–6th century AD). PhD thesis, Deccan College Post-Graduate & Research Institute, Pune, India. [Unpublished].

- Reddy A., Attaelmanan A.G. & Mouton M.
2012. Pots, Plates and Provenance: Sourcing Indian Coarse Wares from Mleiha using X-ray Fluorescence (XRF) Spectrometry Analysis. *International Conference on the Use of X-ray (and related) Techniques in Arts and Cultural Heritage (December 7–8 2011), Sharjah, United Arab Emirates, IOP Material Science and Engineering (MSE) Conference proceedings series 3*. <http://iopscience.iop.org/1757-899X/37/1/012010>. Last accessed 21 September 2014.
- Rutten K.
2006. Het Aardewerk Van Ed-Dur (Umm al-Qaiwain, V.A.E) Uit De Late 1^{ste} Eeuw V. Tot De Vroege 2^{de} Eeuw N. Chr. (Technologische, typologische en vergelijkende studie met een analyse van de ruimtelijkeverspreiding en handel in en voorbij de Perzische Golf tijdens de Laat Pre-islamitische periode (3rd eeuw v.–6th eeuw n Chr.). PhD thesis, Ghent University, Belgium. [Unpublished].
- Salles, J.-F.
1996. Hellenistic Seafaring in the Indian Ocean: A Perspective from Arabia. Pages 293–310 H.P. Ray & J-F. Salles (eds), *Tradition and Archaeology: Early Maritime Contacts in the Indian Ocean*. New Delhi: Manohar Publishers.
- Salles J-F. & Sedov A.V.
2010. *Qani'. Le port antique du Hadramawt entre la Méditerranée, l'Afrique et l'Inde. Fouille srusses 1972, 1985–1989, 1991, 1993–1994*. (Indicopleustoi, 6). Gent: Brepols.
- Sankalia H.D., Deo S.B. & Ansari Z.D.
1969. *Excavations at Ahar (Tambavati)*. Deccan College Building Centenary and Silver Jubilee Series 45.
- Schenk H.
2006. The dating and historical value of Rouletted ware. *Zeitschrift für Archäologie Außereuropäischer Kulturen* 1: 123–152.
- Sedov A.V.
1992. New archaeological and epigraphical material from Qana (South Arabia). *Arabian Archaeology and Epigraphy* 3: 110–137.
1996. Qana (Yemen) and the Indian Ocean: The Archaeological Evidence. Pages 11–35 in H.P. Ray & J-F. Salles (eds), *Tradition and Archaeology: Early Maritime Contacts in the Indian Ocean*. New Delhi: Manohar Publishers.
2007. The port of Qana' and the incense trade. Pages 71–111 in D. Peacock & D.F. Williams (eds), *Food for the Gods: New Light on the Ancient Incense Trade*. Oxford: Oxbow.
2008a. The Pottery (Area A). Pages 61–123 in A. Avanzini (ed.), *A port in Arabia between Rome and the Indian Ocean (3rd C. BC–5th C. AD)*. (Khor Rori Report 2). Rome: 'L'Erma' di Bretschneider.
2008b. The Pottery (Area F). Pages 215–259 in A. Avanzini (ed.), *A port in Arabia between Rome and the Indian Ocean (3rd C. BC–5th C. AD)*. (Khor Rori Report 2). Rome: 'L'Erma' di Bretschneider.
- Sedov A.V. & Benvenuti C.H.
2002. The pottery of Sumhuram: general typology. Pages 177–248 in A. Avanzini (ed.), *Khor Rori Report 1*. (Arabia Antica, 1). Pisa: Edizioni Plus.
- Shajan K.P., Tomber R., Selvakumar V. & Cherian P.J.
2004. Locating the ancient port of Muziris: fresh findings from Pattanam. *Journal of Roman Archaeology* 17: 351–359.
- Smith M.C. & Wright H.T.
1988. The Ceramics from Ras Hafun in Somalia: Notes on a Classical Maritime Site. *Azania* 23: 115–141.
- Tomber R.
2000a. Indo-Roman Trade: The Ceramic Evidence from Egypt. *Antiquity* 74: 624–631.
2000b. The pottery. Pages 53–56 in D.P.S. Peacock, L. Blue, N. Bradford & S. Moser (eds), *Myos Hormos–Quseir al-Qadim: A Roman and Islamic port site on the Red Sea Coast of Egypt Interim Report*. Southampton: University of Southampton. [Unpublished].
2002. Indian Fine Wares from the Red Sea Coast of Egypt. *Man and Environment* 28/1: 25–31.
2008. *Indo-Roman Trade: From Pots to Pepper*. London: Duckworth.

Tomber R., Cartwright A.C. & Gupta S.

2011. Rice temper: technological solutions and source identification in the Indian Ocean. *Journal of Archaeological Science* 38: 360–366.

Yule P. & Kervran M.

1993. More than Samad in Oman: Iron Age pottery from Suhar and Khor Rori. *Arabian Archaeology and Epigraphy* 4/2: 69–106.

Yule P. & Mohammed K.K.

2000. Al Balid Pottery Reference Collection. Salalah, March 2000. www.otnhosting.com/owhsfinal/english/Frank/AlBalid%20Pottery%20Reference%20Collection.pdf. Last accessed 7 September 2014.

Wheeler R.E.M., Ghosh A. & Deva K.

1946. Arikamedu: an Indo-Roman trading station on the east coast of India. *Ancient India* 2:17–124.

Zarins J.

1997. Persia and Dhofar: aspects of Iron Age international politics and trade. Pages 615–689 in G.H. Young, M.W. Chavalas & R.E. Averbeck (eds), *Crossing boundaries and linking horizons*. Bethesda, MD: CDL Press.

2001. *The land of incense. Archaeological work in the Governorate of Dhofar, Sultanate of Oman 1990–1995*. (Archaeology and Cultural Heritage Series, 1). Muscat: Sultan Qaboos University Publications.

Author's address

Anjana Reddy, Coastal Heritage & Palaeontology section, Historic Environment Department, Abu Dhabi Tourism and Culture Authority (TCA Abu Dhabi), Nation Towers Corniche, Building B, PO Box 94000, Abu Dhabi, UAE.

e-mail anjana.lingareddy@tcaabudhabi.ae