



Dosariyah

Reinvestigating a Neolithic coastal community in eastern Arabia

edited by

Philipp Drechsler



ARCHAEOPRESS Publishing LTD
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG

www.archaeopress.com

ISBN 978 1 78491 962 7
ISBN 978 1 78491 963 4 (e-Pdf)

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Cover illustration: Trench E1 during excavation. Spring 2012.

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Printed in England by The Holywell Press, Oxford

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Abstract

Re-investigations at Dosariyah, located in the Eastern Province of Saudi Arabia, took place between 2010 and 2014. They were carried out by the joint German-Saudi Dosariyah Archeological Research Project (DARP). During excavations at different parts of the shallow hill that forms the site, a wealth of material remains was found within almost three metres of anthropogenic deposits. Both radiocarbon dates and comparative studies of artefacts securely date the occupation to the first centuries of the fifth millennium BC. Investigations at the site were supplemented by geomorphological studies and an archeological survey.

The spectrum of material remains excavated at Dosariyah shows unique characteristics. The lithic industry is technologically- and typologically-rooted in the local Arabian Middle Neolithic. Reminiscent of the Arabian Bifacial Tradition (ABT) are bifacially-shaped winged and stemmed arrowheads and bifacial foliates. The poorly-developed primary production is oriented towards the manufacture of flakes although natural pieces of shatter were often used as tool blanks. Production waste proves flint-knapping activities at the site. Likewise, most personal adornment was manufactured in the local tradition. In contrast, large amounts of Black-on-Buff pottery find their closest parallels at Ubaid period settlements in southern Mesopotamia. Other elements of material culture that originate in this cultural sphere are fired-clay objects, shaped bitumen and obsidian artefacts. The absence of related production waste, however, qualifies these objects as imports. Unexplained remains the origin of the Coarse Ware. While evidence for local production at Dosariyah itself is absent, the incised decoration found on one single Coarse Ware vessel is clearly distinct from decorative styles known from southern Mesopotamia.

The mechanisms behind the distribution of foreign materials along the Arabian Gulf coast are still poorly understood. The assumption that Arabian societies were less developed in comparison to societies in Mesopotamia led to the unjustifiable view that foreign traders coming from the upper Gulf were responsible for the appearance of foreign objects in the central Gulf area and beyond. However, the exploitation of marine resources always played a major role for local populations settled along the coasts of the Arabian peninsula. Further, the spectrum of fish remains discovered at Dosariyah includes species that demonstrate the capability for off-shore fishing, while excavations failed to unearth convincing evidence for the presence of Mesopotamian seafarers. It is therefore the central proposition of this book that the local societies living along the shores of the Arabian Gulf coast played an active role in the acquisition of Ubaid pottery and other objects.

In addition to the hunting of a broad spectrum of wild animals and the herding of sheep, goat and cattle, fishing and the gathering of shellfish formed the basis of the diet of the population settled at Dosariyah. Such a broad subsistence base can serve as a protection against environmental crisis, but it also helps to satisfy higher demands for food during short periods of time. As indications for fluctuating occupation densities were likewise observed during excavations, gatherings from time to time of larger groups of people at Dosariyah are plausible.

A predominance of imported objects, considered as 'exotic items', can therewith be understood as integral components of rituals that were part of these gatherings. Based on the material evidence from Dosariyah, such collective social events were embedded in everyday life during the fifth millennium BC.

Zusammenfassung

Zwischen 2010 und 2014 wurden in Dosariyah, einer an der Küste des Arabischen Golfes in der Eastern Province in Saudi-Arabien gelegenen Fundstelle, neue Forschungen durch das deutsch-saudische Dosariyah Archeological Research Project (DARP) durchgeführt. Während der Ausgrabungen konnte in unterschiedlichen Bereichen der Fundstelle ein breites Spektrum an Funden innerhalb einer bis zu drei Meter mächtigen stratigraphischen Abfolge anthropogener Sedimente dokumentiert werden. Das Alter der Besiedlung wurde sowohl radiometrisch als auch durch vergleichende Artefaktstudien in die ersten Jahrhunderte des 5. Jahrtausends v. Chr. datiert. Ergänzt wurden die Ausgrabungen durch lokale geomorphologische Untersuchungen und einen archäologischen Survey.

Das Spektrum der materiellen Hinterlassenschaften in Dosariyah weist eine Reihe von Besonderheiten auf. Technologische und typologische Charakteristika des Steinartefaktinventars finden ihre Parallelen im Arabischen Mittelneolithikum. Insbesondere bifazial geschlagene, gestielte und geflügelte Pfeilspitzen sowie bifaziale Blattspitzen assoziieren das Inventar mit der *Arabian Bifacial Tradition*. Die auf die Herstellung von Abschlägen ausgerichtete Grundformproduktion ist wenig elaboriert, gleichzeitig finden als Ausgangsform für Werkzeuge häufig natürliche Silex-Trümmer Verwendung. Präparationsabschläge und Kerne geben deutliche Hinweise auf die lokale Herstellung von Steinartefakten an der Fundstelle. Auch Muschel- und Scheibenperlen, welche als persönlicher Schmuck interpretiert werden, zeigen deutliche Bezüge zum Arabischen Neolithikum.

Demgegenüber steht die Herkunft großer Mengen von bemalter Black-on-Buff Keramik, welche sowohl in Gefäßform und Verzierung als auch in der chemischen Zusammensetzung des Tons große Ähnlichkeit mit zeitgleichen Tongefäßen der Ubaid-Kultur Südmesopotamiens aufweist. Andere Aspekte materieller Kultur, welche ebenfalls mit Funden aus Mesopotamien assoziiert werden können, sind Ton- und Bitumenobjekte sowie Obsidianartefakte. Da in Dosariyah Hinweise auf ihre lokale Herstellung fehlen, muss bei diesen Objekten von Importen ausgegangen werden.

Ungeklärt dagegen bleibt der Ursprung der sogenannten Coarse-Ware, welche in Dosariyah mit einem Anteil von ungefähr 20 Prozent gefunden wird. Während auch hier Hinweise für eine lokale Herstellung der Keramik an der Fundstelle fehlen, unterscheidet sich das eingeritzte Dekor eines einzelnen Coarse-Ware Gefäßes sehr deutlich von allen aus Mesopotamien bekannten Verzierungsstilen.

Bis heute können diejenigen kulturellen und sozialen Mechanismen, welche hinter der Verbreitung importierter Objekte entlang der Küste des Arabischen Golfes liegen, noch nicht vollständig nachvollzogen werden. Die Vermutung, dass Arabische Gesellschaften während des Neolithikums im Vergleich zu den Gesellschaften Mesopotamiens nur wenig entwickelt waren, führte lange Zeit zu der unbegründeten Annahme, dass nur Seefahrer aus Mesopotamien für die Verbreitung der Importe im zentralen Golf verantwortlich sein könnten. Forschungen an Küstensiedlungen auf der Arabischen Halbinsel konnten hingegen nachweisen, dass insbesondere die Nutzung mariner Ressourcen eine große Rolle für die lokalen Gesellschaften spielte. Der Nachweis von Fischknochen von Meeresfischen in Dosariyah, welche ausschließlich jenseits der Küste zu finden sind, belegt die Befahrung des offenen Meeres. Demgegenüber gelang es in Dosariyah nicht, die Anwesenheit von Personen aus Mesopotamien eindeutig zu belegen. Als Konsequenz wird im vorliegenden Buch argumentiert, dass nicht mesopotamischen Seefahrern, sondern den Vertretern lokaler Gesellschaften, welche an den Küsten des Arabischen Golfes lebten, eine zentrale Rolle bei der Erlangung und Verbreitung der Ubaid-Keramik und anderer Importe zukam.

Zusätzlich zur Fischerei sowie dem Sammeln von Muscheln, stellte die Jagd auf ein breites Spektrum von Wildtieren sowie die Haltung von Ziegen, Schafen und Rindern einen wichtigen Beitrag zur Ernährung der Einwohner von Dosariyah dar. Eine derartig breite Subsistenzbasis kann als Schutz und Risikominimierung unter schwierigen Umweltbedingungen verstanden werden. Gleichzeitig hilft sie jedoch auch, einen kurzzeitig erhöhten Bedarf an Nahrung zu decken. Da während der Ausgrabungen an der Fundstelle deutliche Hinweise auf eine unterschiedliche Intensität der Besiedlung dokumentiert werden konnten, sind zeitlich begrenzte Zusammenkünfte größerer Bevölkerungsgruppen in Dosariyah denkbar. Die große Zahl importierter Gegenstände, welche als 'exotische Objekte' angesehen werden, können damit als zentrale Komponenten von Ritualen verstanden werden, die Bestandteile dieser Zusammenkünfte waren. Basierend auf den aktuellen Erkenntnissen aus den Forschungen in Dosariyah fanden derartige gemeinschaftliche soziale Ereignisse eingebettet in das tägliche Leben in einer Küstensiedlung des 5. Jt. v. Chr. statt.

المُلخَص

أجري بحثٌ جديدٌ خلال الفترة بين عامي 2010 و2014 م ضمن إطار مشروع البحث الأثري الألماني السعودي (DARP) في الدوسرية وهي منطقة أثرية تقع على شاطئ الخليج العربي في المنطقة الشرقية من المملكة العربية السعودية. أمكن خلال أعمال التنقيب توثيق تسلسل طبقي للترسبات والبقايا البشرية والعتور على مجموعة واسعة من اللقى في أماكن مختلفة من هذه المنطقة الأثرية على عمق يتراوح من من متر إلى ثلاثة أمتار. تم تأريخ الإستيطان في القرون الأولى من الألف الخامس قبل الميلاد بالإعتماد على المواد المشعة وعلى دراسة تعتمد على مقارنة القطع الأثرية، هذا وقد استكملت أعمال التنقيب بتطبيق دراسة جيومورفولوجية محلّية ومسح أثري.

تمتلك الآثار المادية التي عُثر عليها في الدوسرية العديد من السمات الخاصة، وقد أظهر جرد القطع الأثرية الحجرية خصائصاً تقنية وطبولوجية متشابهة مع مثيلاتها من العصر الحجري الوسيط في المنطقة العربية، مثل العثور على نصل حجري محفور لرأس سهم له جناحين وكذلك أنصال لها شكل ورقة الشجر المسنّنة التي أوجت جميعها بتقليد صناعة النّصل العربي. كانت أشكال المادة الخام الأساسية المستخدمة في الإنتاج غير متطورة، وبنفس الوقت لوحظ استخدام كسرات السليكات الطبيعية كمادة خام لصناعة أدوات العمل. تعطي الأجزاء المشغولة والحبوب التي عُثر عليها مؤشرات واضحة على الإنتاج المحلي لقطع الحجر ضمن المنطقة الأثرية، وكذلك المحار والصدف وقطع اللؤلؤ التي كانت على الأغلب تستخدم كحلي زينة شخصية تملك دلالات واضحة على العصر الحجري الحديث في المنطقة العربية.

ومن ناحية أخرى يعود أصل عدد كبير جداً من رسومات الفخار - المرسومة باللون الأسود على خلفية من اللون البني المصفر - إلى ثقافة عصر الغبيد التي كانت منتشرة جنوبي بلاد الرافدين نظراً لوجود تشابه بأشكال الجرار أو النزيينات أو عن طريق تشابه المكونات الكيميائية للصلصال المستخدم. كذلك الأمر فقد عُثر على مواد أخرى توجي بلقى من بلاد الرافدين بعضها مصنوعة من الصلصال والقيز وكذلك حجر السبع، ولعدم توفر الدليل الكافي في الدوسرية على أنها منتجات محلية فيعتقد باستيرادهم من مناطق أخرى.

أما أصل المنتجات الفخارية الخشنة والتي عُثر عليها في الدوسرية بنسبة 20% تقريباً بقي غير معروفاً، وعلى الرغم من عدم توافر دلالات على الإنتاج المحلي للفخار هنا فإن الفرق واضح بين المنتجات المزينة بالتحزيز والقطع المزينة من بلاد الرافدين.

لا يمكن حتى اليوم فهم الآلية الثقافية والاجتماعية التي تقف خلف انتشار استيراد العناصر على طول ساحل الخليج العربي. هذا ويعتقد أن المجتمعات العربية خلال العصر الحجري الحديث لم تكن متطورة بشكل كافٍ بالمقارنة مع بلاد الرافدين، مما قاد إلى أن البحارة من بلاد الرافدين فقط هم من كانوا مسؤولين عن التوريد إلى وسط الخليج، وعلى العكس من ذلك فقد أظهرت البحوث المتعلقة بالمستوطنات الساحلية في شبه الجزيرة العربية أن الموارد البحرية كانت تلعب دوراً رئيسياً في حياة السكان المحليين. كما أن العثور على عظام الأسماك البحرية في الدوسرية والتي لا يمكن العثور عليها إلا في الجانب الآخر من الساحل، لهو دليلٌ آخر على استكشاف البحر والوصول إلى هناك، وفي المقابل لم يتسنى إثبات تواجد واضح لأشخاص من بلاد الرافدين في الدوسرية، وكنيجة لذلك يبرهن هذا الكتاب أن الدور الرئيسي لاستيراد ونشر فخار عصر الغبيد وغيرها من الواردات لم يكن لبحارة بلاد الرافدين وإنما قام به مندوبين من سكان محليين مقيمين على ساحل الخليج العربي.

هذا وقد ساهمت تربية الماعز والأعنام والبقير بشكل رئيسي في تأمين المواد الغذائية لشعب الدوسرية بالإضافة إلى الصيد وجمع المحار، ويعد ذلك من عوامل الإكتفاء الذاتي التي تؤمن الحماية وتقلل من المخاطر أثناء الظروف البيئية القاسية، وفي نفس الوقت تساعد على تغطية الحاجات المتزايدة بشكل مفاجئ على مدى قصير، وبما أنه أمكن توثيق أدلة هامة أثناء التنقيبات تثبت إمكانية وجود كثافة استيطانية فقد قاد ذلك إلى التفكير بتجمعات بشرية كبيرة بأوقات متقاربة في الدوسرية يمكن أن يعود إليها عدد كبير من الأشياء المستوردة على أنها «عناصر غريبة نادرة» استخدمت في ممارسة طقوس محددة. استناداً إلى نتائج البحوث الحالية في الدوسرية فقد كانت هناك فعاليات اجتماعية مشتركة تنتمي إلى الحياة اليومية في مستوطنة ساحلية تعود إلى الألف الخامس قبل الميلاد.

Acknowledgements

The Dosariyah Archeological Research Project (DARP) and the results presented in this monograph could not have been achieved without the collaboration of institutions, colleagues, students and friends. DARP was established as a joint archeological research project between the Saudi Commission of Tourism and National Heritage (SCTH) and the University of Tübingen. Financial support for the project was kindly provided by the German Research Foundation (DFG), research grants DR824/1-1 and DR824/1-2, the University of Tübingen (Förderung für Nachwuchswissenschaftler) and SCTH. Additional institutional support came from the German Embassy in Riyadh.

Hans-Peter Uerpmann, Margarethe Uerpmann (University of Tübingen), Ricardo Eichmann (German Archeological Institute) and Abdulhamid M. al-Hashash (Dammam Archeological Museum) were crucial for the success of the project. While Margarethe and Hans-Peter Uerpmann provided help and advice during the whole process of research and funding application, fieldwork and the study and interpretation of finds, Ricardo Eichmann initially opened the door for my work in Saudi Arabia. Abdulhamid al-Hashash welcomed me with great openness in Dammam. Without his enthusiasm in the field of archeology, work at Dosariyah would not have been possible at all.

