

OFFPRINT

RGZM – TAGUNGEN Band 34

zugleich

INTERDISZIPLINÄRE FORSCHUNGEN

zu den Häfen von der Römischen Kaiserzeit
bis zum Mittelalter in Europa Band 5

Herausgegeben von Claus von Carnap-Bornheim, Falko Daim,
Peter Ettl und Ursula Warnke

Claus von Carnap-Bornheim · Falko Daim
Peter Ettl · Ursula Warnke (eds)

HARBOURS AS OBJECTS OF INTERDISCIPLINARY RESEARCH – ARCHAEOLOGY + HISTORY + GEOSCIENCES

International Conference »Harbours as objects of interdisciplinary research –
Archaeology + History + Geosciences« at the Christian-Albrechts-University
in Kiel, 30.9.-3.10.2015, within the framework of the Special Research Program-
me (DFG-SPP 1630) »Harbours from the Roman Period to the Middle Ages«

Römisch-Germanisches
Zentrumuseum
Leibniz-Forschungsinstitut
für Archäologie

R | G | Z | M

DFG Deutsche
Forschungsgemeinschaft



Die Tagung wurde gefördert von der

DFG Deutsche
Forschungsgemeinschaft

Redaktion: Ilka Elisabeth Rau (ZBSA), Nina Marschler (Duisburg),
Claudia Nickel, Marie Röder (RGZM)
Englisches Lektorat: Ilka Elisabeth Rau (ZBSA),
Wilson Huntley (Göttingen)
Satz: Dieter Imhäuser, Hofheim a. T.
Bildbearbeitung: Manfred Albert (RGZM)
Umschlaggestaltung: Claudia Nickel (RGZM)

Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in
der Deutschen Nationalbibliografie: Detaillierte bibliografische
Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

ISBN 978-3-88467-293-8
ISSN 1862-4812

© 2018 Verlag des Römisch-Germanischen Zentralmuseums

Das Werk ist urheberrechtlich geschützt. Die dadurch begründeten
Rechte, insbesondere die der Übersetzung, des Nachdrucks, der
Entnahme von Abbildungen, der Funk- und Fernsehsendung, der
Wiedergabe auf fotomechanischem (Fotokopie, Mikrokopie) oder
ähnlichem Wege und der Speicherung in Datenverarbeitungs-
anlagen, Ton- und Bildträgern bleiben, auch bei nur auszugsweiser
Verwertung, vorbehalten. Die Vergütungsansprüche des
§54, Abs.2, UrhG. werden durch die Verwertungsgesellschaft
Wort wahrgenommen.

Druck: johnen-druck GmbH & Co. KG, Bernkastel-Kues
Printed in Germany.

CONTENTS

Foreword IX

Claus von Carnap-Bornheim · Falko Daim · Peter Ettel · Ursula Warnke

Harbours as Objects of Interdisciplinary Research – Archaeology + History + Geosciences 1

Introductions

Johannes Preiser-Kapeller · Lukas Werther

Connecting Harbours. A Comparison of Traffic Networks across Ancient and Medieval Europe 7

Ralf Bleile

No Harbours without Ships, no Ships without Harbours –

Shipwrecks as Maritime Cultural Heritage of the Baltic Sea 33

Marianne Nitter · Joris Coolen

Any Way the Wind Blows ... Wind Fetch as a Determinant Factor of the Quality of Landing Sites 45

Thomas Engel · Axel Kunz · Hartmut Müller · Lukas Werther

Towards a Virtual Research Environment for Ancient Harbour Data 59

The Mediterranean

Assaf Yasur-Landau · Ehud Arkin Shalev · Paula Rut Zajac · Gil Gambash

Rethinking the Anchorages and Harbours of the Southern Levant 2000 BC - 600 AD 73

Stefan Feuser · Felix Pirson · Martin Seeliger

The Harbour Zones of Elaia – the Maritime City of Pergamon 91

Julia Daum · Martina Seifert

The Adriatic Communication Area: Functional Structure of Roman Imperial Port Cities

and their Facilities along the Italic and Dalmatian Coasts 105

Antonella Antonazzo · Marina Maria Serena Nuovo

Two Ancient Landing Places on the Adriatic Sea: Natural Elements and

Anthropogenic Infrastructures at Cala Incina and Torre Santa Sabina (Puglia/I) 113

Julia Daum

Trajan's Harbours at the Tyrrhenian Coast 133

Nicolas Carayon · Simon J. Keay · Pascal Arnaud · Corinne Sanchez
The Harbour System of Narbo Martius (Narbonne/F) and its Facilities during Antiquity 151

Ada Lasheras González · Patricia Terrado Ortuño
New Approaches to the Study of the Harbour of Tarraco: Archaeological and
Literary Research (3rd Century BC-8th Century AD) 165

Geosciences

Vivien Mathé · Guillaume Bruniaux · Adrien Camus · Julien Cavéro · Camille Fäisse
Marie-Pierre Jézégou · François Lévêque · Corinne Sanchez
Geophysical Investigations into the Roman Port System of Narbonne 185

Valentina Caminnci · Vincenzo Cucchiara · Giuseppe Presti
Geoarchaeology at the Ancient Harbour of Agrigento 195

Iconographic and Written Sources

Stefan Feuser
Images and Imaginations of Roman Imperial Harbours 209

Dominik Heher · Grigori Simeonov
Ceremonies by the Sea. Ships and Ports in Byzantine Imperial Display (4th-12th Centuries) 221

Alkiviadis Ginalis
Emperor or Bishop? Skiathos and the Byzantine Harbour Architecture in the 6th Century AD 249

Myrto Veikou · Ingela Nilsson
Ports and Harbours as Heterotopic Entities in Byzantine Literary Texts 265

The North Sea and the Baltic

Ingo Eichfeld · Daniel Nösler
Farmers, Merchants, Seafarers: a New Discovery of an Emporium of the 1st Millennium AD
on the Southern Lower Elbe 281

Philip Lüth
Hamburg-Harburg, the Harbour of a Small Medieval Town 301

*Bente Sven Majchczack · Steffen Schneider · Tina Wunderlich · Dennis Wilken
 Wolfgang Rabbel · Martin Segschneider*
 Early Medieval Trading Sites on the North-Frisian Island of Föhr.
 First Results of Fieldwork in Witsum and Goting 311

Felix Rösch
 The 11th Century Schleswig Waterfront. Formation, Development and Actors
 of a Commercial Hotspot 329

Inland Navigation

*Lukas Werther · Lars Kröger · André Kirchner · Christoph Zielhofer · Eva Leitholdt
 Michael Schneider · Sven Linzen · Stefanie Berg-Hobohm · Peter Ettl*
 Fossata Magna – a Canal Contribution to Harbour Construction in the 1st Millennium AD 355

*Andreas Wunschel · Peter Ettl · Michael Hein · Sven Linzen
 Christopher-Bastian Roettig · Michael Schneider · Lukas Werther*
 The Waterfront of Karlburg and Salz in the Early and High Middle Ages –
 Interdisciplinary (Geo)Archaeological and Geophysical Studies 373

Lars Kröger
 Ferry Stations as Small Harbours. The Role of River Crossings in the Workaday Life
 at Southern German Rivers 403

Manuela Mirschenz
 The Rhine as a European Transportation Route in Roman Times 415

Mark Driessen
 The Logistic Function of the Rhine-Meuse Delta in the Roman Period:
 the Harbour Town of Voorburg-Arentsburg as a Case-Study 437

List of Contributors 459

FOREWORD

The Priority Programme 1630 »Harbours from the Roman Period to the Middle Ages« funded by the German Research Foundation (Deutsche Forschungsgemeinschaft) in the years 2011-2018 has made it its priority to unite and connect multidimensional approaches to harbour research within the vast research area of the North Atlantic to the Mediterranean. Modern research of the last three to four decades has particularly shown how the integration of geophysical and geoarchaeological methods has brought new insights into interdisciplinary and interpretational approaches. Thus the logical consequence was to dedicate the first international conference on the framework of the Priority Programme to this approach and its wide discussion. It took place from 30 September to 3 October 2015 with the title »Harbours as objects of interdisciplinary research – Archaeology + History + Geosciences«. About 130 participants from 15 nations with 70 lectures presented their work approaches and results within the five sections of the conference: »Plenum keynote-lectures«, »Geophysics and Field Research: Developing methods«, »Geoarchaeology: Changing Harbour Environments«, »Archaeological Features: Harbour Facilities and Infrastructure«, »Written and Iconographic Sources: Complementing the Material Evidence«. The ceremonial address of the evening was given by Sabine Ladstätter (Vienna) on the harbour of Ephesos. On the last day of the conference the participants visited the Viking Museum Haithabu as well as exhibitions at the Schleswig-Holsteinisches Landesmuseum Schloss Gottorf in Schleswig.

Subsequent to the conference in Kiel, the initiators of the Priority Programme decided on what at first glance appears to be an unusual publication strategy in which the predominantly archaeologically and historically oriented papers are being published in the present volume, whereas some mainly geophysical and geoarchaeological papers will be published in Quaternary International Special Issue »Integrated geophysical and (geo)archaeological explorations in wetlands« (guest editors: Christoph Zielhofer, Wolfgang Rabbel, Stefanie Berg-Hobohm, Tina Wunderlich), thereby reaching different milieus, which are, however, interconnected by their interdisciplinary research on harbours. Consequently, the thematic structure of the present volume will differ from the actual conference and the submitted contributions are arranged regionally as well as topically.

Our thanks go especially to Ilka E. Rau, who was both responsible for organising the conference as well as for the editorial responsibilities of this volume. Moreover, our thanks go to the editorial team of the RGZM in Mainz.

The initiators of the SPP 1630 »Harbours from the Roman Period to the Middle Ages«

Claus von Carnap-Bornheim

Falko Daim

Peter Ettel

Ursula Warnke



RETHINKING THE ANCHORAGES AND HARBOURS OF THE SOUTHERN LEVANT 2000 BC - 600 AD

The Southern Levantine coast has been a location for maritime activities beginning as early as the Neolithic period. South of the Carmel Ridge, the coastal plain is generally wide and borders the area of the low hill country (Shephela). Several brooks and wadis divide this coast into several geographic units: the Carmel coast down from the head of the Carmel by Haifa, the Sharon south of Dor and the southern coastal plain or Philistia south of Jaffa. North of the Carmel, the Plain of Akko and the western Galilee form a separate microregion, bordered by mountains from the south, north, and east¹. The geopolitical location of the Southern Levant, at the very eastern edge of the Mediterranean on the one hand and being a land bridge between North Africa (Egypt) and Western Asia (Syro-Mesopotamia) on the other hand, makes the area ideal for connectivity by land and by sea alike. The importance of this region for the understanding of the *longue durée* of Mediterranean networks is, however, more explored for the Bronze and Iron Ages² than for the later periods, as it is hardly mentioned by Horden and Purcell (2000).

The point of inter- and intraregional and intercultural maritime contact, the harbour or the anchorage, has been the topic of a good number of comparative, diachronic studies on the harbours of the Israeli coast led by the late Avner Raban in the 1980s and 1990s³. These examined the development of the use of anchorages and the construction of harbour facilities from the Bronze Age to the medieval period. While the field study of harbours and anchorages of all periods in Israel has continued in the decade since the untimely death of Raban in 2004, no follow-up diachronic study has been presented. During this period, advances in the theoretical study of harbours and maritime interaction have modified long held views on harbour use⁴. This article aims therefore to be a short status report on the study of harbours and anchorages in Israel. It will follow two major components: anchorage use and harbour facilities from the Middle Bronze Age to the Byzantine period. It will not present an evolutionary approach to the »development« of harbour installations, which have at times characterized some of the previous studies. Rather, it will deal with the ways form is made to fit function in all cases: the changing preferences as well as contemporary variability for harbour technology, location, and nature of maritime installations according to economic, political and other reasons.

TERMINOLOGY

One should exercise extreme caution when approaching the written sources in an attempt to shed more light on the issue of the harbours of the Southern Levant in antiquity. Apart from such obvious problems as biased perspectives and uninformed narratives, it is the very terminology employed by ancient writers which creates difficulties in interpreting the exact nature of coastal sites, and may often generate contradictory representations thereof. The challenge, in fact, crosses periods and cultures, to the extent that even today professional literature often remains inconsistent in its employment of terms whose purpose is to describe fully artificial harbours on the one hand, all natural anchorages on the other, and any given feature which may be located on the wide spectrum between these two extremes. The initiative undertaken by the SPP

1630 Working Group on Harbour Terminology is therefore most welcome, and its product should make a significant contribution towards standardizing the discourse used by archaeologists and historians.

It would be impossible, of course, to encompass the entire scope of the problem in brief, even if we wish to limit our investigation only to the Southern Levant in antiquity. The variety of relevant cultures and languages alone would necessitate a thorough toponymic and etymological investigation, which cannot be afforded here. But, regardless of culture and language, the main challenge remains in keeping track of the lively sphere of maritime activity, abundant with features which defy rigid definitions and dynamic in adopting technological innovations.

One example is the general Sumerian term *KAR*, Akkadian *Kāru* – meaning quay, mooring place, but also the harbour district of a town, as well as trade colony, coastal or land-based⁵ – which was used in the Akkadian Assyrian inscriptions to designate the ports of the Levant in the 8th and 7th centuries BC. Most notable is the 7th-century treaty of Esarhaddon king of Assyria and Baal king of Tyre with the Assyrians, which mentions: »These are the ports of trade (*KAR*^{meš}) and the trade routes (*KAŠKAL*^{meš}) which Esarhaddon, king of Assyria, entrusted to his servant Baal: to Akko, Dor, to the entire district of the Philistines, and to all the cities within Assyrian territory on the seacoast, and to Gubla, the Lebanon, all the cities in the mountains.«⁶ In an earlier inscription, describing events of 716 BC, Sargon II argues that he »opened the sealed port of Egypt«⁷. It is unlikely that this term designated only built ports – but probably referred to the activities of maritime trade conducted within these sites.

The Greek language, to take another example, served as the lingua franca of the local civilizations through most of the Hellenistic, Roman and Byzantine periods, and may thus offer a plethora of sources relevant to this discussion. A critical survey of these sources reveals varying degrees of tension between the few terms used to represent harbours and anchorages. The two main terms are *limen* and *ormos*, and, at least initially, in such early sources as Homer, it appears that the *limen* stands to represent the general harbouring area (Hom. *Il.* 23.745), while the *ormos* signifies the inner basin and actual landing space within the harbour (Hom. *Il.* 1.435). From Homer onwards, both terms would serve interchangeably the metaphorical purpose of describing a haven, a shelter and generally a safe place – for example in Euripides' tragedies (Eur. *Med.* 769; Eur. *Hec.* 450).

During the classical period, the vague distinction between the practical senses of *limen* and *ormos*, discernible in Homer, appears on occasion to have grown sharper – ascribing to the former artificial features now significantly more common in the eastern Mediterranean, and natural qualities to the latter. Herodotus demonstrates this distinction accurately, for example when he describes, on the one hand, a natural gulf in Magnesia, where Xerxes' troops made their anchorage (*ormos*) and on the other hand, an artificial harbour (*limen*), circled by a breakwater built by the Samians (Hdt. 7.193; 3.60).

But despite this growing distinction and its adoption by leading writers, we should refrain from imposing it without judgment on all Greek-written sources. Pseudo-Skylax appears well-informed regarding the list of harbour cities in the Levant and their main characteristics, but the text does not seem to differentiate between natural anchorages and artificial facilities in Phoenicia, and it continues to employ the term *limen* abundantly for North Africa, where very few sites actually contained artificial harbours during this period. And the »Letter of Aristeas« uses the term *limen* in a general way in the Levant, often including in the category sites which are not known to have possessed an artificial harbour (»Letter of Aristeas« 114-116): »[The land] also has suitable and spacious harbours (*limenas eukairous*) at Askalon, Joppa, and Gaza, as well as at Ptolemais, which was founded by the King.«

Strabo, too, makes an effort to remain consistent and even adds two terms closely related to the *ormos* for achieving enhanced clarification – the *prosormos* (landing place) and the *uformos* (anchorage, perhaps small). Thus he describes the island of Icaria as completely devoid of harbours (*alimenos*), but as abundant

with small anchorages (*uformos*) (Strab. 14.1.19). But, despite Strabo's influence, it would be impossible to ascribe such consistency to his contemporaries and emulators. Less than a century after the example set by him, Josephus would refer to the massive artificial harbour of Herod at Caesarea both as a *limen* and as an *uformos* – using the latter term to describe the inner basins of the harbour (Joseph. *AJ* 15.332). His general view of the Southern Levantine coast is that it lacks natural havens, even in places that had been employed (and described) as anchorages and harbours before and during his time, such as Strato's Tower and Joppa (Joseph. *AJ* 15.333):

»This city [i. e. Strato's Tower] is situated in Phoenicia, on the sailing route to Egypt, between Joppa and Dora, which are coastal towns with inappropriate anchorage (*proalia dusorma*), on account of the attacks of the winds upon them, which, dragging the sand from the sea to the shore, do not allow the landing of ships, and the merchants are forced for the most part to anchor in the open sea.«

To be sure, some authors may be considered more reliable than others, and the same would apply to the other languages relevant to this area. Still, since linguistic developments are never fully aligned with material innovations, it remains necessary, here as elsewhere, to examine the written in tandem with the material corpora.

THE MIDDLE AND LATE BRONZE AGES

The Middle Bronze Age (c. 1950-1550 BC) was the first period with an abundance of evidence for maritime trade and other interactions⁸, as evidenced by imported pottery from Cyprus⁹, imports of cedar wood and other organic materials¹⁰ and even the travel of artisans, as indicated in the Kabri Aegean-style frescoes¹¹. The mention of the Levantine »harbour people« as a distinct group of the Egyptian execration texts of the 19th and 18th centuries BC indicated the importance of harbour communities in this period¹². Anchors of the Byblian type from Newe Yam and elsewhere are the material evidence for this maritime interaction¹³. An abundance of newly established settlements are visible along the Canaanite coastline, from Tel el Ajjul in the south to Achziv in the north, with settlement systems spread along the course of rivers, most of which are dry in the summer¹⁴. Recent geoarchaeological studies have exposed human impact on the environment during the 2nd millennium BC¹⁵, a period characterized also by changing sea levels. These settlement patterns have given rise to a theory of dual coastal-riverine harbours aided by widespread artificial modification of the rocky coastline, including the cutting of a sailing channel in Achziv¹⁶. These ideas have since taken a foothold in the literature¹⁷. While attractive, they have yet to be corroborated by the archaeological record. To date, there is ample evidence of the construction of coastal fortifications in the Middle Bronze Age and the cutting of dry fortification moats in Achziv, Ashkelon, and Tel el Ajjul¹⁸. However, there is no evidence of any structure connected with maritime activity, such as quays, shipsheds or storage rooms throughout the entire Bronze Age.

The lack of any signs of maritime construction is also evident in the Late Bronze Age (1550-1200 BC). This is a period in which maritime contacts became even more intensified, as evident, for example, in the metal cargoes of copper and tin ingots from this period found on the Carmel coast¹⁹ as well as in presence of Canaanite jars and anchors, both produced on the coast of the Carmel on the Uluburun ship²⁰. It may well be that most of the maritime activity in both the Middle and Late Bronze Ages was conducted through unmodified natural anchorages in bays in proximity to the coastal towns. With the lack of harbour facilities, the identification of these anchorages is difficult and dependent on the co-existence of coastal settlement and maritime remains such as anchors and parts of cargoes of the same period. These simple prerequisites are difficult to fulfil in many cases, as changes in the coastlines and sea level affect the geometry of ancient

coasts in some cases, requiring a geoarchaeological study for the reconstruction of ancient coastlines²¹. Such studies have been conducted in Israel in very recent years at sites such as Dor, Akko and Achziv, yet their results are still unpublished.

A partial list of possible Bronze Age anchorages, from south to north, clearly shows significant gaps in our knowledge. In Ashkelon, extensive coastal and underwater surveys found no evidence of a Bronze (or Iron Age) anchorage, so it is possible that anchoring was conducted on the *kurkar* ridge c. 200m west of the town²². Tel Mor, believed to have functioned as a seaside extension of Ashdod between the Middle and Late Bronze Age, has yet to be the focus of maritime research²³: Yavneh-Yam was fortified in the Middle Bronze Age, and a Late Bronze Age cargo found under water indicates maritime activity at the site²⁴. At Jaffa, the search for the Bronze and Iron Age anchorages has recently been renewed²⁵. At Tel Michal, a possible seaside station, evidence of maritime activity in the Bronze or Iron Age has yet to be found. Tel Dor yielded Middle and Late Bronze Age finds from most of its bays as well as a coastal fortification of the Middle Bronze Age²⁶. Tel Nami and Nami East, a trading site of the Middle Bronze Age IIA to Late Bronze II, had a very different topography in the Bronze Age, hindering the exact identification of the anchorage site²⁷. A small part of the ancient coastline was exposed at the Late Bronze Age tel Abu-Hawam, gateway to the fertile northern valleys of Canaan²⁸. At Tel Akko a geophysical survey²⁹ has suggested the location of an ancient anchorage, currently buried³⁰. Finally, at Achziv, ongoing underwater research – in conjunction with the publication of the results of the Moshe Prausnitz 1963-4 excavations at the site by Yasur-Landau and Nissenbaum from the University of Haifa – has not found supportive evidence for the past hypotheses regarding an artificial entrance channel and inner harbour³¹.

THE IRON AGE

After the collapse of the Late Bronze Age world system, maritime trade recovered in the 11th and early 10th centuries as evidenced by imports of pottery and copper and iron products from Cyprus and ceramics and other goods from Egypt to the Southern Levant³². This era of renewed maritime trade even left one literary sea adventure: the tale of the unfortunate Wenamun, sailing between Egypt, Dor, Byblos and Cyprus³³. Harbours in both Dor and Byblos are specifically mentioned in this important text. During the Iron Age quays and moles are commonly thought to make their first appearance on the coast of the Southern Levant, with archaeological evidence coming mainly from two sites: Dor and Atlit. At both, the constructions are based on large ashlar stones, which are laid on their narrow sides, creating »header« masonry. Ashlar construction appears first on the Carmel coast in the later Iron Age I period (the 11th century), as evident in the massive land constructions at Dor³⁴, yet becomes more common in the Iron Age II period. However, in both Atlit and Dor the dating of the structures is difficult, as their connections with well-stratified land structures was not firmly established. At Tel Dor, a massive stone wall containing ashlar stones arranged in headers has been identified as Late Bronze and Iron Age I quays by Raban, who carried out test excavations beside it. Further examination of the pottery found by Raban in Wall 9, the larger parts of the walls attributed the date of the structures to the late Iron I period³⁵. Excavations in the summer of 2014 directed by Yasur-Landau and Ratzlaff, as part of the Tel Dor project headed by Ayelet Gilboa and Ilan Sharon, have found that only a part of this wall is built of ashlar, while extensive parts are built of boulders, calling for a renewed examination of its function as well as of its date. Furthermore, geophysical prospection close to these walls³⁶ indicated possible buried structures beneath the sand nearby. The elaborate system of quays and moles from Atlit is attributed to the Iron II period by radiocarbon testing of wood found between the stones³⁷. The ceramic evidence from this excavation, as well as the possible connection of these features

with coastal features, is still awaiting publication. However, Raban has suggested a period of use for these features extending well into the 4th century BC based on ceramic evidence found earlier³⁸. A possible third site with the built features of a late Iron Age II stone quay has been identified at Tel Ridan south of Gaza, though details remain mostly unpublished³⁹.

Still, it may well be that most maritime activity was carried out in areas without formal harbour facilities, such as at Ashkelon, a major commercial city in the Late Iron Age⁴⁰, or Ashdod-Yam, where efforts aimed at locating the 8th-century Assyrian harbour are now in their preliminary stages⁴¹. To the north of Ashdod Yam, Yavneh Yam very likely functioned as an anchorage for the nearby fort of Mezad Hashavyahu⁴². It is possible that the cargo of copper ingots from Neve Yam, made from copper mined in Feynan in the Arabah, also belongs the Iron II period and may represent a custom of anchoring in bays⁴³.