The research application for reinvestigations at Dosariyah was well received by the scientific research committee of the Saudi Commission for Tourism and Antiquities (SCTA), now the Saudi Commission for Tourism and National Heritage (SCTH). I would like to express my sincere gratitude to Ali I. al-Ghabban, Vice-President of SCTH and Supervisor of the Custodian's Project for Caring of Kingdom's Cultural Heritage for his ongoing interest and support of the project. My special thanks to Daifallah al-Thali, Khalid M. Escoubi, Abdulaziz S. al-Ghazzi and Jamal S. Omar, Directors for Survey and Excavation during different stages of the project for their great help and unequalled cooperation. In addition, I would like to thank sincerely Abdullah H. Masry, whom I met in Riyadh in 2012. He kindly allowed me to study and copy all his field notes and photographs from his investigations at Dosariyah that remained in his private library. I was very impressed by the accuracy and thoroughness of his documentation.

During the planning phase of the project I benefited from the broad expertise of Nicholas Conard (University of Tübingen), Mirko Nowak (University of Bern), Peter Jablonka (University of Tübingen) and Simone Riehl (University of Tübingen). Collaborating researchers from the outset of the project were Canan Çakırlar (University of Groningen), Katleen Deckers (University of Tübingen), Corina Knipper (CEZ Mannheim), Simone Riehl (University of Tübingen) and Hans-Peter Uerpmann (University of Tübingen). Additional colleagues became more deeply involved as the data and research questions grew: Christoph Berthold (University of Tübingen), Shumon Hussein (University of Leiden), Christine Kainert (Free University of Berlin), Felix Levenson (Free University of Berlin), Peter Magee (Bryn Mawr College), Susan Mentzer (University of Tübingen), James Nebelsick (University of Tübingen), Adrian Parker (Oxford Brookes University), Martin Posselt (Posselt and Zickgraf GbR), Margarethe Uerpmann (University of Tübingen) and Thomas van de Velde (Ghent University). I would like to thank them all for their efforts in answering the many questions resulting from the fieldwork at Dosariyah as well as their encouragement and professionalism.

Over the whole course of the project, Susan Pollock (Free University of Berlin) and Rob Carter (UCLQ) have closely followed the research at Dosariyah and I would like to thank them very much for all their thought-provoking input.

The fieldwork at Dosariyah would not have been possible without the kind support from colleagues working at Dammam Archeological Museum. In particular I would like to thank Azzhr al-Toobi and Hassan Hamdoun for their willingness to participate in the fieldwork. I very much appreciated their true enthusiasm in the field. During my first stay at Dammam Archeological Museum in 2008 I was introduced to Mahmoud al-Hijri who became a trusted friend during subsequent field campaigns. Finally, I have to thank Nabil al-Shaikh. His serenity was of great help especially during the more hectic phases of fieldwork.

My grateful thanks also to all students and postgraduates who participated in the field campaigns between 2010 and 2013: Sirwan Ali, Gregor Bader, Julian Bega, Chris Britsch, Frank Brodbeck, Andrej Girod, Tobias Helms, Simon Herdt, Michael Herles, Georg Häussler, Benni Höpfer, Shumon Hussein, Christine Kainert, Felix Levenson, Stefan Piefel, Mathias Probst, Martin Riesenberg and Alexander Städler. It must have been hard for them to stay close together in the outskirts of Jubail in a fancy hotel for weeks, but I hope that they were able to take home something beyond profession: life experience.

The quality of the individual chapters of the final book was considerably improved by reviewers who were not directly involved in the Dosariyah Archeological Research Project. I fully acknowledge the detailed comments and suggestions of Rob Carter, Rémy Crassard, Susanne Lindauer, Alicia Ventresca Miller, Leah Minc, Kris Poduska, Susan Pollock, Seth Priestman and Vince Van Thienen. Of course, all remaining errors are solely my and the authors' responsibilities.

My special thanks go to the BFSA Monograph Series editors St John Simpson and Derek Kennet. Their thorough assistance and verve safely guided me during the publication process.

Lastly, I would like to thank Barbara and Anna. They not only tolerated my frequent absences from home during various field seasons and additional periods in Saudi Arabia, but too many times also accepted my distractions from everyday life during the different phases of the project.

Philipp Drechsler

May, 2018

Preface

The present monograph on reinvestigations at Dosariyah follows two research objectives. First, it outlines the results of fieldwork at this site and its immediate surroundings in the Eastern Province of the Kingdom of Saudi Arabia and comprehensively documents the range of material culture found during the archeological surveys and excavations. The time span of occupation is closely dated by an extensive series of radiocarbon dates and artefactual analyses which securely place the Neolithic settlement into the first half of the fifth millennium BC. The finds from Dosariyah presented in this book also serve as an important benchmark for less well-dated archeological contexts in eastern Arabia and therefore represent a substantial basis for future research in the region.

Second, this monograph challenges several basic axioms of archeological research in the Arabian Gulf.¹ For decades, the proverbial ‘seafaring merchants of Ur’ — or people from southern Mesopotamia in general — were seen as the driving force behind the distribution of Ubaid pottery and other ‘foreign’ elements of material culture in the Arabian Gulf during the fifth millennium BC. Dosariyah has the distinction of being the site with the highest number of imports, both in terms of counts and diversity of finds, but the presence of southern Mesopotamian people here, or at any other site in this region, remains unproven. Instead arguments are presented which suggest that an indigenous Arabian Neolithic population living along the shores of the central Gulf played an active role in the acquisition of goods from southern Mesopotamia. Being familiar with the exploitation of marine resources from the open sea, these people living at Dosariyah and other contemporaneous settlements along the shores of the Arabian Gulf were plausibly the agents that determined the (re)distribution of material elements of southern Mesopotamian material culture in the central Gulf. Moreover, aspects of environmental conditions, everyday life and material culture are also presented.

The first part of the monograph introduces the site and its immediate surroundings. **Chapter 1** reveals the history of research and contextualizes Dosariyah in terms of its environment and archeology. A more detailed analysis of the site’s environmental history and its change through time is presented in **Chapter 2**. Geomorphological and paleoenvironmental studies focus especially on the fluctuating sea level of the Arabian Gulf during the Holocene, but also consider the development of wide sabkha flats that form a prominent feature in the landscape around Dosariyah. The Dosariyah survey, covering the direct vicinity of the site, is outlined in **Chapter 3**. It takes a diachronic perspective and considers human activities in the wider surroundings from the Neolithic to modern times. Geophysical surveys carried out at Dosariyah are presented in **Chapter 4**. Although not successful in detecting architectural remains, these investigations clearly suggest the presence of anthropogenic accumulations beyond the central fenced area of the site. **Chapter 5** introduces the archeological methodology and excavation techniques, interprets the distribution of finds collected from the surface of the site prior to excavations and describes the excavated stratigraphy and deposits. **Chapter 6** completes this first part of the monograph and compiles all radiometric and archeological data which help to date the occupation at Dosariyah.

The second part of the monograph focuses on the varied material culture recovered from the excavation. Most prominent are finds of thousands of sherds of (partly painted) Ubaid pottery, deriving from vessels imported from southern Mesopotamia. Supplemented by coarse ware of unknown origin, the pottery assemblage from Dosariyah, presented in **Chapter 7**, is the largest excavated in the Arabian Gulf so far. Geochemical analyses of selected pieces of pottery are discussed in **Chapter 8**. **Chapters 9** and **10** describe objects that also fall into the realms of ceramics: reworked pottery and fired clay objects. The spectrum of artefacts made from stone, bone and shell are presented in subsequent Chapters 11 to 15. The lithic industry outlined in **Chapter 11** provides conclusive evidence for the presence of indigenous Arabian populations inhabiting Dosariyah, while a foreign, probably Mesopotamian lithic technology is exclusively restricted to artifacts made from imported raw material. A morphometric study of arrowhead shapes, presented in **Chapter 12**, convincingly documents the morphological homogeneity of arrowheads and suggests occupation by a single, culturally homogeneous, group of people. A group of ground-stone artifacts rarely observed in Neolithic contexts in eastern Arabia are objects made from hematite discussed in **Chapter 13**. While this generally represents a suitable raw material for stone tools, the blood red color that can be obtained from ground hematite might have been used for decorative or ceremonial purposes as well. A rich bone

¹ I am fully aware of the political dispute about the naming of the Persian — or Arabian, depending on one’s point of view — Gulf. According to international organizations including the United Nations and the International Hydrographic Organization and historical sources, the term Persian Gulf is generally preferred. The use of this name, however, would be rejected by the majority of our colleagues from Saudi Arabia. Having taken advantage of their invitation to carry out research in Saudi Arabia and therefore feeling personally committed, I have decided to follow the tradition of archeologists working in the Arabian Peninsula and term the waters ‘Arabian Gulf’.

industry described in **Chapter 14** represents a little-known aspect of Middle Neolithic material culture in Arabia. Repeated finds of production waste prove the on-site production of bone tools while a restricted spectrum of bone tool types suggests a considerable degree of tool standardization. Important indicators for the cultural affiliation of the people settling at Dosariyah are pieces of personal adornment which are presented in **Chapter 15**. **Chapters 16 to 19** consider two unusual groups of artefacts: bitumen objects and pieces of plaster. Detailed morphological studies and a broad range of analytical methods have been employed to analyze their origin and use at Dosariyah. **Chapters 20 to 23** focus on subsistence strategies. The analysis of the zooarcheological assemblage (**Chapter 20**) allows detailed insights into both the terrestrial and marine component of everyday diet. It emphasizes the broad spectrum of exploited animals which include both domesticated and wild species. Additional isotopic analyses of cattle teeth (**Chapter 21**) help to understand patterns of animal husbandry and mobility. These studies are supplemented by analyses of marine shell (**Chapters 22 and 23**) which highlight the importance of this particular marine resource for the inhabitants of the site. Finally, the concluding **Chapter 24** subsumes the results from individual studies with the aim of drawing a comprehensive – though fragmentary – picture of the community living at Dosariyah during the first half of the fifth millennium BC.

Chapter 1

The Site and its Context

Philipp Drechsler

1 Location

Dosariyah is located 10 km south of the old town of Jubail in the Eastern Province of the Kingdom of Saudi Arabia, approximately 1 km inland from the present shores of the Arabian Gulf (**Figure 1.1**). Surrounded by salt flats (sabkhas), the archeological site is situated within a shallow trough or valley close to the southern edge of a raised area surmounting the sabkhas by up to 14 m. The name of the site refers to the local family of al-Dossary who in the past used the area as a preferred grazing ground.

The immediate surroundings of the site were still wilderness as late as 2008, when only a few tents and small wooden houses used for leisure activities at weekends as well as corrals for sheltering camel, sheep and goat, existed in the area. During archeological fieldwork at the site between 2010 and 2013, however, extensive construction activities were begun to the north of Dosariyah as new residential neighborhoods were built for the growing population of Jubail. The infill of sediment and rubble into the salt flats as well as earth-moving in connection with these construction activities represented major obstacles for both archeological and geomorphological surveys in the area. In 2015, construction work began directly west of the site with heavy bulldozing, which reached the fenced area of the site. It is therefore foreseeable that at least the archeological and geomorphological context of the site will be completely destroyed during the next few years.

2 History of Research

The history of research at Dosariyah falls into three different phases: its initial discovery in 1968, archeological excavations and scientific studies during the early 1970s, and the joint Saudi-German Dosariyah Archeological Research Project (DARP) between 2010 and 2014.

2.1 Initial discovery

Dosariyah was initially discovered in 1968 by Grace Burkholder, a school teacher for the Arabian American Oil Company (ARAMCO) in Dhahran, amateur

archeologist and enthusiastic 'pot picker'.¹ While scouting for pottery fragments in the windswept salt flats south of Jubail she came to the site which she named 'site 1' in subsequent publications and maps, stating it was 'carpeted with debris'.² Not being familiar with the kind of decorated pottery that was frequent at the site, Burkholder contacted Geoffrey Bibby of the Danish archeological expedition to the Gulf, which was then visiting archeological sites in the Eastern Province of Saudi Arabia.³ Bibby identified the pottery as Ubaid pottery known from archeological sites in southern Mesopotamia. He further concluded from a short reconnaissance study of the area: 'Here (...) was a strip of low sandy hills fencing the sabkha off from the sea. It must have been a string of islands, I thought, six and seven thousand years ago, when the sabkha was sea. There were no traces of buildings, Grace went on, but there were pieces of plaster showing a smooth face on one side and the impress of bound bundles of reeds on the other'.⁴ With an approximate dating to the fifth millennium BC, Burkholder's discovery of Dosariyah extended the 'range of the Ubaid culture by nearly a thousand kilometers', but also 'added a millennium to Saudi Arabia's prehistory'.⁵ By 1972, Burkholder had identified as many as 39 locations with fragments of Ubaid pottery, including the sites of Abu Khamis in the Ras al Ghair area (quoted as site 11), and Khursaniyah (quoted as site 2).⁶ While most sites with Ubaid pottery that were found by Burkholder north of Jubail are located close to the present-day coast, inland sites also occur towards the south and these are often situated along the edges of sabkhas. In addition, sites identified in al-Hasa oasis and around Ain Dar and Abqaiq also provided pieces of Ubaid pottery. Although Burkholder did not provide a detailed list of objects she collected from the surface of Dosariyah, most of the pieces of jewelry, flint and obsidian implements and of painted Ubaid pottery illustrated in her initial publication are now (2014) on display in the National Museum in Riyadh.⁷

¹ Burkholder 1972: 264.

² Burkholder 1972: 264; see also 1984.

³ Bibby 1970: 376.

⁴ Bibby 1970: 376.

⁵ Burkholder 1972: 264.

⁶ Burkholder 1984: 17.

⁷ Cf. Burkholder 1972.

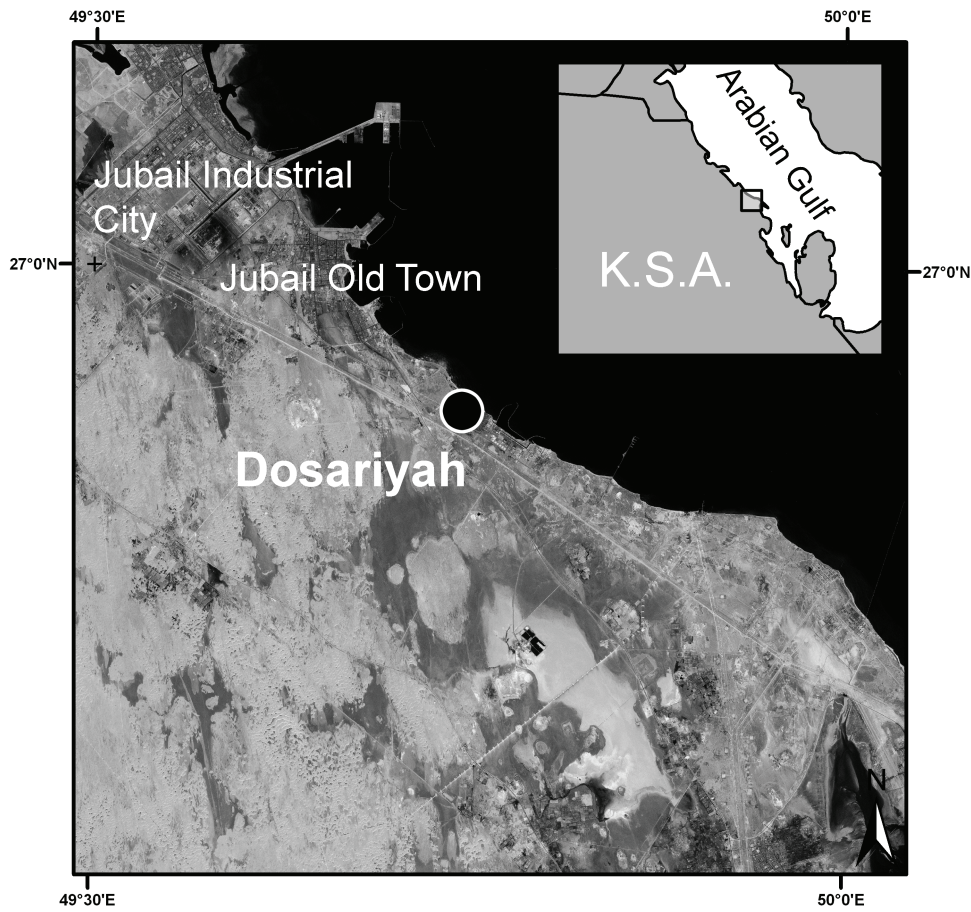


Figure 1.1. Location of Dosariyah south of Jubail Old Town.

2.2 First excavations and scientific studies

After examining the pieces of painted Black-on-Buff pottery that Burkholder had collected at Dosariyah and other sites in the Eastern Province, Bibby called for immediate investigations of those findings and of the underlying mechanisms of their distribution. These field investigations were subsequently carried out in spring 1972 by Abdullah Masry, then a PhD student at the Oriental Institute in Chicago and a member of the Saudi Arabian scholarship program for higher studies abroad. Based on this fieldwork, Masry presented his dissertation, which was supervised by Robert McC. Adams and Robert J. Braidwood and entitled *Prehistory in Northeastern Arabia: The Problem of Interregional Interaction*, to the Department of Anthropology at the University of Chicago in June 1973.⁸

Originally planned as a collaborative field project involving four students from Chicago, only Juris Zarins was finally able to take part in the work in Saudi Arabia. The field investigations carried out by this expedition

were called 'Al Hasa Expedition – The Ubaid Sites Project. Winter/Spring 1972' and consisted of five main parts: 1) test excavations at Ain Qannas in the Al Hasa area; 2) excavations at Dosariyah and surveys in the surrounding coastal zones; 3) test excavations and surveys around Abu Khamis; 4) excavations at several locations on Tarut island; and 5) surveys in the Jabrin oasis.⁹ Over the course of these investigations Masry's field investigations considered all areas and the most substantial sites identified by Burkholder.

The field expedition began on March 1, 1972 when Masry left Riyadh together with four assistants: two field surveyors, a driver and a cook and after nearly two months of 'trials and tribulations involving financial, logistic, personnel and a host of other matters and complications'.¹⁰ After investigations at Ain Qanas (site 18 according to Burkholder's enumeration), Masry and his field team reached Dosariyah on March 23.

⁹ Masry 1974: v.

¹⁰ Field notes by A. Masry. The original field notebook as well as all other field documents and photographs have been made accessible to the author by courtesy of A. Masry and are henceforth referred to as Masry 1972.

⁸ Masry 1974.

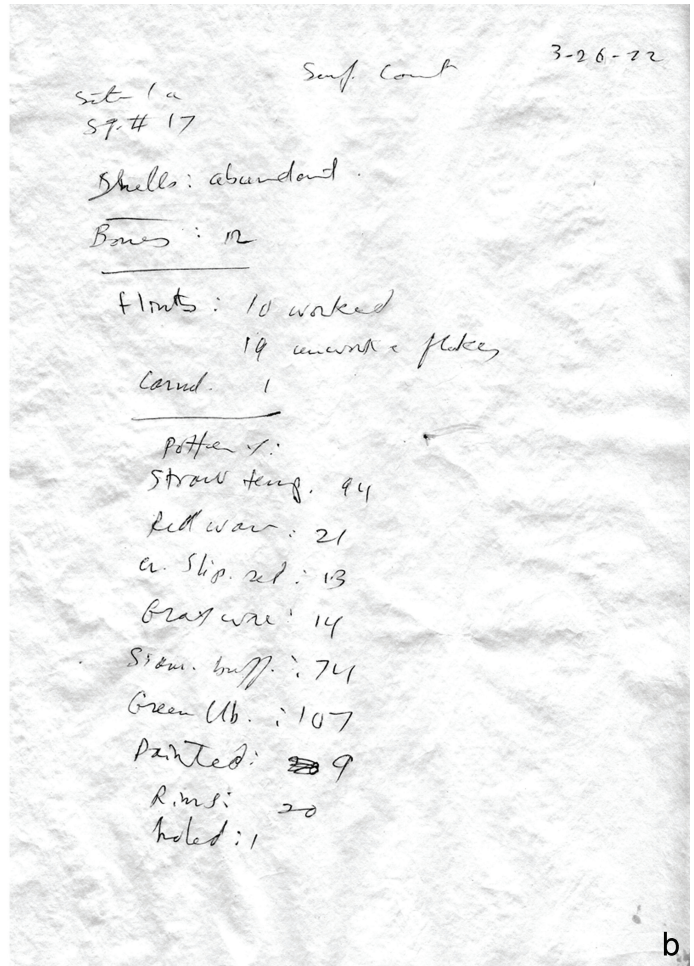
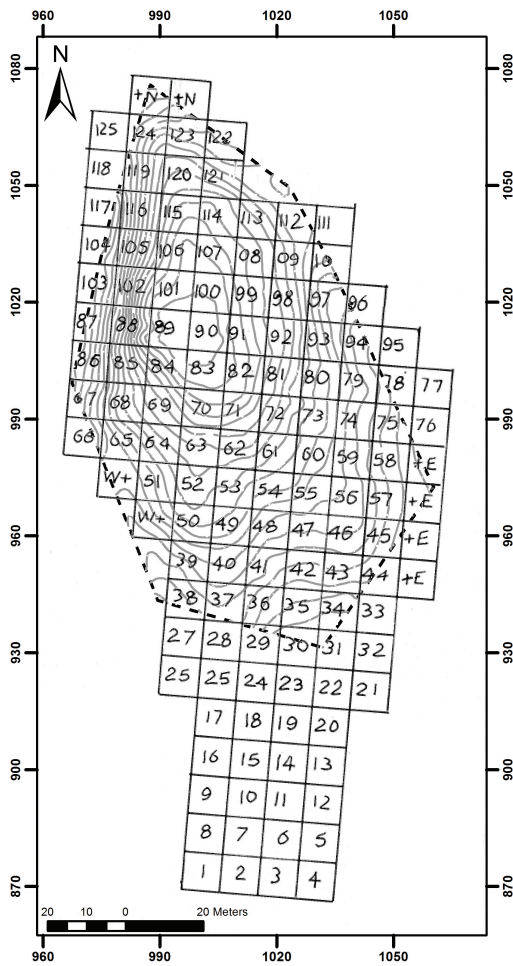


Figure 1.2. a Location and orientation of Masry's surface survey grid in relation to the grid used by the Dosariyah Archeological Research Project. b Field notes from surface sampling (courtesy A. Masry 2013).

Inspections of the site area identified two different parts which were subsequently labelled site 1a (the main site) and a smaller site (site 1b) located approximately 500 m to the north.¹¹ Also noteworthy was a thick vegetation cover at the site, in sharp contrast to the dune-covered surroundings. As no workmen were available in Jubail, fieldwork at Dosariyah started on March 25 with topographic surveys and collection from the surface of the site. To do this systematically, a square grid measuring 10 x 10 m was established (Figure 1.2a) and each square collected separately during the next few days until March 28. Based on the color of paste and treatment, Masry established a 'rough typology of the pottery', which was used for the classification of ceramics (Figure 1.2b).¹²

Excavations at Dosariyah started on March 28 with sondage I, located in square 89 at the western steep slope of the site and measuring 2 x 2 m (Figure 1.3). In

this area, dense and thick layers of shell were unearthed immediately below the surface. According to Masry's field notes, excavations were carried out in spits measuring between 20 and 40 cm in depth. Down to a depth of 1 m Masry noted: 'What is remarkable about the finds until now is that they duplicate 1:1 those lying scattered on the surface, in terms of variety'.¹³ On the next day, and at a depth of 1.6 m below the surface, the 'same variety of artefacts and finds' was noted. At that point, 'the trench sides fell down before we dug any deeper below [level] 4. The dryness and looseness of sand plus wind blow [one word unreadable] to make of the trench walls a very fragile easily crumbling sides: A level 5 was partially exposed before the trench collapsed'.¹⁴

Until April 8, a total of seven soundings were excavated in squares 83, 88, 89, 90 and 92, with each sounding measuring 2 x 2 m (Figure 1.4). During the excavation of sondages I to IV in squares 88 and 89 at

¹¹ Site 1b is located only 330 m to the north, measured from the highest point of Dosariyah.
¹² Masry 1972: March 26.

¹³ Masry 1972: March 29.
¹⁴ Masry 1972: March 30.

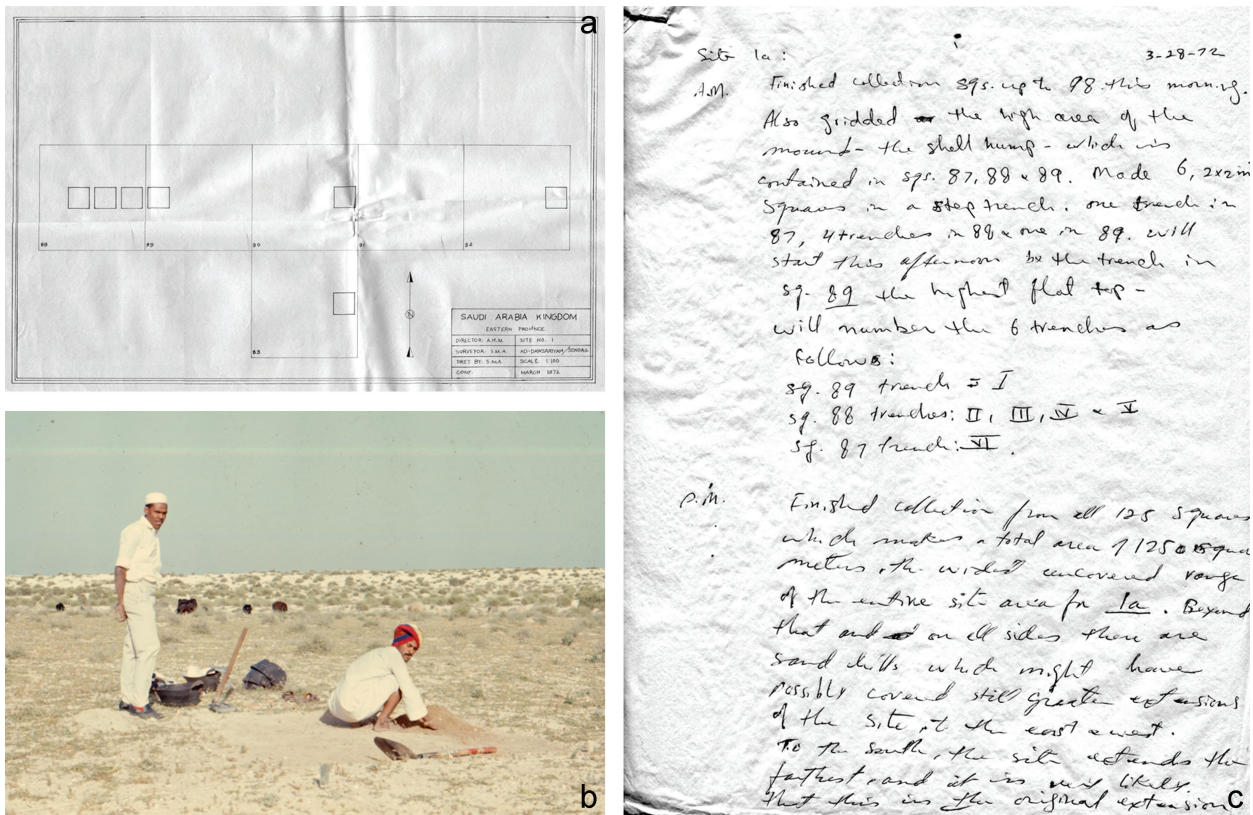


Figure 1.3. a Location of soundings in squares 83, 88, 89, 90 and 92. b The beginning of excavations at Dosariyah. c Field notes, March 28, 1972 (courtesy A. Masry 2013).

the westernmost part of the site, Masry noted that the succession of sediment layers did not only dip to the east, but also came increasingly closer to the surface – suggesting a west–east dipping of the underlying paleotopography of the site.¹⁵ Further on, at this early stage of excavations and on the basis of massive layers of shell and the absence of plaster pieces, Masry proposed that the western part of the site once represented a dumping area of a settlement further east.¹⁶

On April 4 investigations moved temporarily towards site 1b. After surface collection, one sounding (A) was excavated that indicated only a very shallow occupation in this area.¹⁷ As site 1b did not show potential for further work, Masry returned to site 1a and began excavating sondage VII, located in square 92. Excavating this sounding down to a depth of 2.4 m, higher densities of pottery and flint but less dense shell accumulations led him to conclude that ‘It seems that, when in the east side of the site there must have existed more dense occupation than near the shell mound’.¹⁸ In the afternoon of April 8, 1972, after 10 days of field

investigations at Dosariyah, Masry stopped excavations at the site and returned to Dammam the next day.

The results of Masry’s investigations at Dosariyah were published in his dissertation submitted in June 1973.¹⁹ A republication in 1997 uses the original manuscript with some minor changes in both the text and figures.²⁰

2.3 Dosariyah Archeological Research Project (2010–2014)

The Dosariyah Archeological Project arose from my first visit to the site in October 2008. At that time, I was kindly invited by the Saudi Commission for Tourism and National Heritage (SCTH) to visit Neolithic sites in the Eastern Province for potential joint excavation and research projects. Enthusiastically guided by Abdulhamid al-Hashash, then head of the Dammam Archeological Museum, and Mahmoud al-Hijri, one of his colleagues, we went northwards from Dammam to visit the sites of Dosariyah and Abu Khamis. Although Abu Khamis was much more impressive both in its size and scenery, Dosariyah looked more promising for the study of an Arabian Neolithic coastal community in the

¹⁵ Masry 1972: March 30; 1974: 121.

¹⁶ Masry 1972: March 30.

¹⁷ Masry 1972: April 5.

¹⁸ Masry 1972: April 5.

¹⁹ Masry 1974.

²⁰ Masry 1997.