THE PERSIAN AND HELLENISTIC PERIODS

Persian period finds were discovered in about a dozen coastal sites in the area – among them Ashkelon, Ashdod, Dor, Abu Hawam and Megadim. However, most of these sites have not yet produced any evidence of artificial maritime facilities, with the glaring exception of Akko, whose artificial harbour, however, has been shown recently to have been built no earlier than the Hellenistic period⁴⁴. Significant similarities exist between the 7th-century harbour at Atlit, discussed above, and the artificial harbour of Akko. These similarities consist mostly in the layout of the harbour and in the technologies employed to construct it, conventionally referred to as »Phoenician« also in the Persian and Hellenistic periods. Based mostly on these similarities and on the literary corpus, an early Persian dating had been suggested for the construction of the harbour of Akko, asserting that it was accomplished by Cambyses as part of his Egyptian campaign⁴⁵. This hypothesis has been embraced universally and uncritically since the 1970s, despite the fact that Herodotus, our main source for Cambyses, does not mention Akko at all⁴⁶. The hypothesis also ignores the paucity of archaeological finds in the harbour area from the time preceding the Hellenistic period⁴⁷. The mere recognition of Phoenician harbour technology – consisting of the erection of moles constructed of double walls of ashlar headers – is hardly satisfying, since it is characteristic of regional harbours from the 7th century (such as Atlit) to the Hellenistic period (such as Amathus)⁴⁸.

Archaeology has yet questions to answer and gaps to fill concerning the history of Persian Akko⁴⁹. At least as regards the literary sources, it would appear that, during most of its years in power, the Achaemenid administration had neither the need nor the motivation to employ and develop Akko as a major centre of operations in the Levant. And during long periods it also lacked the ability to do so, on account of Phoenician insurrection and the political instability of the region. Intense usage by Persian fleets of the Akko bay area probably started around the early 4th century. Indeed, natural anchorages would have been the standard means of operation for most maritime activity in the Southern Levant during the Persian period. Also the planned city at Tel Megadim, which is suggested to have been a Persian administrative centre or at least a commercial centre, gives no evidence of maritime facilities⁵⁰. The construction of the Phoenician harbour at Akko would have had to await the Hellenistic period and the awakening of local commercial needs.

Evidence of notable economic maritime activity is rife for the Hellenistic Southern Levant and may be found, for example, in a papyrus reporting the shipment of gifts from Akko to Pelusium by Zenon of Philadelphia – a high-ranking official in the Ptolemaic administration⁵¹. Commercial activity involving traffic via Akko is evident in numerous finds of northern Aegean imports. And Herodas – another 3rd-century poet based in Alexandria – speaks of a cargo of grain also originating in Akko, large enough to relieve the place of its destination of »cruel famine«⁵². By the 2nd century, the author of the document purporting to be the »Letter of

Aristeas« ascribes to the city, on top of its centrality, a commodious harbour⁵³. Recent excavations next to the Akko wall, on the side facing the harbour south-west of the Ottoman mole, have revealed a floor which may have been a part of a Hellenistic pier. The floor comprises stone slabs (0.80 m × 0.40 m × 0.15 m) laid over *kurkar* ashlar masonry, and a building excavated some 100 m to the south-west has been read as a ship-shed⁵⁴. The »Letter of Aristeas« also mentions suitable and spacious harbours at Askalon, Joppa and Gaza, but the lack of archaeological finds at these sites suggests that these harbour cities did not rely on artificial facilities but on natural features or on barge-based transportation for loading and unloading cargo ships. One more site remains of relevance in the Hellenistic period – that of Strato’s Tower. Based on archaeological surveys and written sources, this harbour city, located in the southern part of the Carmel coast on the site that would later develop to become Caesarea Maritima, was identified by Raban as the local example of a *limen kleistos* – a walled harbour. In the eastern Mediterranean similar examples are known for the period from Cyprus (Nea Paphos) and the Northern Levant (Laodicea and Antiochia). By the end of the 2nd century, Strato’s Tower was important enough to draw the attention of Alexander Janneus and the Seleucid Demetrius, who together laid an unsuccessful naval siege on it. But by the time Herod was planning the construction of his new city on the site, it was no longer a significant settlement, probably waning in importance as a result of the rise of the adjacent Roman Dor.

THE ROMAN PERIOD

Alongside Akko, Sebastos at Caesarea became the second artificial harbour within the Roman period maritime coastline of the Southern Levant. It was the first and only large-scale attempt to overcome the hostile Southern Levantine coast with an imported non-local building technique, the Roman hydraulic concrete⁵⁵. However, while Sebastos’ economic, political or military function is open to debate⁵⁶, it is telling that the harbour was already declining gradually during the 1st century AD, without any intervention from the imperial government⁵⁷.

Historically significant towns with less sophisticated harbours within the same area continued to operate very successfully alongside Sebastos. Some of them played an essential role in the consolidation of the early Roman Empire. Akko is a case in point. As the maritime gateway to the northern part of the Southern Levant, the city held a key position in the Roman control over Galilee and thus served as a *point d’appui* for various military campaigns against Galilee and Judaea up until 70 AD⁵⁸.

Another – almost unnoticed – example is Dor. The written sources are silent regarding Dor’s role in Roman routine. However, being the southernmost city of the province of Syria, on the border with Judaea during the 1st century AD, naturally implied a strategical function. Such a possibility is further reinforced by Flavius Josephus’ notions referring to Jewish hostages from Sepphoris being held at Dor during the 1st Jewish Revolt⁵⁹ and the city’s coins bearing the title »ruler of the fleet« (112-145 AD)⁶⁰, a title not attested elsewhere in the Southern Levant⁶¹. Perhaps Dor, only 10 km north of Caesarea, assisted in the Roman subjugation process of Judaea during the 1st and 2nd centuries AD⁶². Despite Dor’s suggested significance for the Roman agenda, the archaeological and numismatic record point to the town’s prosperity well into the 3rd century AD. During the Roman period the town reached its greatest extent. By the 3rd century AD, Dor had become a characteristic city of the Roman Near East⁶³.

Finally, Ashkelon’s strategic position along the *Via Maris*, a major trade route in antiquity, speaks for itself. Situated on the route to Egypt, it served as a support base for military operations during the Roman period, implied by its assistance of Julius Caesar with auxiliary forces during the Alexandrian Wars (47 BC)⁶⁴. And, during the reign of Tiberius until the mid-2nd century AD, at least one cohort was recruited from Ashkelon⁶⁵.

Ashkelon's commercial success is indicated by its merchants residing in Athens as early as the 3rd century BC, and during the later Hellenistic period also in Delos, Rhodos and Puteoli, as evidenced by inscriptions⁶⁶. The flourishing trade of Ashkelon and its international character also during the Roman period is implied by a variety of ceramic assemblages⁶⁷. By the end of the 1st century AD Ashkelon, together with Sebastos harbour, was *the* gateway for marble imports to the Southern Levant⁶⁸. And, during the 2nd century AD, a *collegium* of *navicularii* was present at Ashkelon, probably engaged in organized wine trade from Ashkelon to Rome⁶⁹.

Two principles – continuity and innovation – defined the maritime-related infrastructure of these successful Roman period harbour towns. The traditional Southern Levantine local knowledge in accessing the sea, that is to say building in ashlar headers, anchoring offshore, beaching of boats and anchoring in bays, continued well into the Roman period. Even in Caesarea these pragmatic forms of maritime mobility continued to exist. Various anchorages or smaller harbours were operating simultaneously alongside Sebastos, relying solely on natural features or basic artificial facilities. Caesarea's South Bay, for instance, remained mostly unimproved and served as a beach harbour. Large merchant ships anchored offshore and goods were brought in by lighters⁷⁰, while smaller ships could be beached directly on the shore. The very same method is attested in Ashkelon. Here, underwater *kurkar* ridges offshore served as an anchorage for larger ships in a water depth of 4-6 m, while small craft loaded and unloaded these large ships⁷¹. No harbour facilities have been found so far in Ashkelon. An additional small anchorage (Sdot Yam), south of Caesarea, with the possible remains of a column jetty, offered shelter for smaller ships sailing along the coast⁷². Anchoring in bays as a means of operation for maritime activity predominated also in Dor, as the rich underwater finds in the North Bay indicate⁷³. And, despite scholars' expectations of a formal harbour at Dor's North Bay⁷⁴, renewed excavations shed doubts on its existence during the Roman period⁷⁵. Moreover, a few hundred metres north of the Herodian harbour, a small bay with possible structures qualifying as quays or sea walls, built in the traditional ashlar header technique and partly protected by *kurkar* islands, continued to operate from the Hellenistic into the Roman and Byzantine periods⁷⁶. The continuation of the local header technique for building maritime installations is even found in Sebastos harbour itself and just north of the modern harbour basin⁷⁷. Akko's harbour was likewise built under this method, probably during the Hellenistic period as noted above⁷⁸. The commercial activity of the harbour reached its peak during the Hellenistic and Roman periods⁷⁹. Its main feature, the southern breakwater, which protected vessels from southerly and south-westerly winds, remained into the Roman period.

The repertoire of maritime-related infrastructure in the Southern Levant during the Roman period included a lighthouse in Caesarea⁸⁰ and possibly also in Akko harbour. A reassessment of the numismatic and archaeological evidence indicates the construction of a lighthouse at Akko's harbour entrance sometime during the Roman period, which served as a navigational aid to avoid the hazardous reef just south of the harbour for incoming ships⁸¹.

One would also expect facilities for storage in harbour towns. However, only Caesarea and possibly Dor have yielded archaeological evidence for Roman period warehousing. A complex of four-vaulted *horrea* opened towards Caesarea's South Bay, the earliest of which (vault 1) is dated to the 1st century AD⁸², but the majority of them belong to later Roman periods⁸³. Another complex of Roman period vaulted *horrea* faces the inner harbour basin, below the temple platform⁸⁴. In contrast, the possible Roman period storage facility facing Dor's North Bay is much simpler in nature⁸⁵. Finally, the shipsheds or slipways in Dor's Main Bay document yet another maritime-related structure. These installations are traditionally referred to as being Persian/Hellenistic in date⁸⁶. It is possible, however, that they were closely related to the intense building activity at the Tel opposite the Main Bay during the Roman period, facilitating the transportation of building material for the construction of the Roman temple.

THE BYZANTINE PERIOD

With the adoption of Christianity as the state religion in the early 4th century AD, the Southern Levant became the Holy Land and the new worship centre of the Byzantine Empire⁸⁷. This new role opened previously unseen economic horizons to the Southern Levant. The harbours, as the maritime gateways to the area, played an essential role in this economic and political transformation process of the Early Byzantine Empire. Historical sources refer to harbours at Gaza, Ashkelon, Caesarea, Iamnia, Ioppa, Sycamina and Akko (Ptolemais)⁸⁸. In addition, archaeological material indicates active harbours at Dor, Apollonia-Arsuf and Sdot Yam and maritime activity along the Carmel coast, Atlit and Neve Yam⁸⁹. Furthermore, Akko (Ptolemais), Caesarea, Ioppa, Ashkelon and Gaza possessed extensive land communication networks connecting them with other major Byzantine sites⁹⁰. However, besides minor repairs at Sebastos harbour, the construction of a sea wall in Caesarea's North Bay⁹¹ and a possible dry dock at Akko (Ptolemais)⁹², archaeological evidence for other harbour construction works in the Byzantine Southern Levant has not yet been proven sufficiently⁹³. And yet, coastal sites thrived while becoming seats of bishops and offering rest houses⁹⁴ for the numerous pilgrims arriving in the Holy Land. What is more, a considerable quantity of goods was channelled through the simple and pragmatic harbours of these coastal towns, most vividly attested for Ashkelon and Gaza. Despite the absence of any harbour facilities, Ashkelon – together with Gaza – became an empire-wide export centre of wine from the beginning of the 5th century onwards⁹⁵. The so-called Gaza and Ashkelon jars reached the shores of North Africa, Asia Minor, Greece (Corinth and Athens), the Black Sea, Italy, southern France, Spain and even Germany (Trier) and Britain (London)⁹⁶.