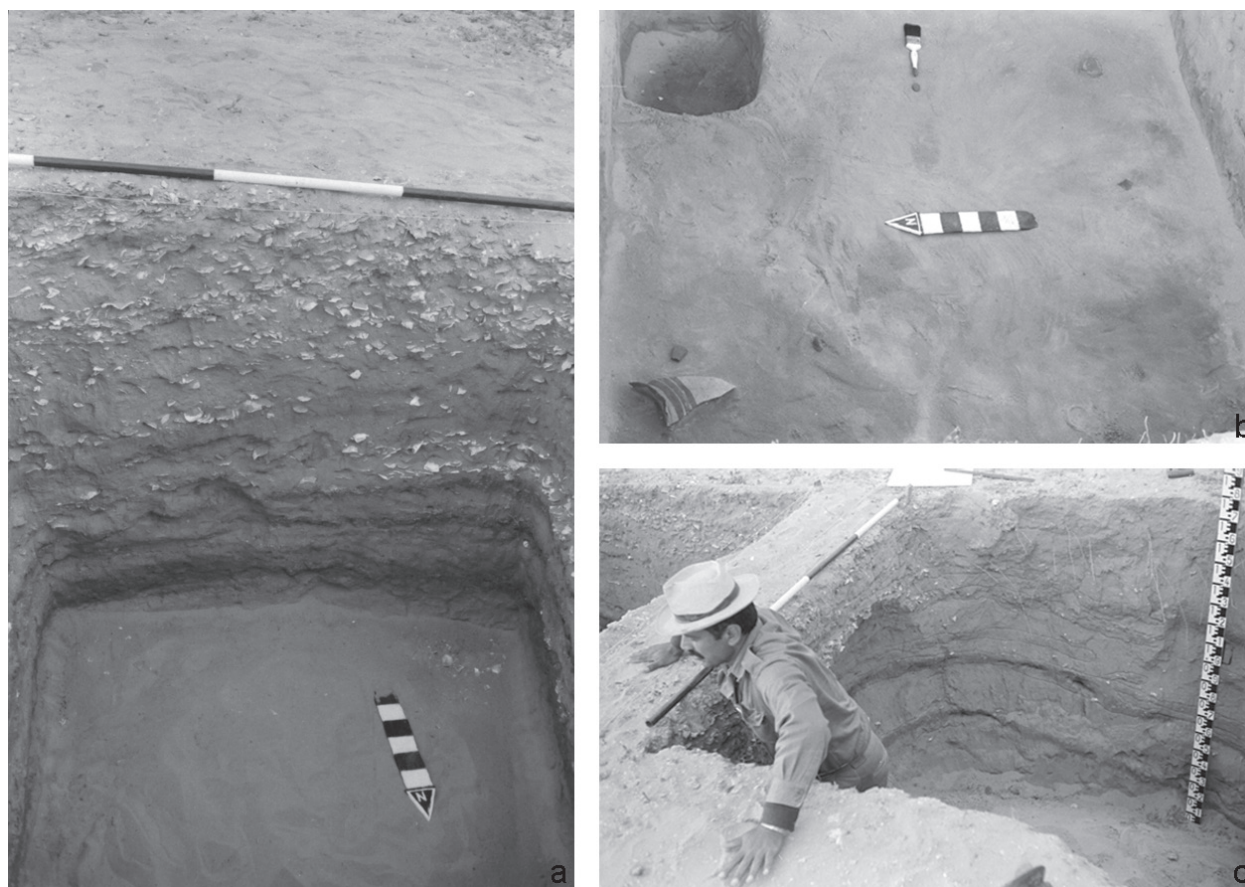


Figure 1.4. Excavations at Dosariyah, 1972. **a** Sondage II. **b** Sondage IV, level 2. **c** Sondage I: survey engineer Salah al Helwa leaves the trench (courtesy A. Masry 2013).

central Gulf area. The surface of the site was littered with archeological remains, and animal burrows suggested the presence of ashy material indicative of substantial activities all over the well-fenced site. Further on there was no evidence of a later settlement at the site after the Neolithic, but limited amounts of modern rubbish suggested some kind of occupation during the short period of time between Masry's excavations in 1972 and the fencing of the site in the early 1980s.

Although my initial visit did not last longer than 30 minutes, the potential of the site for reinvestigations was clearly evident given its size, preservation conditions and densities of material remains. Masry's previous excavations had furthermore proved the deep stratification of the site that led to my expectation that the occupation at Dosariyah covered at least several centuries. In addition, fieldwork at Dosariyah would provide the opportunity to fill the geographical gap between two other Middle Neolithic sites investigated at that time in the Gulf: H3/As-Sabiyah in Kuwait, excavated by Rob Carter and Harriet Crawford between 1998 and 2004 and finally published in 2010,²¹ and Dalma

11 in the Abu Dhabi Emirate, excavated by Katelin Flavin, Elizabeth Shepherd and Mark Beech.²² A first proposal for the establishment of a joint Saudi-German research project focusing on excavations at Dosariyah was kindly approved by SCTH (formerly SCTA) in 2009 and extended in 2013. A research grant from the Deutsche Forschungsgemeinschaft (DFG) provided the financial background for all investigations.

Investigations of the Dosariyah Archeological Research Project (DARP) were intended to center on four main research questions:

- what are the economic and cultural roots of the Neolithic in the eastern part of Arabia?
- what characteristics of the Arabian Neolithic are the results of economic and social adaptations to local environmental conditions?
- what kinds of resources were used during the Middle Neolithic occupation of eastern Arabia?
- which kinds of relationships existed between the Arabian Neolithic and the Ubaid culture of Mesopotamia?

²¹ Carter and Crawford 2010a.

²² Flavin and Shepherd 1994; Beech and Elders 1999; Beech *et al.* 2000; 2016; Beech and Glover 2005.

To approach these questions, the project was at first planned for three years, with field seasons taking place both in the spring and fall. Nevertheless, uncomfortable climatic conditions with heat and heavy winds during the first fall season forced a change of plan, with only one excavation season per year. It therefore became necessary to extend the project until 2014.

A first field season took place for five weeks in February and March 2010. Together with two archeologists from Dammam Regional Museum, Azzhr al-Toobi and Hassan Hamdoun, three test trenches, measuring 2 x 2 m and 2 x 3 m, were excavated by the German team in the central, southern and eastern part of the site. Although one of the major goals of the campaign, the documentation of the site's complete stratigraphy, was only reached in trench S1 due to the massive collapse of trenches, results from this campaign clearly demonstrated the potential of Dosariyah, especially the high density of finds in all parts of the site and the unexpectedly excellent preservation of fish and mammal remains. In contrast, the absence of any evidence of architectural remains was somewhat disappointing. Datable material was retrieved during excavation and provided the basis for a first series of four AMS radiocarbon dates from *Pinctada radiata* (pearl oyster) shell that all fell within the fifth millennium cal. BC.²³

The second field season in October and November 2010 suffered from extreme heat. Nevertheless, the start of larger-scale excavations in the southern part of the site was promising as we were able to document a total of 10 natural pearls among many other finds from trench S2. Again, evidence of architecture remained elusive. As in the previous season, Azzhr al-Toobi and Hassan Hamdoun from Dammam Regional Museum joined the excavations.

As a consequence of the first two seasons, the consecutive third field season in spring 2011 started with geophysical investigations aimed at locating architectural remains. Both geomagnetic and georadar measurements were carried out within the fenced area of the site and within a restricted area further south by Martin Posselt from Posselt and Zickgraf GdR. While geomagnetic measurements did not work particularly well due to severe disturbance caused by the metal fence, results from georadar survey indicated several hot spots for potential architecture. Archeological excavations during that season focused on the complete excavation of trench S2 down to the natural soil.

The large number of archeological remains prevented the study of finds during the field seasons. It was therefore decided to reserve the fall 2011 season for analysis and documentation of the objects retrieved

during previous excavation seasons. In addition to laboratory work, one week was spent at the site to test one area (trench N2) suggested by georadar investigations and to trial a new excavation technique that would prevent the collapse of large and deep trenches. In February and March 2012, excavations took place in both the northern and eastern part of the site and these were actively supported by colleagues from Dammam, Riyadh and Doha. The goal to document the full stratigraphic sequences in these parts of the site necessitated the establishment of two large trenches, each measuring 8 x 8 m (E1.1, N3). An additional extension by 2 m to the west became necessary for trench E1.1 due to the presence of a single installation. Towards the end of the season, Robert Carter and Susan Pollock visited the excavations at Dosariyah and during this time, an excursion was organized which led us to Tarut, Al Hasa and Abu Khamis.

A second season that was dedicated to the analysis and documentation of finds took place in October 2012. During a week in the storerooms of the old National Museum in Riyadh, the inventory of objects from Masry's excavations at Dosariyah in 1972 was documented and the finds partly redrawn. During a short meeting with A. Masry permission was kindly granted to study the field notes from his investigations during the next months. Afterwards, the mission moved to Dammam. Kindly hosted by A. al-Hashash at the provisional offices of the Dammam Regional Museum, almost all the objects recovered during the previous field seasons were studied in detail.

A short visit in Riyadh in February 2013 was reserved for the study of Masry's field notebooks and photographs. As the amount of written and photographic record that was available clearly exceeded all my expectations, I obtained permission to make copies of most of the material for subsequent detailed evaluation. In November 2013, intensive foot surveys were carried out in the vicinity of Dosariyah with the aim of contextualizing the site. Short visits in search of flint raw material sources and additional Middle Neolithic sites led the team to Thaj and Khursaniyah. In addition, geomorphological studies were carried out by Adrian Parker and Mike Morley over 10 days.

In parallel with the writing of this monograph, a two-day symposium was held at the University of Tübingen in June 2014 during which contributors of this book and external specialists met for discussions about the essential results of the Dosariyah Archeological Research Project. One major goal of this workshop was to address the research questions formulated at the very beginning of the project in light of the fieldwork results and the study of finds.

²³ Drechsler 2011: 74.

3 Environmental Context

Dosariyah is located in the central coastal lowlands of the Eastern Province of Saudi Arabia, about 800 m inland from the present shores of the Arabian Gulf. The central coastal lowlands stretch along the coast approximately between As Saffaniyah in the north to Dhahran in the south, while they are bordered by the northern Summan plateau in the west.²⁴ They are characterized by moderate relief. The surface is generally covered by sands although limestone exposures are frequent. In the coastal area, wide sabkhas predominate while in the southeast up to Jubail, barren and unstable sand dunes represent the northward extension of the al-Jafurah desert.²⁵

3.1 Climate

Today, most parts of the Arabian Peninsula form part of the Old World Dry belt, spanning Mauritania in the west, across North Africa and Arabia and into central Asia. According to the Köppen-Geiger climate classification system, BWh climatic conditions prevail. Precipitation is less than 50% of potential evaporation, with an average annual temperature above 18°C.²⁶ With its geographical position around 27° northern latitude, Dosariyah is located within the sphere of the northeasterly trade winds, clearly north of the northernmost extension of the Inter Tropical Convergence Zone (ITCZ) during the Boreal summer.

The region has a desert and semi-desert climate, characterized by high summer temperatures and aridity throughout the year (**Figure 1.5a-d**). The mean annual temperatures recorded from the region are 26.5°C (Dhahran) to the south of Jubail,²⁷ and 26.5°C (Abu Kharuf) and 26.5°C (Abu Ali) to the north.²⁸ The mean July temperature at Dhahran is 35.8°C and 15.8°C for December. Extreme temperature values range between 49.2°C and 4.1°C at Abu Kharuf and 44.3°C and 12.1°C at Abu Ali. The average annual rainfall for the region is 85 mm with high inter-annual variability (**Figure 1.5e**). Mandaville reported annual rainfall values between 5 and 277 mm at Dhahran which is confined to the winter months from October to early May.²⁹ Predominant sources of rainfall are Mediterranean depressions³⁰ supplemented by local convection cells, cyclonic depressions that develop in front of the Zagros Mountains above Iraq and eastern Iran and currents from equatorial areas in Sudan and Ethiopia.³¹ Due to high temperatures, evaporation rates range from 35 up

to 100 times the local mean annual rainfall, resulting in a very high water deficit for plants.³² Dew is an important source of moisture in coastal areas where it occurs at night with up to 0.04 mm per night recorded in the winter months.³³

Wind patterns play a major role in the natural surface landscape development. Strong shamal winds affect the northern Gulf during the summer months with winds blowing at speeds of 40–50 km/hr, while northwesterlies originating from depressions in the Mediterranean occur from November to February.³⁴ These winds are primarily responsible for the inland movement of sand across the central Gulf area,³⁵ but they also transport vast quantities of dust into the lower atmosphere and severely reduce visibility.³⁶ Wind data for the region indicate that the most important direction is from the north and northwest, with a second southeasterly peak originating offshore.³⁷ Barth measured mean wind velocities between 12.6 and 24.8 km/hr for the region with gust values exceeding 43.2 km/hr.³⁸ These winds have a powerful effect on the topography and in particular, the dunes.

Daily wind patterns follow a characteristic time schedule along the coast. In the morning, relatively dry winds blow from inland in the west towards the sea in the east. Heat radiation is higher over land during the night, inducing a gradient in local barometric pressure. Increasing insolation during the day reverses this pattern. An increase in temperature over land benefits the development of low barometric pressure and, as a consequence, humid wind moving from the sea towards the land normally begins blowing before noon and continues until sunset.³⁹ These coastal convection winds tend to move sand inland before it is transported further south, currently preventing the development of large coastal dunes.⁴⁰

3.2 Geology and geomorphology

Eastern Arabia is part of the Arabian platform, built up by sediments of Paleogene and Neogene age. The strata dip gently away from the edge of the Arabian Shield in the west and form zones of cuesta topography with scarps following the curvature of the eastern edge of the Shield. Towards the Gulf these cuestas become barely perceptible⁴¹ and are often covered by Quaternary deposits.

²⁴ See Mandaville 1990: 8.

²⁵ Fryberger *et al.* 1984.

²⁶ Peel *et al.* 2007: 1641.

²⁷ Vincent 2008: 74.

²⁸ Barth 2001.

²⁹ Mandaville 1990.

³⁰ Mandaville 1990: 11.

³¹ Barth and Steinkohl 2004: 101.

³² Mandaville 1990: 16.

³³ Barth 2002.

³⁴ Loughland *et al.* 2012.

³⁵ Loughland *et al.* 2012: 194.

³⁶ Vincent 2008.

³⁷ Barth 2002.

³⁸ Barth 2001.

³⁹ Personal observation P. Drechsler; see also Vincent 2008: 147.

⁴⁰ Loughland *et al.* 2012: 194.

⁴¹ Vincent 2008: 48.

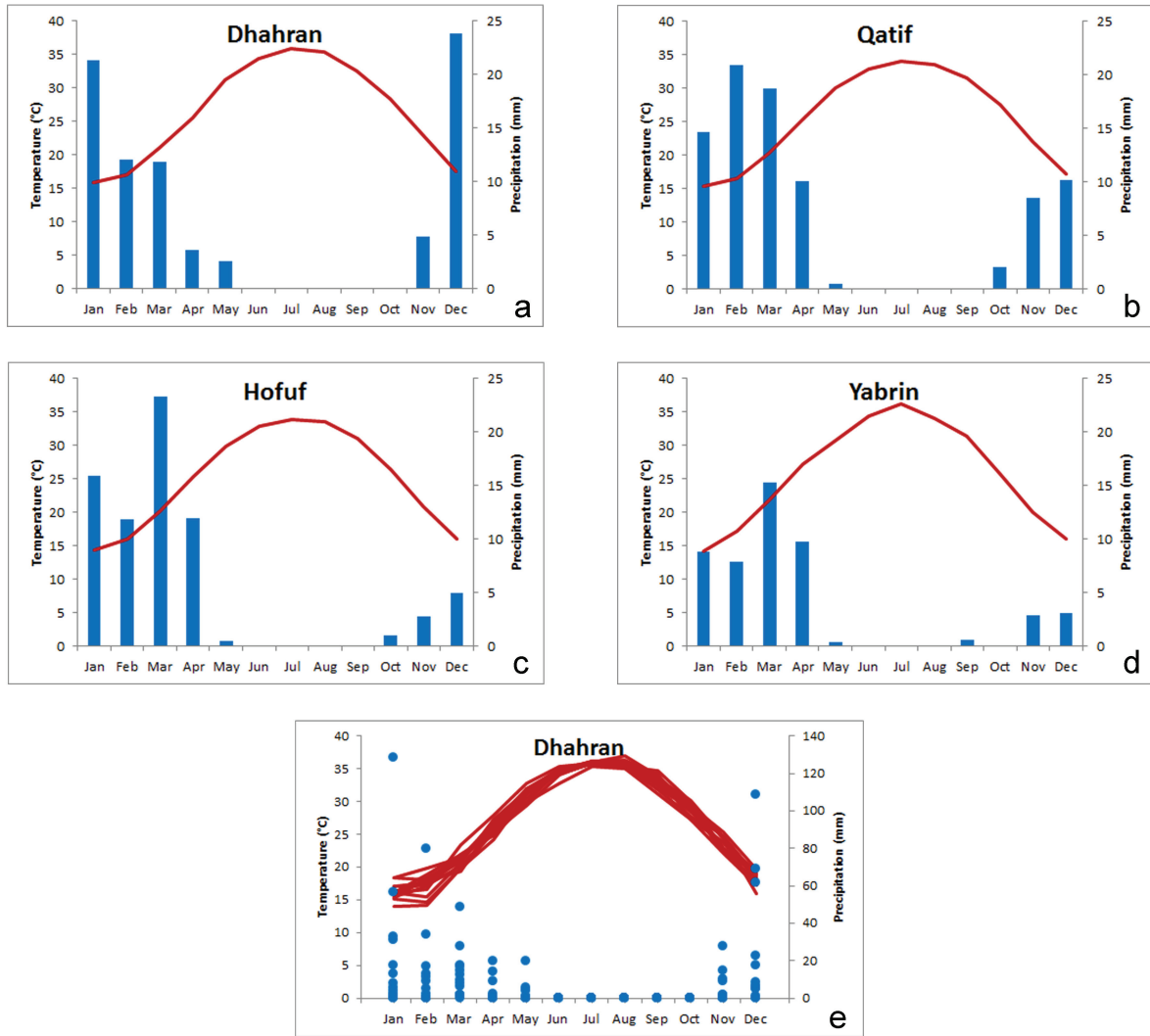


Figure 1.5. Climatic charts from **a** Qatif; **b** Dhahran; **c** Hofuf; and **d** Yabrin indicating average monthly temperature and precipitation (data source: Vincent 2008: tables 4.1, 4.3). **e** Climatic chart from Dhahran showing the inter-annual variability of the average monthly temperature and precipitation between January 1949 and March 1963 (data source: www.ncdc.noaa.gov; recalculated).

3.2.1 Geology

The relief between Dammam and north of Jubail is generally low with a few minor outcrops of Miocene and Pliocene bedrock belonging to the Hadruk and Dam formations. Such outcrops usually occur as minor escarpments (5–20 m high). The Hadruk formation that comprises sandy limestone, marl, gypsum, and beach rock underlies the whole of the Jubail area. One major outcrop occurs at Jebel Barri, 9 km northeast of Dosariyah (N26°53'54" E049°37'52"). In the limestone of the Hadruk formations chert and gypsum layers are prominent. Occasional small outcrops can be found on the surface to the west of Dosariyah.⁴² Rock outcrops north of Jubail belong to the Dam formation and

comprise hard limey sandstone, marl, soft sandstone and beach rock.

A number of major structural geological features are found in the region. These include a series of north-south trending anticlinal structures that are oblique to the axis of the Arabian Gulf. Tectonic uplift and folding from the Middle Eocene has led to the development of several large structural anticlines. These include the Qatar and Dukhan anticlines located on the Qatar peninsula and the Bahrain anticline.⁴³ To the west and southwest of Jubail, the Ghawar anticline is draped over a basement horst structure. It grew initially during the Carboniferous (Hercynian) deformation and was reactivated episodically during the Late Cretaceous.⁴⁴

⁴² A. Parker, personal observation, November 2013.

⁴³ Kassler 1973.

⁴⁴ Saner *et al.* 2005.

Kassler postulated that a northwest extension of the Bahrain Ridge passes through the Al Jubail area, parallel to the coastline, and that this tectonic mechanism accounts for the raised beaches observed near Jubail.⁴⁵ According to Kassler, the Gulf of Salwah, to the southeast, is believed to be a Late Quaternary structural feature and represents an area of synclinal subsidence.⁴⁶ Nevertheless, the raised beaches reported by Holm as far south as Salwah do not conform to this interpretation of the Gulf of Salwah being an area of subsidence.⁴⁷

The anticlines of the Gulf region are of great hydraulic importance. Due to the fractional deformation of the bedded rocks, water flows are generated even through the impervious layers. Artesian springs occur along the anticlines, forming a natural outflow.⁴⁸ Hoetzl studied the regional hydrogeology and demonstrated that groundwater sourced from the Umm er Radhuma aquifer feeds spring systems along the Gulf.⁴⁹ Aquifer recharge occurred during former humid periods with only a minor recent groundwater recharge component.

In addition to the major anticlinal structures, salt diapirism in the region has led to localized uplift. The Dammam dome, located 70 km to the southeast of Dosariyah, is a salt dome where Eocene age rocks crop out through the surrounding Quaternary sand and sabkha deposits.⁵⁰ Modern uplift of the dome occurs at a rate of 0.56 to 0.75 mm per century.⁵¹

Deflated longitudinal dunes with their axis in a north-northwest-south-southeast direction dominate the Quaternary sediments in the region. In places, secondary dunes reworked by eolian action to form smaller dunes during the Holocene overlie these longitudinal dunes. Sand sheets and barchans cover much of the region. Many barchans are found traversing the sabkhas. At many locations dome dunes likewise occur, which evolve into barchans and vice versa.⁵² Sand sheets form flat sandy plains, mostly covered by scattered perennial grasses and other seed-bearing plants. The coastal plain is low lying and in many places the water table is high enough to give rise to extensive sabkhas.⁵³ In recent times, much of the natural landscape and vegetation has been destroyed by infrastructure developments associated with the oil and gas industry and the rapid population growth of the Eastern Province.

3.2.1 The central coastal lowlands

The central coastal lowlands are part of the Al-Jafurah desert that extends along the Arabian Gulf from Kuwait in the north to the Rub' al-Khali in the south, over a distance of almost 800 km.⁵⁴ The Al-Jafurah desert itself can be subdivided into three broad zones according to sand budget and wind speed. Within a northern zone, wind velocities are high and deflation predominates. The central zone, where Dosariyah is located, is characterized by dune transport while wind velocities are lower. In the first two zones sand dunes are more or less isolated while extensive sabkha plains exist. The southern zone stretches into the Rub' al-Khali, where wind energies are lower and continuous dune fields predominate. Based on Landsat images, Loughland *et al.* outlined the actual spatial configuration of geomorphologic units of the Eastern Province that provides a general overview of the landscape features in the central coastal lowlands (**Figure 1.6**).⁵⁵

Studies by Anton indicate that the dunes of the Al-Jafurah desert south of Dhahran are not older than 4000 years.⁵⁶ They may be the result of a major change in the sand dynamics of the northern regions, triggered by large-scale aridification which started around 5500 BP,⁵⁷ followed by degradation of the northern areas.⁵⁸ Anton and Vincent suggest that some of the sand in the Al-Jafurah sand sea originates from the major Quaternary fans developed by wadis transporting sands and gravels from the Arabian Shield towards the Gulf.⁵⁹ One possible major source is the Ad-Dibdibah plain, a vast fan that was developed by the Wadi al-Batin-Wadi ar-Rumah system in northeastern Saudi Arabia. The Arabian Gulf Basin, which was exposed during periods of low sea level during the Late Pleistocene,⁶⁰ represents another sediment source.

3.2.2 The landscape around Dosariyah

The wider landscape around Dosariyah is characterized by a narrow coastal strip, dunes, interdune areas, sand sheets and siliciclastic sabkha terrains.⁶¹ Dosariyah itself is located on a raised area build up by eolianites. These fossilized dunes break off rather steeply towards the sea but are increasingly covered by sand sheets as they move inland. Both Pleistocene deflated longitudinal dunes and smaller Holocene dunes overlay the eolianites (see **Chapter 2**). Over wide areas, these

⁴⁵ Kassler 1973.

⁴⁶ Kassler 1973.

⁴⁷ Holm 1960.

⁴⁸ Johnson *et al.* 1978.

⁴⁹ Hoetzl 1995.

⁵⁰ Weijermars 1999.

⁵¹ Hariri 2014.

⁵² Fryberger *et al.* 1984.

⁵³ Anton and Vincent 1986.

⁵⁴ Fryberger *et al.* 1984: 413.

⁵⁵ Loughland *et al.* 2012.

⁵⁶ Anton 1983.

⁵⁷ Sirocko 1996.

⁵⁸ Barth 2001: 399.

⁵⁹ Anton and Vincent 1986.

⁶⁰ Lambeck 1996.

⁶¹ Fryberger *et al.* 1984: 413.

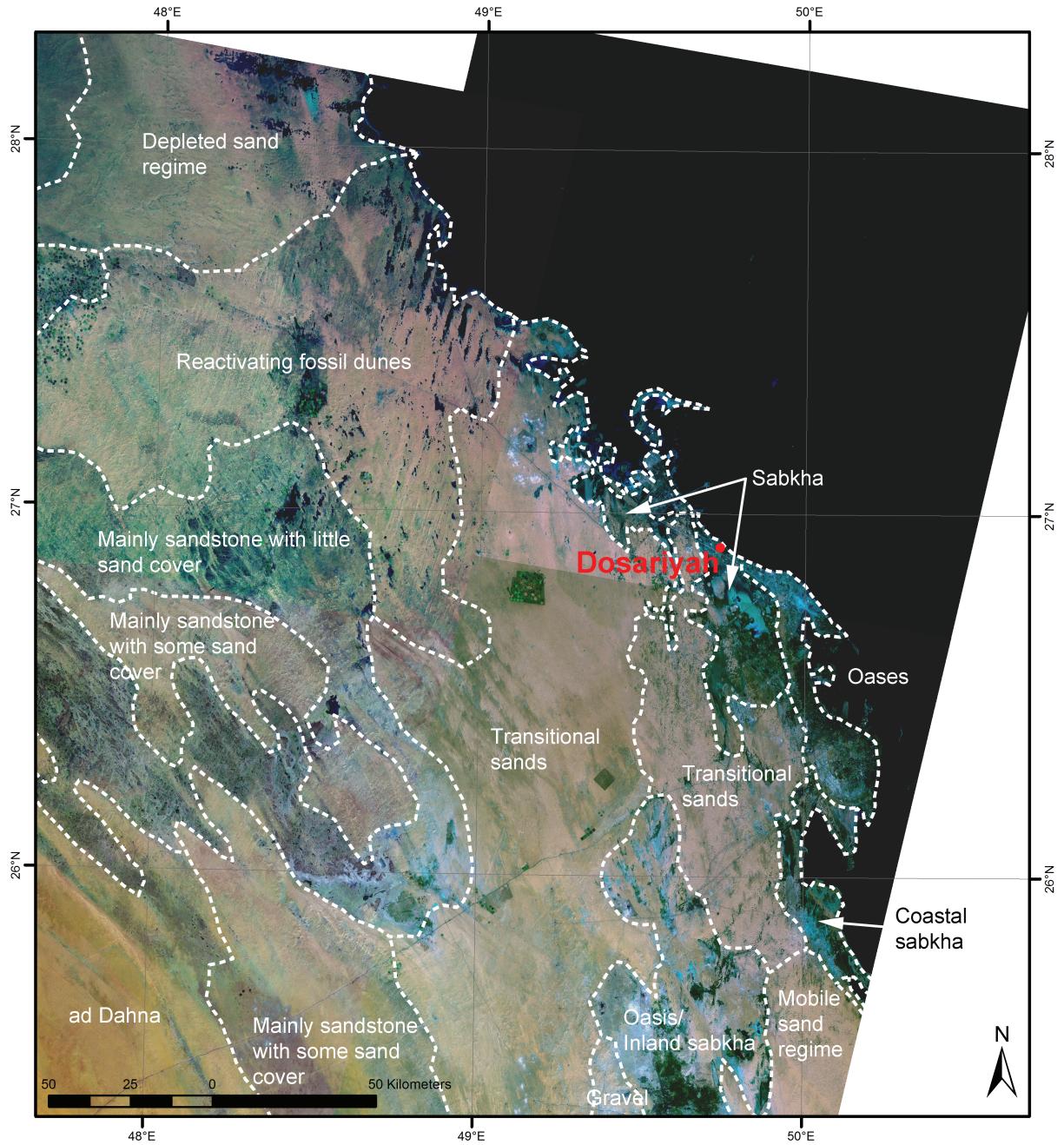


Figure 1.6. General geomorphological configuration of the central coastal lowlands. Dosariyah is located within a zone dominated by sabkhas (after Loughland *et al.* 2012: 196).

dunes are covered by scattered perennial grasses and other small plants.

The landscape to the west, east and south of Dosariyah is dominated by wide sabkhas of the Sabkhat as-Summ, which constitutes one northern part of the larger Sabkhat ar-Riyas.⁶² These sabkhas form a wide arc around the raised area where Dosariyah is located (**Figure 1.7a**). Shells from the marine snail *Cerithium*

scabridum are found on the surface of these sabkhas and indicate that they were once flooded during times of higher sea levels. A series of both active and inactive sand spits along the coast suggest that in the past the sabkhas were connected to the open sea. While clearly of marine origin, the surface morphology and height of the sabkhas is at least partly controlled by the local groundwater level.⁶³ Strips of wind-blown sand cover part of the sabkha surfaces to the southeast of the

⁶² Edgell 2006: 396.

⁶³ Barth 1998.

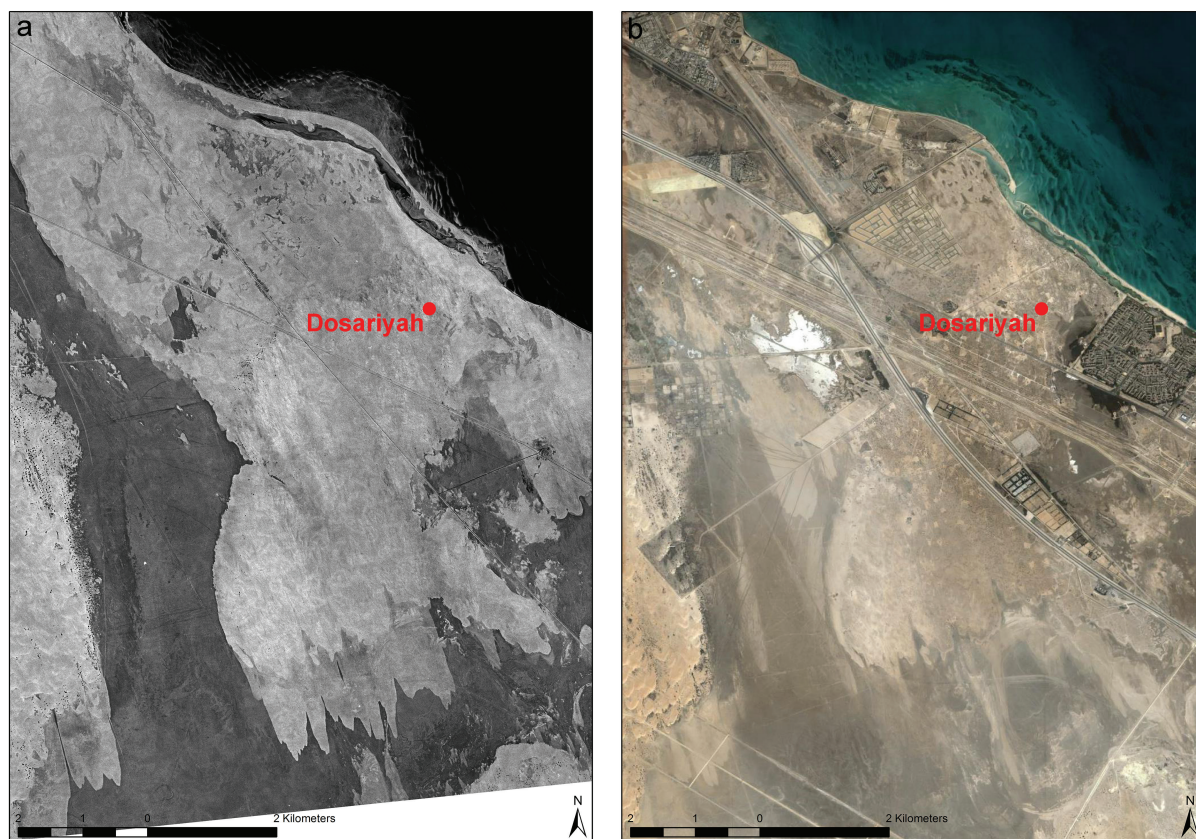


Figure 1.7. Landscape around Dosariyah indicating the anthropogenic impact on the landscape. **a** 1968: declassified CORONA satellite image; **b** 2006: Google Earth.

raised area. They are both indicative of current sand transport induced by winds from the north-northwest and a comparatively older date of the sabkha itself.