Likewise, Caesarea prospered despite having only basic harbour facilities. The capital of Palestina Prima reached its peak in the Byzantine period⁹⁷; its prosperous economy is attested by the many warehouses dating to this time span⁹⁸. Meanwhile, Sebastos, the great Herodian harbour had lost its splendour and was in a state of deterioration⁹⁹. A renovation project of the harbour was initiated under the reign of Anasthastius I (491-518 AD)¹⁰⁰. However, while there are impressive architectural remains related to the elaboration of the temple platform during the Byzantine period¹⁰¹, repairs related directly to the harbour were modest. A simple rubble breakwater was placed on the submerged northern breakwater¹⁰², and sea walls were built along the inner harbour's southern side¹⁰³ and a few hundred metres north of the inner basin¹⁰⁴. Nonetheless, the harbour experienced a secondary peak during 4th-6th centuries AD¹⁰⁵. Additionally, Caesarea's main harbour, the South Bay, the southern anchorage (Sdot Yam) and the North Bay, which was improved by a concrete sea wall¹⁰⁶, continued to operate during the Byzantine period¹⁰⁷.

Finally, the case of Dor sheds additional light on the economic capabilities of natural anchorages. The decline of the settlement at the Tel by the first quarter of the 3rd century AD has been traditionally understood to be a result of the rise of neighbouring Caesarea¹⁰⁸ rendering Dor's harbours redundant. However, there is growing archaeological evidence for the continuation of the town, with its harbours being highly active¹⁰⁹. Not only did Byzantine Dor encompass a considerable area of 6.8 ha, but it also possessed one of the largest episcopal basilicas of the Southern Levant, a possible pilgrimage site¹¹⁰. Industrial activity is attested by a potential purple dye workshop on the coast¹¹¹, nine farmsteads and 30 wine presses¹¹² from Dor's immediate hinterland. Although the existence of an active Byzantine town is open to debate, the 118 active sites from Dor's neighbourhood are clear evidence of a lively rural community¹¹³. Several Byzantine shipwrecks, iron anchors and ceramic assemblages in the southern anchorage of Dor – also known as Tantura Lagoon – attest lively maritime activity¹¹⁴. The discovery of the shipwrecks in Tantura Lagoon not only documents the largest concentration of Byzantine ships found in the Southern Levant, but also proves the concurrent coexistence of two different shipbuilding traditions in the region¹¹⁵. Except for one instance¹¹⁶, all of the wrecked vessels were of a small size¹¹⁷ and, judging by the underwater finds, engaged in regional trade.

Furthermore, a recent study has revealed vibrant maritime commercial activity for Dor's northern bay as well¹¹⁸. The demand for goods by the ever-growing population of Dor's immediate hinterland, and on occasion maybe even by the area of Caesarea¹¹⁹, was met by two – for the first time simultaneously operating – harbours in Dor.

Except for the absence of Sebastos' harbour and the demise of the southern breakwater of Akko harbour¹²⁰, the maritime coastline of the Byzantine Southern Levant resembled very much the one known from earlier periods. Harbours in this area remained simple and basic. However, with the new empire's orientation towards the East, these basic harbours became crucial suppliers of goods for the increasing local population. More intriguingly, however, they were capable of developing into empire-wide export centres, despite their limited harbour installations. Apparently, the importance of a coastal town did not promote improvements of harbour facilitation, nor did the commercial success of a coastal town depend on elaborate harbour structures.

CONCLUSIONS

A recent attempt to produce a typology of the physical remains of harbours, anchorages, moorings, and hauling facilities¹²¹ includes no less than ten different categories: man-made harbours, proto-harbours, deep-water natural anchorages, shallow water natural anchorages, offshore anchor holds, bollards or mooring holes, slipways, isolated wooden wharfs or jetties, isolated stone-built marine structures and harbours in the inlet of a coastal river. It is without doubt a very useful tool in the cataloguing of Israel's maritime heritage as part of a planned management and conservation effort. Some categories contain a number of technologically different maritime structures. One such category is that of man-made harbours, which include the Caesarea harbour(s), the series of Akko harbours (from Hellenistic to Crusader and Ottoman periods) and the Atlit harbour. The sheer number of categories and variability within categories can by themselves provide an important insight into the modes in which people in antiquity chose their interface for anchoring solutions. Thus there are hardly any two cases that are similar to one another, indicating that solutions were tailor-made for local conditions of topography, economic means, and the plethora of perceived and actual local needs. It seems that the availability of technology for the construction of harbour facilities was never a major cause for the actual use of such a technology. The Diffusion of Innovation Theory¹²² may explain the many stages needed between the knowledge of new technology and its implementation. It defines these five stages of the innovation process as the following:

- knowledge of the existence of the innovation and understanding of its function
- persuasion of the merits of the innovation
- decision to use the innovation
- implementation into actual use
- confirmation: reinforcement based on the positive outcomes emerging from the use.

The acceptance and implementation of innovation depends on several interrelating parameters, among them the relative advantage of the innovation and its compatibility with present values and past experience as well as its complexity and its difficulty of use and understanding¹²³.

Thus we believe that we should stay away from (neo-)evolutionary views in understanding the *longue durée* of the use of patterns of harbours and anchorages on the Southern Levantine coast. In the 2nd millennium, technological innovations related to harbour facilities, such as the moles and storage galleries known from Old and Middle Kingdom Egypt at sites such as Wadi Gawassis, Ain Sukhna and Wadi el Jarf, or shipsheds known from Late Minoan Kommos¹²⁴, are to date unknown along the coast of Israel. It is very likely that

anchorages in natural bays and offshore supported the majority of maritime activities. The introduction of quays and moles made of ashlar construction in the Iron Age seems highly likely, making these the earliest maritime facilities known in the Southern Levant. However, several problems in the dating and even the function of the features from Dor and Atlit still haunt current research. In this period too, the majority of harbour activity was conducted without formal harbour facilities. The finds from the Persian and Hellenistic periods show that even during this period, in which a significant increase in the construction of artificial harbour facilities in the eastern Mediterranean can be found, few such cases are known from the Israeli coast and even these may show some continuity with earlier Iron Age construction. In the Roman period, the spectacular case of Caesarea using innovative construction methods to build a mega-harbour masks the other side of the tale: that this is the only case of a Roman harbour construction from Roman Palestine and that the extremely active sea trade was carried out by other coastal sites, such as Dor, using no or minimal harbour facilities. Most telling is the case of the Byzantine period, with evidence of flourishing maritime trade and positively no evidence for any construction of wharves, quays or moles. It seems that the massive maritime activities of the Byzantine period were supported by anchoring in bays, possibly the default setting of the Southern Levantine system since the Bronze Age.

The short examination of the nomenclature of harbours and anchorages shows the potential for this venue for such study of historical sources as well as a direction for an understanding of the ancient importance of such locales. The initial results of this survey seem to suggest that the unified terminology used by the few Akkadian sources and more numerous Greek sources point to a specific point of view towards definition: that the main interest was the activity conducted in these places: commercial gateways to maritime trade and other interactions rather than to the materiality of the technology that allowed these interfaces.

Notes

- 1) Rainey/Notley 2006, 36 ff.
- 2) e. g. Broodbank 2013, fig. 9, 1. – Tartaron 2013.
- 3) Raban 1985; 1995a. – Galili/Raban/Sharvit 2002, 933-943.
- 4) e. g. Tartaron 2013. – Preiser-Kapeller/Daim 2015.
- 5) CAD K, 321.
- 6) Na'aman 1994, 3; 2009, 98f. – Rainey 2001, 58. – Rainey/Notley 2006, 281.
- 7) Rainey/Notley 2006, 236.
- 8) Marcus et al. 2008.
- 9) Artzy 2006a. – Maguire 2009.
- 10) Marcus 2007.
- 11) Cline/Yasur-Landau/Goshen 2011.
- 12) Rainey 2006, 292.
- 13) Wachsmann 1998, 262-271. – Galili 1985.
- 14) Cohen 2002, 123-128.
- 15) Marriner et al. 2014.
- 16) Raban 1985; 1991.
- 17) e. g. Tartaron 2013, tab. 5.2.
- 18) Burke 2008, 229-233; Stager et al. 2008, 218-223.
- 19) Galili/Gale/Rosen 2011.
- 20) Goren 2012.
- 21) Carayon/Marriner/Morhange 2011. – Marriner et al. 2014.
- 22) Raban/Tur-Caspa 2008. – Wachsmann 2008.
- 23) Dothan 1973; but see Barako 2013 for a markedly different interpretation of the site's early Iron Age function.
- 24) Raban/Galili 1985, 329.
- 25) Burke 2011, 63f.
- 26) Raban 1995b, 301-307. – Kingsley/Raveh 1996, 29-41.
- 27) Artzy 1995.
- 28) Artzy 2006b.
- 29) Artzy 2012, 8f.
- 30) Artzy/Quartermaine 2014, 22.
- 31) Prausnitz 1975. – Raban 1991.
- 32) Sherratt 2003. – Gilboa/Sharon 2003, fig. 9, 11. – Waiman-Barak/Gilboa/Goren 2014.
- 33) Rainey/Notley 2006, 132. – Gilboa 2015.
- 34) Gilboa/Sharon 2008, 158.
- 35) Raban 1995b, 310-341. – Artzy 2006a, 76.
- 36) Lazar et al. submitted.
- 37) Haggi/Artzy 2007, 78f. – Haggi 2010.

- 38) Raban 1996a, 501-504.
- 39) Raban 1993, 964. – Raban/Galili 1985, 329-332.
- 40) Master 2003.
- 41) Fantalkin 2014.
- 42) Fantalkin 2001.
- 43) Yahalom-Mack et al. 2014.
- 44) Gambash 2014.
- 45) Moshe Dothan is the likely progenitor of the hypothesis, see Dothan 1976; 1985. Avner Raban followed Dothan closely, see Raban 1985; 1995a.
- 46) Of particular note are the commentary on Herodotus 3.4.3 and a recent survey of the Persian-Egyptian struggle, Asheri/Lloyd/Corcella 2007, 401. – Ruzicka 2012, 67. Other examples include Katzenstein 1979, 27. – Inlow 1979, 50f. – Miller/Hayes 1986, 450. – Blenkinsopp 1988, 62. – Dandamaev 1989, 73. – Haggi/Artzy 2007, 82. These accounts make do with quoting Dothan and Raban's hypothesis, or, at best, the two sources that inspired it, Diodorus and Strabo. Commendable caution is taken by Wallinga 1993, 124.
- 47) Of note here is the archaeological research of Galili suggesting that the harbour could not be built before the Hellenistic period, see Galili et al. 2002. – Galili/Rosen 2008. – Galili et al. 2010.
- 48) Based on the excavations of 1964-1966, Flinder first made the hypothesis that the initial harbour facilities in Akko were built when the Phoenicians »colonized« Akko (Flinder/Linder/Hall 1993, 199-225), though no date or even period are suggested for the event. For Phoenician harbour technology see Raban 1995a, 153-163. All dates below are BC unless stated otherwise.
- 49) See, for example, Artzy's recent report, Artzy 2012.
- 50) Stern 1982, 15.
- 51) P. Lond. 7.2141. See, Lawall 2013.
- 52) Herod. 2.16. Thales' ship of grain is said to have been worth five talents. Its destination was probably the island of Kos, Nairn 1904, 15.
- 53) Letter of Aristaeas 114-16: »ἐργάσιμος γὰρ καὶ πρὸς τὴν ἐμπορίαν ἐστὶ κατεσκευασμένη ἡ χώρα, καὶ πολύτεχνος ἡ πόλις, οὐ σπανίζει δὲ οὐδὲν τῶν διακομιζομένων διὰ τῆς θαλάσσης. ἔχει γὰρ καὶ λιμένας εὐκαίρους χορηγοῦντας, τὸν τε κατὰ τὴν Ἀσκαλῶνα καὶ Ἰόππην, καὶ Γάζαν, ὁμοίως δὲ καὶ Πτολεμαίδα τὴν ὑπὸ τοῦ βασιλέως ἐκτισμένην. μέση δὲ κεῖται πρὸς τοὺς προειρημένους τόπους, οὐκ ἀπέχουσα τούτων πολὺ.«
- 54) Sharvit/Planer/Buxton 2013.
- 55) Raban 2009.
- 56) To assist Roman grain ships as an additional shelter on their route from Alexandria to Rome see Oleson/Brandon/Hohlfelder 2011, 117. – Raban 2009, 53. 185, to serve the international trade see Raban 1992, 119, or to fulfill a military function see Beebe 1983.
- 57) Gambash 2013. Remains of shipwreck cargoes, dated to the 2nd-3rd century AD, on top of the main moles, indicate their disintegration, Raban 1992, 114f. The flushing system went out of use by c.200 AD, Raban 2009, 204.
- 58) Herod's campaign in 39 BC, *los. Bell. Iud.* 1,290; Varus' operation in 4 BC, *los. Bell. Iud.* 2, 66-68; Cestius Gallus campaign in 66 AD, *los. Bell. Iud.* 2, 499; and most famous Vespasian's and Titus' campaign in 67 AD, *los. Bell. Iud.* 3, 29. 110. 115. – Kashtan 1988. – Kasher 1990, 287-312. – Gambash 2013.
- 59) *los. Vita* 31. – Kasher 1990, 290f.
- 60) Meshorer/Bijovsky/Fischer-Bossert 2013, 39.
- 61) The importance of Dor harbour has been first noted by Dahl 1915, 91. Kingsley/Raveh 1994 further elaborated these notions presuming a built harbour, Kingsley/Raveh 1994; 1996, 84.
- 62) See Kasher 1990, 290f.
- 63) Stern 1995. – Nitschke/Martin/Shalev 2007.
- 64) *los. Ant. Iud.* 14, 128. 139. – *los. Bell. Iud.* 1, 187. – Kasher 1990, 182.
- 65) Ameling et al. 2014, 245.
- 66) Ameling et al. 2014, 241.
- 67) Johnson 2008.
- 68) Fischer 1996, 261; 1998.
- 69) Eck/Zissu 2001.
- 70) Raban 2009, 203.
- 71) Galili et al. 2010, 141. – Raban/Tur-Caspa 2008, 67.
- 72) Galili/Dahari/Sharvit 1993, 67.
- 73) Arkin 2015.
- 74) Kingsley/Raveh 1994; 1996, 84.
- 75) Arkin 2015.
- 76) Hillard 1997. – Raban 2009, 17ff.
- 77) Raban 1995a, 180; several structures along the coastline were built in ashlar headers, some of them bearing grooves for dovetailed clamps. These structures have been associated with a maritime function such as quays or piers, see Raban 2009, 131-136.
- 78) For the building in header technique in Akko harbour, see Raban 1995a, 158f.; for the Hellenistic date of the harbour, see Galili/Rosen 2008. – Galili et al. 2010. – Artzy 2012, 82. – Sharvit/Planer/Buxton 2013. – Gambash 2013.
- 79) Galili et al. 2010.
- 80) Vann 1991.
- 81) Rosen/Galili/Zvieli 2012.
- 82) Blakely 1988.
- 83) Patrich 2011.
- 84) While a Herodian date has been proposed by Negev 1993, 273; a 300 AD construction date has been argued by Patrich 2011, 228.
- 85) Raban 1995b, 289f.
- 86) Raban 1995b, 307ff.
- 87) Dauphin 1997.
- 88) Kingsley 1999a, 94f. with historical references.

- 89) Kingsley 1999a, 94f. Archaeological evidence from underwater surveys: Ashkelon: Galili 2008, 1926-1928. – Raban/Tur-Caspa 2008. Caesarea: Oleson 1994. – Oleson et al. 1996. Iamnia: Galili/Dahari/Sharvit 1993, 61ff. – Galili 2008, 1928. – Galili/Rosen/Zviely 2009, 381. Sycamina: For Byzantine shipwreck assemblages in the Haifa area, see Galili/Sharvit 1999a. Akko: Galili et al. 2010. Dor: Kingsley/Raveh 1996. – Arkin 2015. Sdot Yam: Galili/Dahari/Sharvit 1993, 68f. – Galili 2008, 1929. Apollonia-Arsuf: Galili/Dahari/Sharvit 1993, 63ff. – Grossmann 2001. Galili 2008, 1928f. For the use of Byzantine harbours for transportation of raw glass, see Galili/Gorin-Rosen/Rosen 2015. For Byzantine shipwreck assemblages along the Carmel coast, Atlit and Neve Yam: Galili/Sharvit 1999b.
- 90) Roll 1999.
- 91) Raban 1989, 143f.
- 92) A historical source is referring to a dry dock in Akko (Ptolemais), however, no archaeological evidence has been found so far, see Kingsley 1999a, 94 with historical references.
- 93) Two built harbours have been suggested for Byzantine Apollonia-Arsuf, Grossmann 2001. The northern »Crusader Harbour« has been presumed as an enclosed harbour by three breakwaters. The results of renewed excavations in the harbour, however, suggest that the presumed Byzantine western breakwater is actually part of a natural rock, Mirkin 2014, 9. The lower courses of the northern and southern »breakwater« or walls are built in header fashion. Unfortunately, the paucity of finds during the renewed excavations do not contribute to a proper dating of these structures, Mirkin 2014. See also Kingsley 1999a, 97f. remarks on the harbours of Apollonia.
- 94) Such as Gaza, Ashkelon, Iamnia, Ioppa, Atlit, Caesarea, Akko (Ptolemais) and Achziv, see Kingsley 1999a, 93 with historical references.
- 95) Kingsley 1999b, 174-180. – Mayerson 2008. – Johnson/Stager 2008.
- 96) Johnson/Stager 2008.
- 97) Kingsley 2001, 82f.
- 98) Patrich 2011, 225-236.
- 99) Remains of shipwreck cargoes, dated to the 2nd-3rd century AD, on top of the main moles, indicate their disintegration, Raban 1992, 114f. The flushing system went out of use by c. 200 AD, see Raban 2009, 204. The underwater finds from the outer basin for the 2nd-3rd century AD are meager, but renewed activity is attested for the 4th-6th century AD, Oleson et al. 1996.
- 100) PG 87.3, 2817 §19.
- 101) Raban 1996b, 657.
- 102) Although the technology of building in Roman hydraulic concrete was still known in the 6th century AD, this technique was not applied, Hohlfelder 1988. The actual design of the harbour during the Byzantine period is under debate. Hohlfelder 1993, 693ff. proposed an all-weather harbour with a functioning outer basin – though on a smaller scale than the Herodian harbour – while Kingsley 2001 argues for a simple single northern mole.
- 103) Raban 1996b, 657.
- 104) Raban 2009, 128. 136.
- 105) Oleson et al. 1996.
- 106) Raban 1989, 143f.
- 107) Galili/Dahari/Sharvit 1993, 65-69. – Raban 2009, 203. – Hillard 1997, 137f.
- 108) Stern 1995, 280f.
- 109) The town continued off the Tel to the north and east, Gibson/Dauphin 1994/1995.
- 110) Dauphin 1997.
- 111) Raban 1995b.
- 112) Gibson et al. 1999.
- 113) Olami/Sender/Oren 2004.
- 114) Kingsley Raveh 1996. – Kingsley 2001, 75. – Kahanov/Royal 2001. – Royal/Kahanov 2005. – Mor/Kahanov 2006. – Barkan et al. 2013. – Navri/Kahanov/Cvikel 2013. – Israeli/Kahanov 2014.
- 115) Navri/Kahanov/Cvikel 2013, 306.
- 116) Navri/Kahanov/Cvikel 2013.
- 117) Navri/Kahanov/Cvikel 2013, 323.
- 118) Arkin 2015.
- 119) Gambash forthcoming.
- 120) Galili et al. 2010, despite unfavorable anchoring conditions in the harbour during the Byzantine period, maritime activity continued, though in lower amounts compared to previous periods.
- 121) Galili/Arenson 2014, 157. 160-167.
- 122) Rogers 1983. – Shortland 2004, 4ff.
- 123) Rogers 1983, 163-206. – Shortland 2004, 5.
- 124) Fattovich 2012. – Tallet 2012. – Tartaron 2013, 158ff.

Abbreviation

CAD K = Chicago Akkadian Dictionary K

Sources

P.Lond.: Greek Papyri in the British Museum. London. VII, The Zenon Archive. Edited by T. C. Skeat (London 1974).

Herod.: J. Rusten / I. C. Cunningham, Theophrastus: Characters; Herodas: Mimes; Sophron and Other Mime Fragments. Loeb Classical Library 225 (Cambridge MA 2002).

los. Ant. Iud.: Josephus in Nine Volumes, Vol. 2: Jewish Antiquities, Books XII-XIV. With an English Translation by R. Marcus. The Loeb Classical Library 203 (London, Cambridge MA 1943, reprint 1961).

los. Bell. Iud.: Josephus in Nine Volumes, Vol. 7: The Jewish War, Books I-III. With an English Translation by H. St. J. Thackeray. The Loeb Classical Library 203 (London, Cambridge MA 1927, reprint 1967).

PG: K. Kempen, Procopii Gazaei in imperatorem Anastasium panegyricus [unpubl. diss. Univ. Bonn 1918].

Letter of Aristeas: Aristeas to Philocrates (letter of Aristeas). Edited and translated by M. Hadas (New York 1951, reprint 1973).

References

Ameling et al. 2014: W. Ameling / H. M. Cotton / W. Eck / B. Isaac / A. Kushnir-Stein / H. Misgav / J. Price / A. Yardeni (eds) with contr. by A. Eck / R. Hoyland, *Corpus Inscriptionum 3: South Coast 2161-2648* (Berlin, New York 2014).

Arkin 2015: E. Arkin, *The North Bay of Dor. A Roman Seafront and Byzantine Anchorage* [unpubl. M.A. thesis Univ. Haifa 2015].

Artzy 1995: M. Artzy, Nami: A Second Millennium International Maritime Trading Center in the Mediterranean. In: S. Gitin (ed.), *Recent Excavations in Israel: A View to the West, Reports on Kabri, Nami, Miqne-Ekron, Dor and Ashkelon*. Archaeological Institute of America Colloquia & Conference Papers 1 (Dubuque 1995) 17-40.

2006a: M. Artzy, *The Jatt Metal Hoard in Northern Canaanite/Phoenician and Cypriote Context*. *Cuadernos de Arqueología Mediterránea* 14, 1 (Barcelona 2006).

2006b: M. Artzy, *The Carmel Coast during the Second Part of the Late Bronze Age: A Center for Eastern Mediterranean Transshipping*. *Bulletin of the American Schools of Oriental Research* 343, 2006, 45-64.

2012: M. Artzy, *Return to Tel Akko, its Anchorages, Harbor, and its Surroundings*. *Leon Recanati Institute for Maritime Studies News* 37 (Haifa 2012) 5-14.

Artzy/Quartermaine 2014: M. Artzy / J. Quartermaine, *How and When did Tel Akko get its Unusual Banana Shape?* In Y. Galanakis / T. Wilkinson / J. Bennet (eds), *AΘYPMATA: Critical Essays on the Archaeology of the Eastern Mediterranean in Honour of E. Susan Sherratt* (Oxford 2014) 11-22.

Asheri/Lloyd/Corcella 2007: D. Asheri / A. Lloyd / A. Corcella, *A Commentary on Herodotus Books I-IV*. In: O. Murray / A. Moreno (eds), *A Commentary on Herodotus Books I-IV*. Translated by B. Grazioso / M. Rossetti / C. Dus / V. Cazzato (Oxford 2007).

Barako 2013: T. Barako, *Philistines and Egyptians in Southern Coastal Canaan during the Early Iron Age*. In: A. Killebrew / E. Lehmann (eds), *The Philistines and Other »Sea Peoples« in Text and Archaeology* (Atlanta 2013) 43-51.

Barkan et al. 2013: D. Barkan / A. Yasur-Landau / H. Mommsen / D. Ben-Shlomo / Y. Kahanov, *The Dor 2006 Shipwreck: the Ceramic Material*. *Tel Aviv* 40, 2013, 117-143.

Beebe 1983: H. K. Beebe, *Caesarea Maritima: It's Strategic and Political Significance to Rome*. *Journal of Near Eastern Studies* 42/3, 1983, 195-207.

Blakley 1988: J. A. Blakley, *Caesarea Maritima: the Pottery and Dating of Vault One Horreum, Mithraeum and Later Uses* (New York NY 1988).