South and west of Sabkhat as-Summ, there are extensive dune fields interrupted by smaller sabkhas (Sabkhat al-Fasl, Sabkhat as-Safi, Sabkhat Mahbulah) and hard rock outcrops (Jebel Barri, Jebel Abu Sharif).⁶⁴ Along the western borders of Sabkhat as-Summ and Sabkhat al-Fasl, there are extended palm groves that are no longer under cultivation but which indicate near-surface occurrences of sweet water.

Today, most features of the landscape are widely blurred by infrastructure developments (**Figure 1.7b**). North of Dosariyah, the construction of residential neighborhoods has led to the infill of sabkhas. Further north along the coast, the King Abdul Aziz Naval Base occupies wide areas. Along the southern edge of the sabkha south of the site, an extensive housing complex was built for the Jubail seawater desalination plant run by SWCC (Sea Water Conversion Cooperation). Other major interference is caused by several pipelines crossing the area from northwest to southeast,

connecting the oil and gas extracting areas north of Jubail with the processing and shipping facilities at Ras Tanura.

3.2.3 Hydrology

Today, perennial rivers do not exist in eastern Arabia and occurrences of sweet water are therefore restricted to springs and wells fed by (fossil) groundwater, and ponds receiving surface runoff from rainfall. Relict palm stands along the western edges of Sabkhat as-Summ are indicative of extensive subsurface sweet water sources as are several shallow hand-dug wells in the region that once provide relatively good, if brackish, water.⁶⁵ Sporadic occurrences of individual date-palm trees in the vicinity of Dosariyah and especially along the edges of the eolianites close to the seashore suggest the presence of sweet water closer to the site as well.

Extensive occurrences of artesian water were observed both within the dune fields and in the sabkhas during geomorphological studies carried out during the planning of the Industrial City north of Jubail and

⁶⁴ Defense Mapping Agency 1982.

⁶⁵ Mandaville 1990: 8.

approximately 15 km north of Dosariyah.⁶⁶ With sodium chloride (NaCl) concentrations down to 0.2%, and gypsum (CaSO₄) concentrations of 0.07% this water is almost potable.⁶⁷ According to James and Little, two different sources for this artesian water exist:⁶⁸ extended aquifers which conduct water from distant sources in the west to the springs at Bahrain and Qatif, as well as to submarine springs along the southern shores of the Gulf; it is suggested that a second source of sweet water exists in the dune fields surrounding the sabkhas of the central coastal lowlands themselves. These dunes contain high groundwater tables up to 20 m above the sabkha surfaces. As some pinnacles of the Hadruk formation reach high levels in the dunes, it is possible that water stored at high levels in the dunes enters the Hadruk formation through sub-vertical fissures contributing to artesian pressure beneath the sabkhas.⁶⁹

3.2.4 Flora

The flora of the Arabian Gulf coast belongs to the Nubio-Sindian center of endemism,⁷⁰ generally characterized by scattered trees of species such as *Aerva javanica* (Arabic: *ra'*), *Acacia tortilis* (Arabic: *samur*), the salt-loving shrub *Halopeplis perfoliata* (Arabic: *khurrayz*) and the grass *Panicum turgidum* (Arabic: *thumam*).⁷¹

While the wide coastal sabkhas of the central coastal lowlands are devoid of higher plant life, areas covered with fixed sand show denser vegetation and provide the habitat preferred by wild or naturalized date palms and *Tamarix* shrubs.⁷² Two trends in the local vegetation can be observed along the central Gulf area: the overall proportion of therophyte elements (annual plants) declines from north to south and this is paralleled by decreasing total species diversity.⁷³

Characteristic plant communities for the central coastal lowlands are the *rimth* (dominated by *Haloxylum salicornicum*) saltbush shrubland and the *thumam* (*Panicum turgidum*) grass shrubland. Open *rimth* saltbush shrubland covers major parts of northeast Arabia where it ranges from Iraq in the northeast down into the northern edge of the Rub' al Khali. It is found on sands in wide topographic lows with groundwater not far below the surface. Less salt tolerant than other halophytes, it is not generally found on the highly saline sabkha margins, but dominates areas surrounding such salt-rich lows at only marginally higher elevations.

While generally considered to be of limited value for grazing, *rimth* provides good firewood which is often carried some distance by Bedouins.⁷⁴ *Thumam* grass shrubland is found on relatively well-drained sand substratum, although it also occurs on elevated ground near saline terrain. It is widely distributed in the central coastal lowlands where it represents a very important grazing association. *Panicum turgidum* is often found associated with shrubs of *Calligonum comosum* that produces excellent firewood.⁷⁵

In the past, the coastal areas of the central coastal lowlands were comparatively densely vegetated although major grazing activity during the last few decades, and a continuously increasing animal population accompanied by supplemental feeding and trucking of water, have changed the vegetation significantly.⁷⁶ Former extensive shrubland communities covering 15–20% of the ground have become degraded *thumam* grasslands that seldom exceed a ground cover of more than 5%.⁷⁷

3.2.5 Fauna

The wild fauna of eastern Arabia is heavily affected by human action today. Millennia of intensive hunting as well as recent industrialization and urbanization have had a very strong impact both on the faunal composition and frequencies of wild animals.

The Arabian Peninsula shows a four-fold faunal division between the Afro-tropical, Saharo-Sindian, Palearctic and Oriental Region. Eastern Arabia can be assigned to the Saharo-Sindian region.⁷⁸ It is part of a vast region that links the western Sahara to the deserts of Afghanistan and central Asia. Animal species in this region are particularly adapted to arid, dry and desiccated landscapes. Characteristic herbivores of this faunal community in eastern Arabia were the Arabian Oryx (*Oryx leucoryx*), gazelle (*Gazella gazella*) and wild goat (*Capra aegagrus*). Carnivores include the striped hyena (*Hyaena hyaena*), golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*) and caracal (*Caracal caracal*).⁷⁹ Lagomorphs and rodents are frequent even today in coastal deserts and plains. Desert reptiles are also frequent, and lizards (*Uromastix* sp.) in particular were the most commonly eaten desert animals until historic times.⁸⁰ The bird fauna of eastern Arabia is diverse. In addition to migrant desert and marine birds, partridges, ducks and geese inhabit the reed beds of marshy depressions. Although now extinct, ostrich

⁶⁶ James and Little 1994: 88.

⁶⁷ James and Little 1994: 90, table 2. The limit of NaCl for potable water is 1000 mg/l by WHO standards. World Health Organization 1984.

⁶⁸ James and Little 1994: 92.

⁶⁹ James and Little 1994: 92.

⁷⁰ White and Leonhard 1991.

⁷¹ Vincent 2008: 174.

⁷² Mandaville 1990: 8.

⁷³ Mandaville 1990: 23.

⁷⁴ Mandaville 1990: 28.

⁷⁵ Mandaville 1990: 107.

⁷⁶ Barth 1998; 1999.

⁷⁷ Barth 1998.

⁷⁸ Harrison 1964: 10.

⁷⁹ Masry 1997: 29.

⁸⁰ Masry 1997: 30.

(*Struthio camelus syriacus*) used to be common along the coastal plains and further inland.⁸¹ Along the coast and offshore, a great variety of marine species are still of major economic importance.

4 Cultural Context

A series of radiocarbon dates place Dosariyah at the beginning of the fifth millennium cal. BC. The spectrum of material culture discovered at the site shows affinities with the Arabian Middle Neolithic,⁸² but elements of southern Mesopotamian material culture also occur.

4.1 The Arabian Middle Neolithic

The fifth millennium BC represents a flourishing period in prehistoric Arabia. High numbers of archeological sites suggest a rapid growth of human populations, potentially enabled by ameliorating climatic conditions.⁸³

4.1.1 Paleoclimatic background

In the southern part of the Arabian Peninsula, a northward shift of the Indian Ocean Monsoon provided higher amounts of precipitation during the mid-Holocene.⁸⁴ As a result, dune fields became stabilized and vegetated with C_3 grasslands and scatters of woody vegetation.⁸⁵ The lowlands and desert areas were covered by grassland vegetation with woody elements,⁸⁶ while grass and scrub vegetation with a higher density of trees predominated in the Yemen highlands.⁸⁷

In the Levant, an increase in precipitation is evident in a dripstone sequence from Soreq Cave located in the Judean Hills, which suggests higher precipitation with rainfall of 675–950 mm/yr between 8000 and 6000 BC. During the fifth millennium BC, rainfall did not exceed present values.⁸⁸ While mechanisms of changing climatic conditions during the Late Pleistocene and Holocene are comparatively well understood both in the southern and northern part of Arabia, poorly developed climatic archives in central and eastern Arabia obscure the pattern for these regions.⁸⁹ The general absence of dripstones in the central and eastern parts of Arabia that date to the Holocene contradicts the notion of a well-developed mid-Holocene period of moister climatic conditions induced by a northward shift of the Indian Ocean Monsoon beyond 23°–24° north.⁹⁰ Nevertheless,

the development of ephemeral lakes in interdunes⁹¹ and endorheic depressions⁹² suggest higher amounts of (irregular) precipitation in northern and central Arabia contemporaneous with the Arabian Middle Neolithic.⁹³

4.1.2 Settlement and mobility pattern

Neolithic groups whose subsistence was primarily based on domesticated sheep, goat and cattle as well as on hunting a broad range of wild animals benefited from these favorable environmental conditions. The distribution pattern of stylistically similar arrowheads⁹⁴ demonstrates the great mobility of these populations. The presence of similar point shapes in the desert interior, coastal regions and mountain ranges suggests the exploitation of all these regions by the same or closely related groups.⁹⁵ Further evidence of the mobility of these communities is provided by personal adornments made of marine shell that have been found up to 180 km away from the closest seashore, demonstrating the mobility of the pastoral communities who must regularly have come into contact with coastal communities as part of their annual cycle of migration.⁹⁶ Additional evidence of mobility comes in the form of exotic goods such as obsidian in southwest Arabia.⁹⁷

The predominance of a highly mobile way of life in Arabia during the Middle Neolithic constrained the development of settlements with fixed dwellings. Places that were occupied permanently or at least for longer periods of time developed exclusively in those regions where diverse or especially resource-rich environments supported a greater degree of sedentism. This process is documented along the shores of the Peninsula, where such settlements relied on marine resources. Along the coast of the Gulf of Oman, settlements affirm this date to the sixth millennium BC,⁹⁸ therefore suggesting a long tradition of marine exploitation in Arabia. Based on the environmental characteristics of the site locations that provided a year-round food supply, it has been suggested that at least semi-sedentary communities settled in this area.⁹⁹

In contrast, comparable settlements along the southern shores of the Arabian Gulf barely predate the fifth millennium BC. Rising sea levels during the Holocene led to the flooding of the Arabian Gulf

⁸¹ Potts 2001a.

⁸² Drechsler 2007; 2009: 22; Charpentier 2008: 108.

⁸³ Parker and Goudie 2008: 467.

⁸⁴ Lezine *et al.* 1998; Neff *et al.* 2001; Fleitmann *et al.* 2003.

⁸⁵ Parker *et al.* 2004.

⁸⁶ Schulz and Whitney 1986; Lézine *et al.* 1998; 2007; Parker *et al.* 2004.

⁸⁷ Wilkinson 1997.

⁸⁸ Bar-Matthews *et al.* 2003: 3195.

⁸⁹ Fleitmann *et al.* 2004: 1.

⁹⁰ Fleitmann *et al.* 2004: 20.

⁹¹ Schulz and Whitney 1986: 181.

⁹² Garrard *et al.* 1981.

⁹³ Schulz and Whitney 1986.

⁹⁴ Drechsler 2009.

⁹⁵ Spoor 1997.

⁹⁶ Uerpmann M. *et al.* 2000; 2006; Beech *et al.* 2006; Uerpmann M. and Uerpmann H.-P. 2008.

⁹⁷ Edens and Wilkinson 1998.

⁹⁸ Uerpmann H.-P. and Uerpmann M. 2003; Biagi and Nisbet 2006; Charpentier 2008.

⁹⁹ Biagi and Nisbet 2006.

basin,¹⁰⁰ preventing the preservation of older sites. In the northern Arabian Gulf, sea level was possibly up to 2.5 m higher during the fifth to the third millennium BC, while thereafter it was relatively stable, close to present-day levels.¹⁰¹ Coastal settlements along the Gulf are often associated with dense accumulations of shell, suggesting that the collection and consumption of shellfish played a major role in subsistence in addition to the catching of fish.¹⁰² Frequent finds of both wild and domesticated mammals at these coastal sites indicate the exploitation of a broad spectrum of resources for the daily diet. These data suggest a mixed foraging and food-producing strategy prevailing in Arabia during the Middle Neolithic. Significant populations lived across the Arabian Peninsula, practicing a diverse range of subsistence strategies tied to a variety of well-watered or marine habitats (lakes, lagoons, springs, creeks).

Evidence of nucleated, long-term settlements associated with the Arabian Middle Neolithic also comes from the Yemen Plateau, where environmental reconstruction suggests woodland vegetation, generally higher water tables and scattered ponds in many upland basins as a result of higher precipitation during the mid-Holocene.¹⁰³

Similarly, rich habitats that allowed for a year-round settlement included oases along the coast and in the interior of the Arabian landmass. Oases in the interior that are based on fossil groundwater are situated in three major basins in the cuesta (ridge) landscape of the Arabian Shield in central and eastern Arabia, and in the sediment bodies of the northern Arabian Peninsula.¹⁰⁴ The outcrops of the water-bearing formations along the edges of these basins are zones of groundwater recharge during periods of high precipitation, while artesian springs can be found within the centers of the basins. Long intervals between water recharge and discharge which can range up to tens of thousands of years,¹⁰⁵ as well as the distance between recharging and discharging areas, make these water sources independent of prevailing climatic conditions. Accordingly, springs are the origins of oases within the flat desert, as is the case with the Al-Qatif and Al-Hasa oases in the Eastern Province of Saudi Arabia.¹⁰⁶

The existence of a curving, packed stone and mud wall associated with the Ubaid-related, Middle Neolithic levels 1–4 at Ain Qannas indicates the presence of permanent architecture there.¹⁰⁷ This suggests

intensive use of the rich oasis environment near the site, potentially linked to cultural contacts with southern Mesopotamia, as indicated by the Ubaid pottery found at Ain Qannas. Besides Ain Qannas, evidence of continuously inhabited settlements in inland eastern Arabia during the fifth millennium BC is scarce.