Blenkinsopp 1988: J. Blenkinsopp, *Ezra-Nehemiah: A Commentary*. *Old Testament Library Series* (Louisville KY 1988).

Broodbank 2013: C. Broodbank, *The Making of the Middle Sea: a History of the Mediterranean from the Beginning to the Emergence of the Classical World* (London, New York, Oxford 2013).

Burke 2008: A. A. Burke, *Walled up to Heaven: the Revolution of Middle Bronze Age Fortification Strategies in the Levant* (Winona Lake IN 2008).

2011: A. Burke, *Early Jaffa: From the Bronze Age to the Persian Period*. In: M. Peilstöcker / A. Burke (eds), *The History and Archaeology of Jaffa*. *The Jaffa Cultural Heritage Project* 1 (Los Angeles 2011) 63-78.

Carayon/Marriner/Morhange 2011: N. Carayon / N. Marriner / C. Morhange, *Geoarchaeology of Byblos, Tyre, Sidon and Beirut*. *Rivista di Studi Fenici* 39/1, 2011, 45-55.

Cline/Yasur-Landau/Goshen 2011: E. Cline / A. Yasur-Landau / N. Goshen, *New Fragments of Aegean-Style Painted Plaster from Tel Kabri, Israel*. *American Journal of Archaeology* 115/2, 2011, 245-261.

Cohen 2002: S. Cohen, *Canaanites, Chronologies, and Connections: The Relationship of Middle Bronze IIA Canaan to Middle Kingdom Egypt*. *Studies in the Archaeology and History of the Levant* 3 (Winona Lake 2002).

Dahl 1915: G. Dahl, *The Materials for the History of Dor*. *Transactions of the Connecticut Academy of Sciences* 20 (New Haven CT) 1-181.

Dandamaev 1989: M. A. Dandamaev, *A Political History of the Achaemenid Empire*. Translated into English by W. J. Vogelsang (Leiden et al. 1989).

Dauphin 1997: C. Dauphin, *On the Pilgrim's Way to the Holy City of Jerusalem: the Basilica of Dor in Israel*. In: J. R. Barlett (ed.), *Archaeology and Biblical Interpretation* (London, New York 1997) 145-166.

- Dothan 1973: M. Dothan, The Foundation of Tel Mor and of Ashdod. *Israel Exploration Journal* 23/1, 1973, 1-17.
- 1976: M. Dothan, Akko: Interim Excavation Report First Season, 1973/4. *American School of Oriental Research* 224, 1976, 1-48.
- 1985: M. Dothan, A Phoenician Inscription from Akko. *Israel Exploration Journal* 35, 1985, 81-94.
- Eck/Zissu 2001: W. Eck / B. Zissu, A *Nauclerus de oeco poreutico-rum* in a New Inscription from Ashkelon/Ascalon. *Scripta Classica Israelica* 20, 2001, 89-96.
- Fantalkin 2001: A. Fantalkin, Mezad Hashavyahu: Its Material Culture and Historical Background. *Tel Aviv* 28/1, 2001, 3-165.
- 2014: A. Fantalkin, Ashdod-Yam on the Israeli Mediterranean Coast – A First Season of Excavations. *Skyllis* 14/1, 2014, 45-57.
- Fattovich 2012: R. Fattovich, Egypt's Trade with Punt: New Discoveries on the Red Sea Coast. *British Museum Studies in Ancient Egypt and Sudan* 18, 2012, 1-59.
- Fischer 1996: M. Fischer, Marble, Urbanism, and Ideology in Roman Palestine: the Caesarea Example. In: A. Raban / K. G. Holum (eds), *Caesarea Maritima: a Retrospective after Two Millennia*. *Documenta et Monumenta Orientis Antiqui* 21 (Leiden, New York, Köln 1996) 251-261.
- 1998: M. L. Fischer, Marble Studies: Roman Palestine and the Marble Trade. *Xenia*. *Konstanzer Althistorische Vorträge und Forschungen* 40 (Konstanz 1998).
- Flinder/Linder/Hall 1993: A. Flinder / E. Linder / E. T. Hall, Survey of the Ancient Harbor of Akko, 1964-1966. In: M. Heltzer / A. Segal / D. Kaufman (eds), *Studies in Archaeology and History of Ancient Israel* (Haifa 1993) 199-225.
- Galili 1985: E. Galili, A Group of Stone Anchors from Newe-Yam. *International Journal of Nautical Archaeology and Underwater Exploration* 14/2, 1985, 143-153.
- 2008: The New Encyclopedia of Archaeological Excavations in the Holy Land 5, Suppl. (2008) 1925-1934 s.v. Marine Archaeology (E. Galili).
- Galili/Arenson 2014: E. Galili / S. Arenson, Management of the Underwater and Coastal Archaeological Heritage in Israel's Seas. *RIPARIA, International Journal of History of the Interactions Between Society and the Environment* 0, 2014, 151-177.
- Galili/Rosen 2008: The New Encyclopedia of Archaeological Excavations in the Holy Land 5, Suppl. (2008) 1558-1561 s.v. Acco: the Harbor (E. Galili / B. Rosen).
- Galili/Sharvit 1999a: E. Galili / J. Sharvit, Haifa, Underwater Surveys. *Hadashot Arkheologiyot – Excavations and Surveys in Israel* 110, 1999, 15-20.
- 1999b: E. Galili / Y. Sharvit, Underwater Survey in the Mediterranean 1992-1996. *Hadashot Arkheologiyot – Excavations and Surveys in Israel* 19, 1999, 96-101.
- Galili/Dahari/Sharvit 1993: E. Galili / U. Dahari / J. Sharvit, Underwater Surveys and Rescue Excavations along the Israeli Coast. *International Journal of Nautical Archaeology* 22/1, 1993, 61-77.
- Galili/Raban/Sharvit 2002: E. Galili / A. Raban / J. Sharvit, Forty Years of Marine Archaeology in Israel. In: H. Tzalas (ed.), *Tropis VII. 7th International Symposium on Ship Construction in Antiquity*, Pylos 1999 (Athens 2002) 927-961.
- Galili/Rosen/Zviely 2009: E. Galili / B. Rosen / D. Zviely, Ancient Sounding-Weights and Navigation along the Mediterranean Coast of Israel. *International Journal of Nautical Archaeology* 38/2, 2009, 343-368.
- Galili/Gale/Rosen 2011: E. Galili / N. Gale / B. Rosen, Bronze Age Metal Cargoes off the Israeli Coast. *Skyllis* 11, 2011, 64-73.
- Galili/Gorin-Rosen/Rosen 2015: E. Galili / Y. Gorin-Rosen / B. Rosen, Mediterranean Coasts, Cargoes of Raw Glass. *Hadashot Arkheologiyot – Excavations and Surveys in Israel* 127, 2015. www.hadashot-esi.org.il/Report_Detail_Eng.aspx?id=24846 (1.3.2016).
- Galili et al. 2002: E. Galili / J. Sharvit / U. Dahari / N. Bahat Zilberstein / G. Finkielstejn / E. J. Stern / R. Kool / Y. Kahanov, Akko Harbor, Underwater Surveys. *Hadashot Arkheologiyot – Excavations and Surveys in Israel* 114, 2002, 12-15.
- 2010: E. Galili / B. Rosen / D. Zviely / N. Silberstein / G. Finkielstejn, The Evolution of Akko Harbor and its Mediterranean Maritime Trade Links. *Journal of Island and Coastal Archaeology* 5/2, 2010, 191-211.
- Gambash 2013: G. Gambash, Caesarea and the Grand Strategy. *Skyllis* 13/1, 2013, 53-58.
- 2014: G. Gambash, En Route to Egypt: Akko in the Persian Period. *Journal of Near Eastern Studies* 73/2, 2014, 273-282.
- forthcoming: G. Gambash, Maritime Activity in the Ancient Southern Levant: the Case of Late Antique Dor. *ARAM* 26/1 (forthcoming).
- Gibson/Dauphin 1994/1995: S. Gibson / C. Dauphin, The Byzantine City of Dor/Dora Discovered. *Bulletin of the Anglo-Israel Archaeological Society* 14, 1994/1995, 9-38.
- Gibson et al. 1999: S. Gibson / S. A. Kingsley / S. Clarke / J. Clarke, Town and Country in the Southern Carmel: Report on the Landscape Archaeology Project at Dor. *Levant* 31, 1999, 71-121.
- Gilboa 2015: A. Gilboa, Dor and Egypt in the Early Iron Age: an Archaeological Perspective of (Part Of) the Wenamun Report. *Egypt and the Levant* 25, 2015, 247-274.
- Gilboa/Sharon 2003: A. Gilboa / I. Sharon, An Archaeological Contribution to the Early Iron Age Chronological Debate: Alternative Chronologies for Phoenicia and their Effects on the Levant, Cyprus and Greece. *Bulletin of the American Schools of Oriental Research* 332, 2003, 7-80.
- 2008: A. Gilboa / I. Sharon, Between the Carmel and the Sea: Tel Dor's Iron Age Reconsidered. *Near Eastern Archaeology* 71/3, 2008, 146-170.
- Goren 2013: Y. Goren, International Exchange During the Late Second Millennium BC: Microarchaeological Study of Finds from the Uluburun Ship. In: J. Aruz / S. B. Graff / Y. Rakic (eds), *Cultures in Contact: From Mesopotamia to the Mediterranean in the Second Millennium BC* (New York NY 2013) 54-61.
- Grossmann 2001: E. Grossmann, Maritime Tel Michal and Apollonia: Results of the Underwater Survey 1989-1996. *British Archaeological Reports International Series* 915 (Oxford 2001).
- Haggi 2010: A. Haggi, Report on Underwater Excavation at the Phoenician Harbour, Atlit, Israel. *International Journal of Nautical Archaeology* 39/2, 2010, 278-285.
- Haggi/Artzy 2007: A. Haggi / M. Artzy, The Harbor of Atlit in Northern Canaanite/Phoenician Context. *Near Eastern Archaeology* 70/2, 2007, 75-84.