4.1.3 Subsistence

Because conditions for the preservation of animal bones are generally poor in Arabia, the number of archeological sites that provide information on prevailing economic activities is restricted. Until recently archeologists have favored the view that it was predominantly groups of hunter-gatherers who roamed the wide landmass of the Peninsula during the early and mid-Holocene.¹⁰⁸ Although rarely explicitly noted, the assumption of hunting and gathering as the predominant way of life is based on the overwhelming number of arrowheads found at countless locations in the desert interior of Arabia.¹⁰⁹ The comparatively small number of archeological sites with clear evidence of the presence of domesticated animals supported the view that these bones represent an exotic complement to hunting. Nevertheless, a compilation of archeological sites with bone preservation clearly suggests that domesticated animals represent a common element of the zooarcheological assemblages in Arabia during the mid-Holocene.¹¹⁰ The presence of domesticated sheep, goat and cattle in sixth-millennium BC¹¹¹ archeological contexts in southern Arabia indicates that the herding of domesticated animals had a long tradition in Arabia, clearly predating the fifth millennium BC. One can plausibly argue that the question of whether the herding of domesticated animals or the hunting of wild animals was of greater importance finds its answer in the diverse environments of Arabia: whenever possible, herding was supplemented by hunting wild animals and vice versa. Along the coasts, both fishing and the collection of shellfish played a major role in the economy.

4.1.4 Material culture

In contrast to the restricted evidence of places that were permanently occupied, there are numerous sites all across the Arabian Peninsula with evidence of an ephemeral occupation that can be related to the Arabian Middle Neolithic. Characterized by scatters of flint artifacts and in some cases spatially associated with fireplaces, such localities can be interpreted as the remains of short-term occupations of highly mobile societies. The ephemeral character of most

¹⁰⁰ Lambeck 1996.

¹⁰¹ Al-Asfour 1978; Sanlaville 1989; Engel and Brückner 2014.

¹⁰² Beech 2004.

¹⁰³ Fedele and Zaccara 2005; Fedele 2008.

¹⁰⁴ Burdon 1977.

¹⁰⁵ Wushiki 1997.

¹⁰⁶ Hötzel and Zötl 1984.

¹⁰⁷ Masry 1974.

¹⁰⁸ Tosi 1986; Potts 1993: 168; Cleuziou and Tosi 1998: 123; Edens and Wilkinson 1998: 68; Cleuziou *et al.* 2002: 20; McCorriston *et al.* 2002: 83.

¹⁰⁹ Uerpmann M. *et al.* 2000: 321.

¹¹⁰ Drechsler 2007.

¹¹¹ Martin *et al.* 2009.

Arabian Middle Neolithic sites had a major effect on the preservation of material culture. Due to the restricted anthropogenic accumulation of settlement debris and prevailing natural erosion of sediment, flint artifacts constitute the most frequent category of finds. Less resistant material such as pottery often shows heavy traces of weathering, while artifacts made from organic material are preserved only at a very few sites. The defining element for Middle Neolithic artifact assemblages is therefore flint artifacts, supplemented by objects made from other stone.

Characteristic elements of the flint artifact assemblages that date approximately to the fifth millennium BC and therefore fall into the later phase of the Arabian Middle Neolithic,¹¹² are bifacial forms with an emphasis on stemmed and usually shouldered points and on narrow foliates, supplemented by scrapers and diverse light and heavy-duty tools.¹¹³ While originally defined for the Rub' al Khali, comparable tool types occur in a much broader area defining an 'Arabian bifacial lithic tradition', *sensu* Edens,¹¹⁴ often referred to as Arabian Bifacial Tradition (ABT). The corresponding primary production is poorly developed, not standardized and highly heterogeneous. It is oriented towards the production of flakes and can best be described as expedient.¹¹⁵ Despite basic technological and typological similarities, Arabian Middle Neolithic flint artifact assemblages reminiscent of the Arabian Bifacial Tradition show some degree of regional variability.¹¹⁶ In the western Rub' al Khali, the Eastern Province of Saudi Arabia and Qatar, the assemblages are dominated by stemmed bifacial points.¹¹⁷ In contrast, sites in eastern Oman show a clear bifacial component while stemmed points are under-represented.¹¹⁸ Stemmed points also occur in southern Oman, but they are not barbed and tend to show a pronounced triangular cross section. Greater similarities to the Rub' al Khali assemblages exist in the areas west of the Rub' al Khali, in Wadi Dawasir and the Asir highlands as well as in the southern Hejaz and central Nejd in the north.¹¹⁹

Regional variability has been explained by the presence of local populations adapted to different regional environments.¹²⁰ Beyond differences in the lithic assemblages, these adaptations are also mirrored in differences in the structuring of space on sites, as well as differences in the prevailing economy. While pastoralism predominates in the southern Arabian highlands, the coastal sites of Oman and the Eastern

Province of Saudi Arabia, hunting and gathering is attested in sites in the Rub' al Khali. Although distinguished by these environmental adaptations, the different lithic facies can be seen as formalized due to inter-regional exchange¹²¹ or a common cultural background as the result of the development of the Arabian Middle Neolithic out of refugia during a period of climatic deterioration.¹²²

Both technological and typological characteristics of the Middle Neolithic flint industries as well as the spectrum of flint raw material at many sites is characteristic of mobile societies: raw material is often diverse, and even at sites close to raw material outcrops, imported flint occurs regularly.¹²³ Apparently, pieces of flint were carried along for some time until they were discarded or replaced by a better piece. Despite the presence of bifacial chipping and pressure flaking for the production of bifacial implements, the Arabian Middle Neolithic flint artifact production has been described as opportunistic.¹²⁴

4.2 Beyond the Ubaid phenomenon: life in the central Gulf area during the Middle Neolithic

Evidence of persistent settlement activities comes from a number of Middle Neolithic sites along the shores of the upper and central Gulf, many of which are characterized by architectural remains and a broad spectrum of artifacts (H3/As-Sabiyah,¹²⁵ Bahra 1/As-Sabiyah,¹²⁶ Marawah 11¹²⁷). Although generally associated with artifact assemblages that show strong affinities with the Arabian Middle Neolithic, the occurrence of Ubaid pottery at these places indicates cultural ties to southern Mesopotamia.¹²⁸ In the lower Gulf towards the Strait of Hormuz, contemporaneous sites are often associated with substantial shell middens, but lack any traces of architecture and are characterized by a more restricted spectrum of material remains. They can therefore be considered to be the remains of ephemeral camp sites¹²⁹ that were temporarily used by mobile societies during a year-round migration cycle that was well established in southeast Arabia on the Oman peninsula.

4.2.1 Archeological evidence

The Arabian Middle Neolithic is mostly aceramic. With the exception of about 40 archeological sites that are predominantly located along the shores of the Arabian

¹¹² Charpentier 2008.

¹¹³ Kapel 1967; Tixier 1980; Edens 1982.

¹¹⁴ Edens 1982: 120.

¹¹⁵ Nelson 1991: 64.

¹¹⁶ Spoor 1997.

¹¹⁷ Edens 1988: 33.

¹¹⁸ Bergne and Copeland 1976; Uerpman H.-P. *et al.* 2013.

¹¹⁹ Edens 1988: 34.

¹²⁰ Edens 1988: 35; see Spoor 1997.

¹²¹ Edens 1988: 37.

¹²² Drechsler 2009; Preston *et al.* 2015.

¹²³ Uerpman M. *et al.* 2008; Drechsler 2010.

¹²⁴ Kallweit and Davies 2010: 105.

¹²⁵ Carter and Crawford 2010a.

¹²⁶ Bieliński 2011; 2012.

¹²⁷ Beech *et al.* 2005.

¹²⁸ Oates J. *et al.* 1977; Roaf and Galbraith 1994.

¹²⁹ Uerpman M. and Uerpman H.-P. 1996.

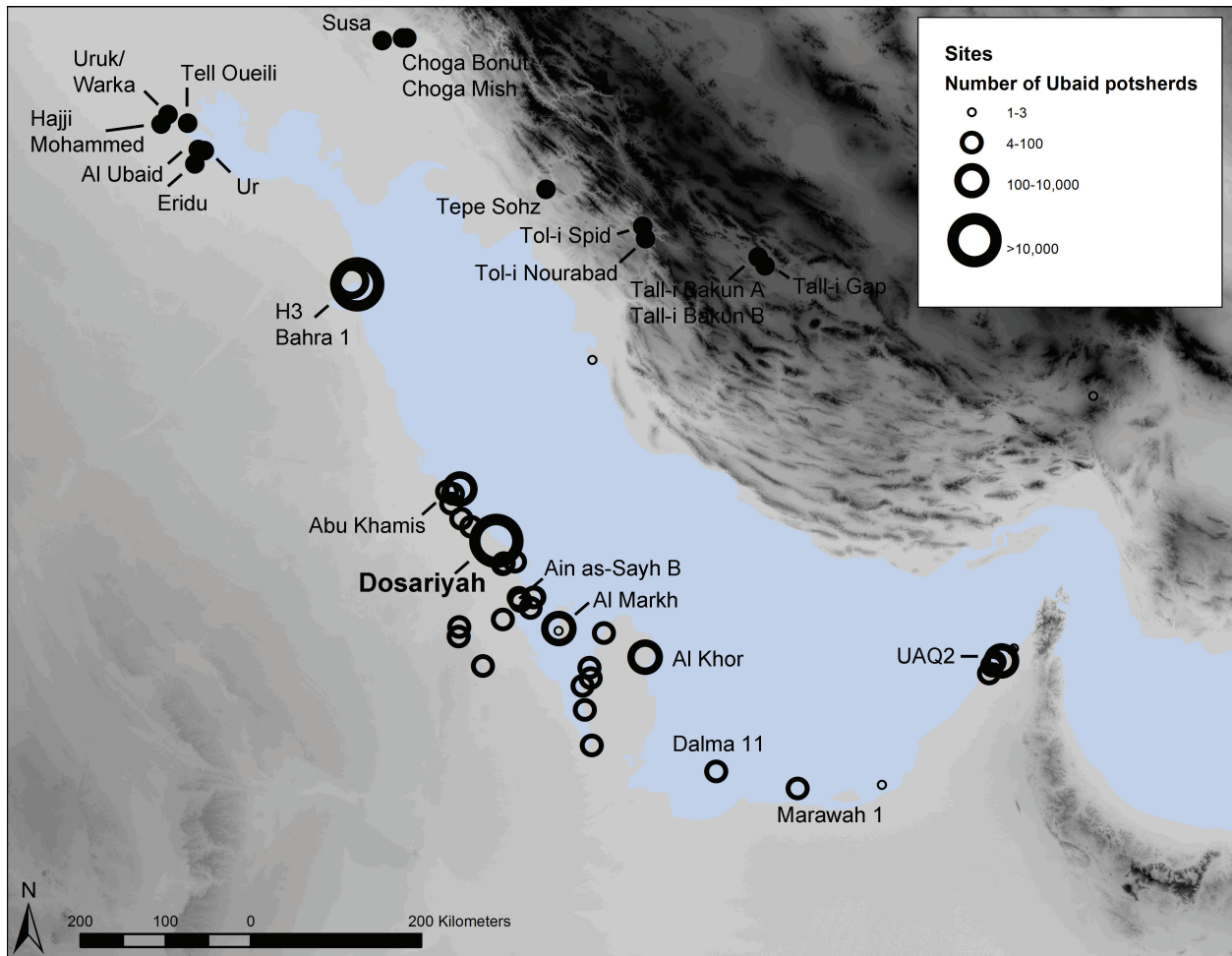


Figure 1.8. Sites with Ubaid pottery along the shores of the Arabian Gulf (open circles) and major contemporary sites in southern Mesopotamia and Iran. Shoreline reconstruction for the upper Gulf between c.5300 and 4550 BC (after Pournelle 2003: 123, fig. 44).

Gulf (Figure 1.8), pottery vessels or fired clay objects are known neither from occupation nor from burial or ritual contexts. Only at sites close to the Arabian coast of the Gulf and the Al-Hasa oasis, does pottery occur in the form of painted buff ware and coarse ware. Both vessel shape and decorative style and the chemical composition of the clay suggest an origin of the painted Black-on-Buff ware in southern Mesopotamia and possibly Iran.¹³⁰ While the underlying mechanisms of this distribution are unknown, trade or exchange are often invoked as driving forces.¹³¹ The frequency of Ubaid pottery at eastern Arabian sites seems to decrease as the distance from southern Mesopotamia increases.¹³²

¹³⁰ Bibby 1970; Oates J. *et al.* 1977; Roaf and Galbraith 1994; Beech *et al.* 2005: 46; Carter and Crawford 2010b: 206.

¹³¹ Oates J. *et al.* 1977; Uerpmann M. and Uerpmann H.-P. 1996; Carter and Crawford 2010b; Drechsler 2011.

¹³² A small quantity of painted buff ware from sites along the coast of eastern Arabia shows painted decorations that are not commonly associated with Mesopotamian decorative styles. The term 'Ubaid pottery', however, is well established for finds of painted buff ware in the Arabian Gulf. In this volume 'Ubaid pottery' is used in the latter

It occurs in high quantities at Middle Neolithic sites in Kuwait (H3/As Sabiyah, Bahra 1/As-Sabiyah) and in the central Gulf (Abu Khamis, Dosariyah), but was found in significantly lower numbers at several other coastal sites between Ras al-Khaimah and the Qatar peninsula.¹³³ Stylistically, ceramics from these sites fall within the Ubaid 3 to Ubaid 5 phases,¹³⁴ with most assemblages falling in the Ubaid 3 period. Prominent exceptions are H3/As-Sabiyah and Bahra 1/As-Sabiyah, both located in the As-Sabiyah region of present-day Kuwait, where an Ubaid 2 or early Ubaid 3 (Ubaid 2/3) component was documented.¹³⁵ Therefore one can argue that the sites with Ubaid pottery and therefore the contacts with southern Mesopotamia did not last

sense as a general term for painted (and unpainted) buff wares found at fifth-millennium BC Arabian Middle Neolithic sites, to avoid the somewhat cumbersome and technical terms 'painted buff ware' or 'Black-on-Buff ware'.

¹³³ Boucharlat *et al.* 1991; Vogt 1994; Uerpmann M. and Uerpmann H.-P. 1996; Beech *et al.* 2000; Phillips 2002.

¹³⁴ Oates J. 1993.

¹³⁵ Carter 2010b; Smogorzewska 2013: 556.

longer than a millennium.¹³⁶ The location of most sites with Ubaid pottery along the raised shoreline of the Gulf during the fifth millennium BC suggests that contact between southern Mesopotamia and the Gulf was established by seafaring. Direct evidence of boat building was discovered at H3/As-Sabiyah in Kuwait where finds of bitumen fragments with reed impressions and barnacles were interpreted as boat remains.¹³⁷ The painting of a boat on a clay disc also discovered at H3/As-Sabiyah proposes the use of the sail in the Gulf at this time.¹³⁸

The role of Ubaid pottery and also of Coarse Ware within the Neolithic societies is still not clear. The spectrum of vessel forms suggests both daily domestic activities (storage jars, cooking pots) and representative items (highly decorated open bowls). Nevertheless, the supply of pottery was marginal at most sites, almost excluding a regular use in daily life. The fact that Ubaid pottery was valuable goods is confirmed by the frequent mending of broken vessels and the reuse of sherds of Ubaid pottery as pendants (see **Chapters 7, 9**).