- Hillard 1997: T. W. Hillard, Caesarea's North Bay: an Anchorage of Hellenistic Straton's Tower? In: S. Swiny / R. L. Hohlfelder / H. Wylde Swiny (eds), *Res Maritimae. Cyprus and the Eastern Mediterranean: From Prehistory to Late Antiquity*. Proceedings of the Second International Symposium Cities on the Sea, Nicosia, Cyprus, October 18-22, 1994. American School of Oriental Research Archaeological Reports 4; Cyprus American Archaeological Research Institute, Monograph Ser. 1 (Atlanta GA 1997) 135-151.
- Hohlfelder 1988: R. L. Hohlfelder, Procopius, De Aedificiis 1.11.18.20: Caesarea Maritima and the Building of Harbours in Late Antiquity. In: I. Malkin / R. L. Hohlfelder (eds), *Mediterranean Cities: Historical Perspectives* (Abingdon, Oxon, New York 1999) 54-62.
- 1993: R. Hohlfelder, Anastasius I and the Restoration of Caesarea Maritima's Harbor: the numismatic evidence. In: A. Biram / J. Aviram, *Biblical Archaeology Today: Proceeding of the Second International Congress of Biblical Archaeology*, Jerusalem, April 1984 (Jerusalem 1993) 687-696.
- Horden/Purcell 2000: P. Horden / N. Purcell, *The Corrupting Sea: A Study of Mediterranean History* (Malden MA et al. 2000).
- Inlow 1979: E. B. Inlow, *Shahanshah: A Study of the Monarchy of Iran* (Delhi 1979).
- Israeli/Kahanov 2014: E. Israeli / Y. Kahanov, The 7th-9th Century Tantura E Shipwreck, Israel: Construction and Reconstruction. *International Journal of Nautical Archaeology* 43/2, 2014, 369-388.
- Johnson 2008: B. L. Johnson, Imported Pottery of the Roman and Late Roman Period. In: L. E. Stager / J. D. Schloen / D. M. Master (eds), *Ashkelon 2: Imported Pottery of the Roman and Late Roman Period*. Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006 (Winona Lake IN 2008).
- Johnson/Stager 2008: B. L. Johnson / L. E. Stager, Byzantine-Period Wine Jars and Their Distribution. In: L. E. Stager / J. D. Schloen / D. M. Master (eds), *Ashkelon 1: Introduction and Overview*. Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006 (Winona Lake IN 2008) 479-487.
- Kahanov/Royal 2001: Y. Kahanov / J. Royal, Analysis of Hull Remains of the Dor D Vessel, Tantura Lagoon, Israel. *International Journal of Nautical Archaeology* 30, 2001, 257-265.
- Kasher 1990: A. Kasher, Jews and the Hellenistic Cities in Eretz-Israel: Relations of the Jews in Eretz Israel with the Hellenistic Cities during the Second Temple Period (332 BCE-70 CE). *Texte und Studien zum Antiken Judentum* 21 (Tübingen 1990).
- Kashtan 1988: N. Kashtan, Akko-Ptolemais: A Maritime Metropolis in Hellenistic and Early Roman Times, 332 BCE-70 CE, as Seen through the Literary Sources. In: I. Malkin / R. L. Hohlfelder (eds), *Mediterranean Cities: Historical Perspectives* (Abingdon, Oxon, New York 1999) 37-53.
- Katzenstein 1979: J. H. Katzenstein, Tyre in the Early Persian Period (539-486 B.C.E.). *The Biblical Archaeologist* 42/1, 1979, 23-34.
- Kingsley 1999a: S. A. Kingsley, *Specialized Production and Long-Distance Trade in Byzantine Palestine* [unpubl. diss. Univ. Oxford 1999].
- 1999b: S. A. Kingsley, The Economic Impact of the Palestinian Wine Trade in Late Antiquity. In: S. A. Kingsley / M. Decker (eds), *Economy and Exchange in the East Mediterranean during Late Antiquity*. Proceedings of a Conference at Somerville College, 29th May 1999, Oxford (Oxford 2001) 44-68.
- 2001: S. A. Kingsley, »Decline« in the Ports of Palestine in Late Antiquity. In: L. Lavan (ed.), *Recent Research in Late-Antique Urbanism*. *Journal of Roman Archaeology Suppl. Ser.* 42 (Portsmouth RI 2001) 69-87.
- Kingsley/Raveh 1994: S. A. Kingsley / K. Raveh, A Reassessment of the Northern Harbour of Dor, Israel. *International Journal of Nautical Archaeology* 23/4, 1994, 289-295.
- 1996: S. A. Kingsley / K. Raveh, *The Ancient Harbour and Anchorage at Dor, Israel*. Results of the Underwater Surveys, 1976-1991 (Oxford 1996).
- Lawall 2013: M. L. Lawall, Two Amphorae from the Swedish Cyprus Expedition in the National Museum of Denmark: Late Archaic through Late Classical Cypriot Trade. In: M. Lawall / J. Lund (eds), *The Transport Amphorae and Trade of Cyprus*. Gösta Enbom Monographs 3 (Aarhus, Lancaster, Bristol 2013) 51-60.
- Lazar et al. submitted: M. Lazar / K. Englotz / U. Basson / A. Yasur Landau, Water Saturated Sand and a Shallow Bay: Combining Coastal Geophysics and Underwater Archaeology in the South Bay of Tel Dor (submitted for publication 2016).
- Maguire 2009: L. Maguire, *The Cypriot Pottery and its Circulation in the Levant*. Tell El-Dab'a XXI (Wien 2009).
- Marcus 2007: E. Marcus, Amenemhet II and the Sea: Maritime Aspects of the Mit Rahima (Memphis) Inscription. *Egypt and the Levant* 17, 137-190.
- Marcus et al. 2008: E. Marcus / Y. Porath / R. Schiestl / A. Seiler / S. M. Paley, The Middle Kingdom Egyptian Pottery from Middle Bronze Age Ila Tel Ifshar. *Egypt and the Levant* 18, 2008, 203-219.
- Marriner et al. 2014: N. Marriner / C. Morhange / D. Kaniewski / N. Carayon, Ancient Harbour Infrastructure in the Levant: Tracking the Birth and Rise of New Forms of Anthropogenic Pressure. *Scientific Reports* 4, 2014, 1-11.
- Master 2003: D. Master, Trade and Politics: Ashkelon's Balancing Act in the Seventh Century BCE. *Bulletin of the American Schools of Oriental Research* 330, 2003, 47-63.
- Mayerson 2008: P. Mayerson, The Export of Holy Wine from Byzantine Ashkelon: the Wine of Ashkelon in Byzantine Texts. In: L. E. Stager / J. D. Schloen / D. M. Master (eds), *Ashkelon 1: Introduction and Overview*. Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006 (Winona Lake IN 2008) 471-478.
- Meshorer/Bijovsky/Fischer-Bossert 2013: Y. Meshorer / G. Bijovsky / W. Fischer-Bossert, Coins of the Holy Land: the Abraham and Marian Sofaer Collection at the American Numismatic Society and the Israel Museum. In: D. Hendin / A. Meadows (eds), *Coins of the Holy Land: the Abraham and Marian Sofaer Collection at the American Numismatic Society and the Israel Museum*. *Ancient Coins in North American Collections* 8 (New York NY 2013).
- Miller/Hayes 1986: J. M. Miller / J. H. Hayes, *A History of Ancient Israel and Judah* (Louisville KY 1986).
- Mirkin 2014: D. Mirkin, Reports to the Trustees of the Honor Frost Foundation. <http://honorfrostfoundation.org/wp/wp-content/uploads/2014/03/HFF-Apllonia-report2-Daniel-Mirkin.pdf> (1.3.2016).

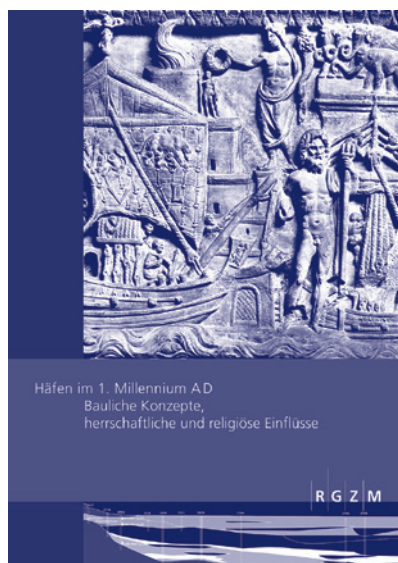
- Mor/Kahanov 2006: H. Mor / Y. Kahanov, The Dor 2001/1 Shipwreck, Israel: a Summary of the Excavation. *International Journal of Nautical Archaeology* 35, 2006, 274-289.
- Na'aman 1994: N. Na'aman, Esarhaddon's Treaty with Baal and Assyrian Provinces along the Phoenician Coast. *Rivista di Studi Fenici* 22, 1994, 3-8.
- 2009: N. Na'aman, Was Dor the Capital of an Assyrian Province? *Tel Aviv* 36, 2009, 95-109.
- Narin 1904: J. A. Nairn, *The Mimes of Herodas* (Oxford 1904).
- Navri/Kahanov/Cvikel 2013: R. Navri / Y. Kahanov / D. Cvikel, The Byzantine-Period Dor 2006 Shipwreck, Israel: Preliminary Hull Construction Report. *International Journal of Nautical Archaeology* 42/2, 2013, 305-325.
- Negev 1993: A. Negev, *The New Encyclopedia of Archaeological Excavations in the Holy Land* 1 (1993) 272-273 s.v. Caesarea: Excavations in the 1950s and 1960s (A. Negev).
- Nitschke/Martin/Shalev 2007: J. L. / Nitschke / S. R. Martin / Y. Shalev, Between Carmel and the Sea: Tel Dor, the Late Periods. *Near Eastern Archaeology* 74/3, 2011, 134-154.
- Olami/Sender/Oren 2004: Y. Olami / S. Sender / E. Oren, Map of Binyamina (48). *Archaeological Survey of Israel* (Jerusalem 2004).
- Oleson 1994: J. P. Oleson, The Finds and the Ships. In: M. A. Fitzgerald / A. N. Sherwood / S. E. Sidebotham (eds), *The Harbours of Caesarea Maritima: Results of the Caesarea Ancient Harbour Excavations Project 2, 1980-85*. Center for Maritime Studies, University of Haifa 5 = *British Archaeological Reports International Series* 594 (Oxford 1994).
- Oleson/Brandon/Hohlfelder 2011: J. P. Oleson / C. Brandon / R. Hohlfelder, Technology, Innovation, and Trade: Research into the Engineering Characteristics of Roman Maritime Concrete. In: D. Robinson / A. Wilson (eds), *Maritime Archaeology and Ancient Trade in the Mediterranean*. *Oxford Center for Maritime Archaeology Monographs* 6 (Oxford 2011) 107-119.
- Oleson et al. 1996: J. P. Oleson with contr. by R. L. Hohlfelder / A. N. Sherwood / S. E. Sidebotham, Artifactual Evidence for the History of the Harbors of Caesarea. In: A. Raban / K. G. Holum (eds), *Caesarea Maritima: a Retrospective after Two Millennia*. *Documenta et Monumenta Orientis Antiqui* 21 (Leiden, New York, Köln 1996) 359-377.
- Patrich 2011. J. Patrich, *Studies in the Archaeology and History of Caesarea Maritima: Caput Judaeae, Metropolis Palaestinae*. *Ancient Judaism and Early Christianity* 77 (Leiden, Boston MA 2011).
- Prausnitz 1975: M. Prausnitz, The Planning of the Middle Bronze Age Town at Achzib and its Defences. *Israel Exploration Journal* 25/4, 1975, 202-210.
- Preiser-Kapeller/Daim 2015: J. Preiser-Kapeller / F. Daim (eds), *Harbours and Maritime Networks as Complex Adaptive Systems*. *RGZM – Tagungen* 23 = *Interdisziplinäre Forschungen zu den Häfen von der Römischen Kaiserzeit bis zum Mittelalter in Europa* 2 (Mainz 2015).
- Raban 1985: A. Raban, The Ancient Harbours of Israel in Biblical Times. In: A. Raban (ed.), *Harbour Archaeology*. *Proceedings of the First International Workshop on Ancient Mediterranean Harbours, Caesarea Maritima, 1983*. *British Archaeological Reports International Series* 257 (Oxford 1985) 11-44.
- 1989: A. Raban, The Site and the Excavations. In: J. P. Oleson (ed.), *The Harbours of Caesarea Maritima: Results of the Caesarea Ancient Harbour Excavation Project 1, 1980-1985*. Center of Maritime Studies, University of Haifa 3 = *British Archaeological Reports International Series* 491 (Oxford 1989).
- 1991: A. Raban, Minoan and Canaanite Harbours. In: R. Laffineur / L. Basch (eds), *Thalassa: L'Égée Préhistorique et la Mer* (Liège 1991) 129-146.
- 1992: Raban 1992: A. Raban, Sebastos the Royal Harbour at Caesarea Maritima: a Short Lived Giant. *International Journal of Nautical Archaeology* 21/2, 1999, 111-124.
- 1993: *The New Encyclopedia of Archaeological Excavations in the Holy Land* 3 (1993) 957-965 s.v. Marine Archaeology (A. Raban).
- 1995a: A. Raban, The Heritage of Ancient Harbour Engineering in Cyprus and the Levant. In: V. Karageorghis / D. Michaelides (eds), *Proceedings of the International Symposium »Cyprus and the Sea«*, Nicosia 1993 (Nicosia 1995) 139-189.
- 1995b: A. Raban, Dor-Yam: Maritime and Coastal Installations at Dor in their Geomorphological and Stratigraphical Contexts. In: E. Stern (ed.), *Excavations at Dor, Final Report*. I A: Areas A and C: Introduction and Stratigraphy *Qedem Reports* 1 (Jerusalem 1996) 285-354.
- 1996a: A. Raban, The Phoenician Harbour and »Fishing Village« at Atlit. *Eretz-Israel: Archaeological, Historical and Geographical Studies* 25, 1996, 490-508.
- 1996b: A. Raban, The Inner Harbor Basin of Caesarea: Archaeological Evidence for its Gradual Demise. In: A. Raban / K. G. Holum (eds), *Caesarea Maritima: a Retrospective after Two Millennia*. *Documenta et Monumenta Orientis Antiqui* 21 (Leiden, New York, Köln 1996) 628-666.
- 2009: A. Raban, The Harbour of Sebastos (Caesarea Maritima) in its Roman Mediterranean Context. In: M. Artzy / B. Goodman / Z. Gal (eds), *The Harbour of Sebastos (Caesarea Maritima) in its Roman Mediterranean Context*. *British Archaeological Reports International Series* 1930 (Oxford 2009).
- Raban/Galili 1985: A. Raban / E. Galili, Recent Maritime Archaeological Research in Israel – A Preliminary Report. *International Journal of Nautical Archaeology and Underwater Research* 14/4, 1985, 321-356.
- Raban/Tur-Caspa 2008: A. Raban / Y. Tur-Caspa, Offshore Underwater Surveys: Underwater Survey 1985-1987. In: L. E. Stager / J. D. Schloen / D. M. Master (eds), *Ashkelon 1: Introduction and Overview*. *Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006* (Winona Lake IN 2008) 67-98.
- Rainey 2001: A. F. Rainey, Herodotus' Description of the East Mediterranean Coast. *Bulletin of American Schools of Oriental Research* 321, 2001, 57-63.
- 2006: A. Rainey, Sinuhe's World. In: A. Maeir (ed.), *I Will Speak the Riddles of Ancient Times: Archaeological and Historical Studies in Honour of Amihai Mazar on the Occasion of His Sixtieth Birthday* (Winona Lake IN 2006) 277-299.
- Rainey/Notley 2006: A. F. Rainey / R. S. Notley, *The Sacred Bridge: Carta's Atlas of the Biblical World* (Jerusalem 2006).
- Rogers 1983: E. M. Rogers, *Diffusion of Innovations* (New York, London 1983).

- Roll 1999: I. Roll, The Roads in Roman-Byzantine Palaestina and Arabia. In: M. Piccirillo / E. Alliata (eds), *The Madaba Map Centenary: Travelling through the Byzantine Umayyad Period* (Jerusalem 1999) 109-113.
- Rosen/Galili/Zvieli 2012: B. Rosen / E. Galili / D. Zvieli, The Roman Lighthouse at Akko, Israel. *International Journal of Nautical Archaeology* 41/1, 2012, 171-178.
- Royal/Kahanov 2005: J. Royal / Y. Kahanov, New Dating and Contextual Evidence for the Fragmentary Timber Remains Located in the Dor D Site, Israel. *International Journal of Nautical Archaeology* 34/2, 2005, 308-313.
- Ruzicka 2012: S. Ruzicka, *Trouble in the West: Egypt and the Persian Empire, 525-332 B.C.E.* Oxford Studies in Early Empires (Oxford, New York 2012).
- Sharvit/Planer/Buxton 2013: J. Sharvit / D. Planer / B. Buxton, Preliminary Findings from Archaeological Excavations Along the Foot of the Southern Seawall of Akko, 2008-2012. *Michmanim* 24, 2013, 39-40.
- Sherratt 2003: S. Sherratt, The Mediterranean Economy: »Globalization« at the End of the Second Millennium B.C.E. In: W. Dever / S. Gitin (eds), *Symbiosis, Symbolism and the Power of the Past: Canaan, Ancient Israel and Their Neighbors from Late Bronze Age through Roman Palaestina*. Proceedings of the Centennial Symposium W.F. Albright Institute of Archaeological Research and American Schools of Oriental Research, Jerusalem, May 29-31 2000 (Winona Lake IN 2003) 37-62.
- Shortland 2004: A. Shortland, Hopeful Monsters? Invention and Innovation in the Archaeological Record. In: J. Bourriau / J. Phillips (eds), *Invention and Innovation: the Social Context of Technological Change 2: Egypt, the Aegean and the Near East, 1650-1150 BC* (Oxford 2004) 1-11.
- Stager et al. 2008: L. Stager / J. Schloen / D. Master / M. Press / A. Aja, Stratigraphic Overview. In: D. Master / J. Schloen / L. Stager (eds), *Ashkelon 1: Introduction and Overview*. Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006 (Winona Lake IN 2008) 213-323.
- Stern 1982: E. Stern, *Material Culture of the Land of the Bible in the Persian Period* (Warminster 1982).
- 1995: E. Stern, Historical Conclusion. In: E. Stern (ed.), *Excavations at Dor, Final Report, Volume I A, Areas A and C: Introduction and Stratigraphy*. Qedem Reports 1 (Jerusalem 1996) 271-283.
- Tallet 2012: P. Tallet, Ayn Sukhna and Wadi el-Jarf: Two Newly Discovered Pharaonic Harbours on the Suez Gulf. *British Museum Studies in Ancient Egypt and Sudan* 18, 2012, 147-68.
- Tartaron 2013: T. F. Tartaron, *Maritime Networks in the Mycenaean World* (Cambridge, New York 2013).
- Vann 1991: R. L. Vann, The Drusion: a Candidate for Herod's Lighthouse at Caesarea Maritima. *International Journal of Nautical Archaeology* 20/2, 1991, 123-139.
- Wachsmann 1998: S. Wachsmann, *Seagoing Ships and Seaman-ship in the Bronze Age Levant*. (London 1998).
- 2008: S. Wachsmann, Underwater Survey 1996-1997. In: D. Master / J. Schloen / L. Stager (eds), *Ashkelon 1: Introduction and Overview*. Final Reports of the Leon Levy Expedition to Ashkelon, 1985-2006 (Winona Lake IN 2008) 97-100.
- Waiman-Barak/Gilboa/Goren 2014: P. Waiman-Barak / A. Gilboa / Y. Goren, A Stratified Sequence of Early Iron Age Egyptian Ceramics at Tel Dor. *Egypt and the Levant* 24, 2014, 315-342.
- Wallinga 1993: H. T. Wallinga, *Ships and Sea-Power before the Great Persian War: the Ancestry of the Trireme* (Leiden, New York, Köln 1993).
- Yahalom-Mack et al. 2014: N. Yahalom-Mack / E. Galili / I. Segal / A. Eliyahu-Behar / E. Boaretto / S. Shilstein / I. Finkelstein, New Insights Into Levantine Copper Trade: Analysis of Ingots From the Bronze and Iron Ages in Israel. *Journal of Archaeological Science* 45, 2014, 159-177.

Summary

This article aims to be a short status report on the study of ancient harbours and anchorages in Israel. It investigates two major components: anchorage use and harbour facilities from the Middle Bronze Age to the Byzantine period. It does not present an evolutionary approach to the »development« of harbour installations, which has at times characterized some of the previous studies. Rather, it deals with the ways form is made to fit function: the changing priorities and variability of harbour technology, location, and the nature of maritime installations vis-à-vis economic, political, and other circumstances. In addition, a short examination of the nomenclature of harbours and anchorages in the written sources demonstrates both the need for pursuing this venue of research and its potential for a better understanding of the significance of such sites along the coast of Israel.

AUS DER REIHE / FURTHER READING



Häfen im 1. Millennium AD
Bauliche Konzepte,
herrschaftliche und religiöse Einflüsse

R G Z M

RGZM – Tagungen, Band 22
354 S., 242 meist farbige Abb.
Mainz 2015
ISBN 978-3-88467-249-5
€ 52,- [D]

Thomas Schmidts · Martin Marko Vučetič (Hrsg.)

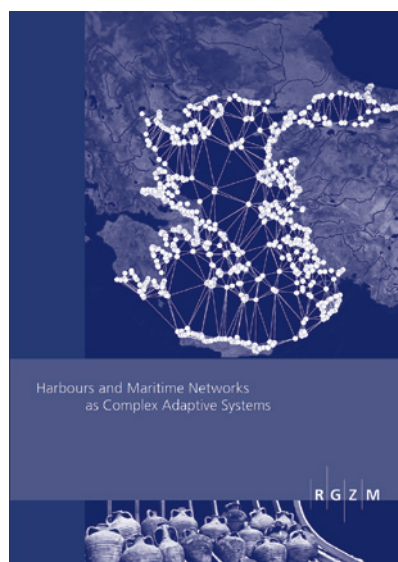
Häfen im 1. Millennium AD

Bauliche Konzepte, herrschaftliche und religiöse Einflüsse

Interdisziplinäre Forschungen zu den Häfen von der Römischen Kaiserzeit bis zum Mittelalter in Europa, Band 1

Das DFG-Schwerpunktprogramm »Häfen von der Römischen Kaiserzeit bis zum Mittelalter – Zur Archäologie und Geschichte regionaler und überregionaler Verkehrssysteme« (SPP 1630) widmet sich unter verschiedensten Aspekten der Erforschung von Häfen als Schnittstellen zwischen Wasser- und Landweg.

19 Beiträge, die auf einer Plenartagung 2014 gehalten wurden, füllen einen geographisch weit gespannten Rahmen, der vom Nordatlantik bis in den östlichen Mittelmeerraum reicht. Breiten Raum nehmen dabei Ergebnisse der häufig in enger Zusammenarbeit mit naturwissenschaftlichen Disziplinen angelegten Feldforschungen ein. Eine Besonderheit liegt in der Zusammenschau von Arbeiten aus unterschiedlichen historischen, archäologischen und naturwissenschaftlichen Disziplinen.



Harbours and Maritime Networks
as Complex Adaptive Systems

R G Z M

RGZM – Tagungen, Band 23
152 S., 76 meist farbige Abb.
Mainz 2015
ISBN 978-3-88467-248-8
€ 32,- [D]

Johannes Preiser-Kapeller · Falko Daim (eds)

Harbours and Maritime Networks as Complex Adaptive Systems

Interdisziplinäre Forschungen zu den Häfen von der Römischen Kaiserzeit bis zum Mittelalter in Europa, Band 2

The concept of complex systems allows for a better understanding of the interplay between social and environmental factors for the emergence and maintenance of maritime infrastructure and route systems in the ancient and medieval period.

Complexity theory and network analysis provide an analytical framework to describe social configurations (cities, maritime communities, polities) and environmental phenomena (hydrosphere, climate) as complex systems, entangled via mechanisms of feedbacks, adaptation or disruption. In this volume, this approach is applied on various phenomena of maritime history as discussed within the DFG-funded Special Research Programme (SPP 1630) »Harbours from the Roman Period to the Middle Ages« (www.spp-haefen.de).

Verlag des Römisch-Germanischen Zentralmuseums, Mainz

Ernst-Ludwig-Platz 2 · 55116 Mainz · Tel. 061 31/91 24-0 · Fax 061 31/91 24-199
E-Mail: verlag@rgzm.de · Internet: www.rgzm.de · <http://shop.rgzm.de>

AUS DER REIHE / FURTHER READING



Sven Kalmring · Lukas Werther (Hrsg.)

Häfen im 1. Millennium AD

Standortbedingungen, Entwicklungsmodelle und
ökonomische Vernetzung

Interdisziplinäre Forschungen zu den Häfen von der
Römischen Kaiserzeit bis zum Mittelalter in Europa, Band 3

Das DFG-Schwerpunktprogramm »Häfen der Römischen Kaiserzeit bis zum Mittelalter – Zur Archäologie und Geschichte regionaler und überregionaler Verkehrssysteme« (SPP 1630) widmet sich der Erforschung von Häfen als Schnittstellen zwischen dem Wasser- und Landweg unter verschiedensten Aspekten.

Der Band versammelt 13 Beiträge, die 2015 im Rahmen einer Plenartagung gehalten wurden. Der geographisch weit gespannte Rahmen reicht vom Nordatlantik bis in den östlichen Mittelmeerraum. Thematisiert werden See- und Binnenhäfen sowie künstliche Wasserstraßen. Der Band vereint Ergebnisse interdisziplinärer (geo-)archäologischer und geophysikalischer Feldforschungen, schriftquellenbasierter Untersuchungen und überregionaler Studien.

RGZM – Tagungen, Band 31
251 S., 122 meist farbige Abb.
Mainz 2017
ISBN 978-3-88467-283-9
€ 46,- [D]

Verlag des Römisch-Germanischen Zentralmuseums, Mainz

Ernst-Ludwig-Platz 2 · 55116 Mainz · Tel. 0 61 31/91 24-0 · Fax 0 61 31/91 24-199
E-Mail: verlag@rgzm.de · Internet: www.rgzm.de · <http://shop.rgzm.de>