With the exception of Ain Qannas, located in the northern part of the Al-Hasa oasis in the Eastern Province of Saudi Arabia about 60 km inland, Ubaid pottery was scarcely taken into the interior as the majority of 'inland' sites in the Eastern Province are located at the margins of sabkhas, most likely flooded during the mid-Holocene.¹³⁹ In contrast to Ubaid pottery, the occurrence of Arabian Coarse Ware is restricted to the upper and central Gulf where it occurs in lower quantities in comparison to — and always together with — Ubaid pottery. Originally designated as 'simple cooking ware' the broad spectrum of vessel shapes, as well as the presence of decorated vessels,¹⁴⁰ suggests a more diverse use. Although the places of production of this pottery are unknown, the spatial distribution pattern of this kind of pottery suggests a local, Arabian origin. This kind of pottery therefore represents a characteristic element of the Middle Neolithic coastal sites in eastern Arabia.

4.2.2 *Trading networks, exchange patterns or kin relationships?*

The presence of foreign pottery at Middle Holocene sites along the southern shores of the Gulf which originates from different manufacturing locations in southern Mesopotamia suggests a well-established and stable social and/or exchange network during the fifth millennium BC. The underlying mechanisms are, however, poorly understood. Based on his

investigations at Ain Qannas, Dosariyah and Abu Khamis, Masry suggests a common cultural sphere with intense overland contacts or even an origin of the Ubaid 'culture' in eastern Arabia.¹⁴¹ Excavations at Oueili and the discovery of predecessors of the Ubaid pottery from the central Gulf seized this interpretation.¹⁴² Early levels, designated as Ubaid 0,¹⁴³ contain pottery and bricks reminiscent of those from cultural traditions in northern and central Mesopotamia. Subsequent research therefore favored the view of maritime interaction¹⁴⁴ and looked for causes and potential goods for exchange¹⁴⁵ without investigating the fundamental social and economic systems. But is it plausible to argue that communities in southern Mesopotamia, still in the process of state formation, sent out trade expeditions down the Gulf to obtain prestigious goods (i.e. natural pearls)?¹⁴⁶ Or is it likewise reasonable to assume that indigenous eastern Arabian societies who were intimate with seafaring and the exploitation of marine resources sailed in their vessels towards the northwest to obtain pottery?

States with well-developed urban centers and administrative hierarchies potentially able to organize and sustain a trading network did not appear in southern Mesopotamia before the Late Uruk period in c.3000 BC.¹⁴⁷ Although similarities of architecture and painted pottery styles in southern Mesopotamia from the Early Ubaid through the Late Uruk periods suggest a certain degree of demographic and cultural continuity, it is debatable whether later mechanisms of formalized exchange (or trade) can be extrapolated from the more distant past. By the beginning of the Ubaid period (Ubaid 0–1), small villages and towns were common across Mesopotamia. Much of this region was linked through social networks, and similarities in artifacts indicate a widespread exchange of goods and knowledge.¹⁴⁸ At this time, even the larger communities such as Eridu, Ur or Tell al-Ubaid were small, averaging about 1 ha, with estimated populations not exceeding 1000 people. As these small communities were widely dispersed and lacked the linear distribution typical of settlements dependent on irrigation canals,¹⁴⁹ the practice of irrigation agriculture in southern Mesopotamia at that time is questionable. During the Middle Ubaid (Ubaid 2–3), a two-tiered settlement system appeared that often marks the emergence of hierarchically organized, non-state societies.¹⁵⁰ Important centers such as Eridu

¹³⁶ Rose 2010: 864.

¹³⁷ Carter 2006; Carter and Crawford 2010b.

¹³⁸ Carter 2010d: 91.

¹³⁹ R. Carter, personal communication.

¹⁴⁰ Kainert and Drechsler 2014.

¹⁴¹ Masry 1997: 123.

¹⁴² Huot 1989.

¹⁴³ Oates J. 2004.

¹⁴⁴ Oates J. *et al.* 1977; Carter 2006; Carter and Crawford 2010b.

¹⁴⁵ Uerpmann M. and Uerpmann H.-P. 1996.

¹⁴⁶ Oates J. *et al.* 1977: 233; Uerpmann M. and Uerpmann H.-P. 1996: 135.

¹⁴⁷ Adams 1981; Nissen 1988; 2001; Pollock 1999; Yoffee 2005.

¹⁴⁸ Kennet D.J. and Kennet J.P. 2006.

¹⁴⁹ Adams 1981: 59.

¹⁵⁰ Wright 1981; Stein 1994.

grew up to 10 ha, with estimated populations of 2000 to 3000.¹⁵¹ During this period, Ubaid pottery appears in Middle Neolithic settlements along the southern coast of the Arabian Peninsula for the first time. Although an economic and political differentiation is indicated by this hierarchical distribution of settlements in Mesopotamia, little evidence exists to support elite control of long-distance exchange systems and centralized control of high-status craft production.¹⁵² Instead, Ubaid-period societies were centered on the temple complex, and ideology appears to have played an important role in organizing these communities.¹⁵³ Only by the end of the Ubaid period were some communities substantially larger than their neighbors, ruled by hereditary leaders and administered by institutionalized administrative organizations.¹⁵⁴ But it was not before the late Uruk period that 'colonists' and/or 'merchants' from southern Mesopotamia were able to gain access to critical material and wealth objects and that the movement of goods to southern cities was facilitated by outposts strategically located in areas containing valuable resources, affording control over the distribution of these materials.¹⁵⁵

Even if the fifth-millennium BC southern Mesopotamian socio-economic environment did not support regular trade it remains a valid hypothesis that southern Mesopotamian seafarers sporadically traveled down the Gulf to obtain some kind of local products not available in their homeland in exchange for pottery. But what would be appropriate and beneficial targets of this exchange? Copper, the most important export of eastern Arabia during the third millennium BC, can be excluded, as there is no evidence of copper mining during this period. In addition, eastern Arabia in the central Gulf region lacks any copper sources. One possibility that has been repeatedly mentioned is that Ubaid pottery was exchanged for pearls.¹⁵⁶ Although pearl fishing in the Gulf clearly dates back to the fifth or even sixth millennium BC,¹⁵⁷ the use of pearls is most convincingly attested at that time for southeast Arabian societies who used them to adorn their dead.¹⁵⁸ In addition, mother-of-pearl was used for the manufacture of adornment and fishing hooks by local coastal populations.¹⁵⁹ In addition to pearls and shell, the spectrum of potential goods for exchange that has been suggested by different researchers includes

livestock,¹⁶⁰ dried fish,¹⁶¹ leather and textiles, access to water and a peaceful passage,¹⁶² or marriage partners to encourage a multi-directional network of family connections.¹⁶³

Although plausible to some degree, all these suggestions are difficult to verify based on the archeological record. The question remains open as to what goods or commodities were so important in southern Mesopotamian societies that Mesopotamian seafarers sailed down the Gulf.

While the problem of goods provided for exchange remains, at least the question of impetus for this exchange can be broached if one considers the local Arabian populations living along the shores of the Gulf as the active agents in this kind of exchange; it is not only from mending holes that we know that Ubaid pottery was considered valuable. At Dalma 11, located in the lower Gulf and well beyond the area of the central Gulf that had easier access to southern Mesopotamian pottery, Ubaid pottery was imitated in painted plaster vessels.¹⁶⁴ Clearly, there was a certain need for painted pottery along the Arabian shores of the Gulf but again, the specific character of this need is difficult to demonstrate. Carter suggests that the Ubaid pottery found in Arabian Neolithic contexts was oriented 'towards serving and display, both of the ceramics themselves and of the food served.' He further proposes that 'Ubaid pottery was not only used to present food, but was also redistributed in acts of ceremonial gift-giving or exchange at communal events, perhaps in feasting contexts'.¹⁶⁵

It is the idea of this feasting context that is further developed by Peter Magee.¹⁶⁶ Following Ibn Khaldun, Magee introduces the idea of *assabiya*, social mechanisms that derived from shared experiences of desert life, as one of the formative elements of Arabian (pre)history.¹⁶⁷ According to Ibn Khaldun, *assabiya* is antithetical to an urban existence based on royalty, wealth and luxury, but emphasizes kin relationships that allow the overcoming of social or environmental challenges. It can be defined as 'a corporate spirit oriented towards obtaining and keeping power' which was 'held together by the sense of common ancestry, whether real or fictitious'.¹⁶⁸ Was the presence of Ubaid pottery in eastern Arabia an integral part of ceremonies that center on social cohesion in this region? During the subsequent fourth millennium

¹⁵¹ Adams 1981.

¹⁵² Stein 1994.

¹⁵³ Hole 1994: 139; Stein 1994.

¹⁵⁴ Kennet and Kennet 2006: 83.

¹⁵⁵ Algaze 2001; Rothman 2001.

¹⁵⁶ Oates J. et al. 1977; Uerpmann M. and Uerpmann H.-P. 1996; Carter and Crawford 2001; Phillips 2002; Carter 2006; Charpentier et al. 2012.

¹⁵⁷ Charpentier et al. 2012.

¹⁵⁸ Kiesewetter et al. 2000; Beauclair 2005; 2008.

¹⁵⁹ Beech and Elders 1999; Méry et al. 2009.

¹⁶⁰ Kallweit 2003: 63.

¹⁶¹ Uerpmann M. and Uerpmann H.-P. 1996: 139, n. 70.

¹⁶² Carter and Crawford 2010b: 209.

¹⁶³ Carter and Crawford 2010b: 210.

¹⁶⁴ Beech et al. 2000; <http://www.adias-uae.com/plaster.html>, accessed 17/09/2014.

¹⁶⁵ Carter 2006: 60.

¹⁶⁶ Magee 2014.

¹⁶⁷ Magee 2014: 11.

¹⁶⁸ Hourani 1992: 2 after Magee 2014: 12.

BC, such social strategies are well attested. While a mound of dugong bones at Akab, Umm al-Quwain, indicates mass slaughter and consumption, potentially in the context of totemism,¹⁶⁹ an oval arrangement of forty cattle skulls that were pushed into the sediment at Kheshiya, Wadi Sana, Yemen,¹⁷⁰ was associated with a collective event that ‘commemorated the convergence of a social group or several social groups whose practice of ritual sacrifice emphasized their community ties’.¹⁷¹

Another fundamental characteristic of Arabian societies is the high degree of mobility in view of a diverse spatial distribution of environmental resources. This high degree of mobility was often accompanied – and is traceable through – the displacement of material culture. In addition to an exchange of material goods and ideas, ‘regularized interaction between groups would also have provided an opportunity for the alignment of ideological and social systems across the entire peninsula’.¹⁷² The distribution of soft stone, obsidian, worked stone and shell¹⁷³ that were found in distances up to 180 km from their original sources¹⁷⁴ suggests that this kind of mobility was already established in the fifth millennium BC, be it in the form of intense interaction between different population groups or actual movements of people.¹⁷⁵ It is a fascinating and peculiar characteristic of the spatial distribution of Ubaid pottery that – in contrast to many other aspects of material culture – it scarcely found its way inland, but it almost exclusively occurs along the (former) coastline. Although considered a valuable item at coastal sites, it was not distributed further inland. No explanations can be given at present, but it is reasonable to assume that some kind of social mechanisms/restrictions hindered an effective redistribution.¹⁷⁶

One interesting aspect in the discussion about the distribution of Ubaid pottery along the Gulf coast comes from Rose’s hypothesis of a population refuge in the Arabian Gulf basin (‘Arabo-Persian Gulf Oasis’) that became submerged by rising sea levels until the mid-Holocene.¹⁷⁷ Fed by both allochthonous rivers and groundwater aquifers, favorable environmental conditions are suggested to have existed at times when

precipitation was reduced in the interior. According to Rose, arid conditions during MIS 2 forced nomadic groups to contract toward the Arabian Gulf basin.¹⁷⁸ In contrast, ameliorating climatic conditions in Arabia from the onset of the Holocene onwards, together with the contemporaneous postglacial flooding of the Gulf, drew populations into the hinterland and thus led to a permanent inland shift of the settlements in accordance with the transgressive sea. It has already been argued that the formation of rich coastal zones along the northern shorelines of the Gulf – in southern Mesopotamia – promoted the development of Ubaid communities and played a critical role in the process of state formation.¹⁷⁹

But what were the consequences of these changing environmental conditions for the populations in eastern Arabia? First of all, an almost dramatic increase in the number of archeological sites can be observed. With the exception of Qatar, sites that are (often only tentatively) dated to the seventh and sixth millennia BC are very rare in eastern Arabia. In contrast, more than 60 sites are known today along the shores of the Gulf that date to the fifth millennium BC, thus coinciding with the final phase of the marine incursion. Further on, the settlements along the shores of the central and lower Gulf seem to lack local ancestors predating the Arabian Middle Neolithic/Ubaid 3 period. The only exception might be Ain Qannas, where Ubaid pottery was found that can be associated with Ubaid 2. The fact that Ain Qannas is located about 60 km inland and on the edge of a well-watered oasis suggests a different mechanism for the establishment of this site. It is therefore conceivable that the present picture of the spatial distribution of sites along the shores of the Gulf is the result of the history of its flooding, with the majority of Middle Neolithic sites located along or close to the shoreline of the mid-Holocene high stand. Contemporaneous with the incursion of the Gulf, populations and their settlements were pushed outwards onto dry land. Such a mechanism would have one further important implication. During the time when the Arabian Gulf basin served as a refugium it might have been occupied by a single population with a common cultural background, consecutively driven apart by the transgression. In that case, did the imports of Ubaid pottery function as a symbol for a common ancestry, as an assurance of shared identity? The early Ubaid settlements in southern Mesopotamia were located on slight rises (‘turtle backs’) within aquatic habitats in the wetlands at the head of the Arabian Gulf.¹⁸⁰ Such locations were at the interface between fresh- and saltwater and were optimal for freshwater

¹⁶⁹ Méry *et al.* 2009.

¹⁷⁰ McCorrison and Martin 2009; McCorrison 2011: 100.

¹⁷¹ McCorrison and Martin 2009: 246.

¹⁷² Magee 2014: 62.

¹⁷³ Edens 1988.

¹⁷⁴ Beech *et al.* 2006: 24.

¹⁷⁵ See Uerpmann M. *et al.* 2000 for year-round migration cycles in southeastern Arabia.

¹⁷⁶ The use of pottery vessels is widely restricted to sedentary communities, while mobile societies often replace pottery by other, less breakable, materials. It is therefore plausible that at first sight the pots did not travel further inland due to the risk of breakage during transport. Nevertheless, if we consider Ubaid pottery in an Arabian Neolithic social context as a valuable or exotic item rather than a functional one, even single – especially painted – potsherds would have kept their essential value.

¹⁷⁷ Rose 2010.

¹⁷⁸ Rose 2010: 854.

¹⁷⁹ Kennet D.J. and Kennet J.P. 2006.

¹⁸⁰ Pournelle 2003.

accessibility, hunting and fishing, and transportation.¹⁸¹ The settlements in southern Mesopotamia therefore closely mirror the characteristics of the majority of Middle Neolithic settlements along the southern shores of the Gulf, both in their locations on islands or very close to the former sea lines and in characteristic adaptations to marine resources. Are these similarities simply the result of congeneric adaptations to similar environmental conditions? Or are we faced with

developments that find their basis in a common cultural context deeply rooted in both southern Mesopotamian and coastal Arabian societies? The study of material remains excavated at Dosariyah unveiled in the subsequent chapters will try to find answers to these questions, ultimately contributing to a growing body of knowledge about a fascinating facet of the prehistory of the Arabian Peninsula.

¹⁸¹ Oates J. 1960.