The Fighting Dhow

Early modern vernacular watercraft and organised maritime violence in the Persian Gulf

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SUMMARY

This thesis presents an original contribution to knowledge by identifying architectural signatures of violence in watercraft, and their potential archaeological remains, through analysis of visual sources. It examines how traditional maritime societies of the Persian Gulf under stress of violence adapted their watercraft to fight and how this influenced their nautical traditions. When the Portuguese attacked Hormuz in the Persian Gulf in 1507, the defending forces used boats and ships designed for utility work or trade, but three hundred years later the British were fighting off 'pirates' in watercraft especially built or adapted for combat. This transition in the vernacular watercraft tradition of the early modern Persian Gulf is identifiable through the correlates of violence in the watercraft themselves, long considered the most sophisticated technology available to pre-industrial societies.

The vernacular ships and boats from the Persian Gulf and the Arabian seas are known collectively as dhows, but while there were many types, most are now extinct. Historical documentary sources before the nineteenth century rarely describe Indigenous craft in detail and there are few archaeological studies of these watercraft, yet hundreds of contemporary images form a rich and little-used resource that illustrates this technological transition. This study compares evidence of Persian Gulf watercraft from archaeological and ethnographic contexts with that from an unprecedentedly large corpus of 405 historical visual sources dating to the period from 1200 to 1900. These comparisons show how vernacular watercraft traditions, and hence the societies they served, changed over time. The corpus includes paintings, drawings, petroglyphs, graffiti, models, photographs and Islamic miniatures together depicting over 1,250 individual watercraft.

People in the maritime societies of the Persian Gulf changed the way they built and acquired watercraft to cope with the stresses of organised violence in the wake of European intrusions in the Indian Ocean. Dhows were often sewn together and with light frames that could not well withstand the shock of cannons mounted athwartships, so guns usually only fired over the bow. In contrast, later fighting dhows had strong frames with planks fastened by metal, full decks, and guns arranged to fire broadside through gunports like European warships. The corpus of images shows that structural modifications to Indigenous and imported craft were introduced to accommodate weapons in response to increasing violence, producing designs that were better suited to local conditions than larger European ships. The fighting dhows were all eventually destroyed or abandoned as maritime truces took effect in the nineteenth century and simpler designs of utility and trading craft were preferred. This study also examines the potential archaeological signatures of this revolutionary technological and organisational transition. While the monumental warships of

the European traditions absorb much archaeological attention, the results of this thesis demonstrate that vernacular fighting craft of peripheral maritime societies like those of the Khalijis offer unique insights into the ways people modify their everyday things in response to violence.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Mick de Ruyter

19 March 2021

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De Ruyter, M. 2019 The first dhow?: Reconstructing an Arab warship from an eighteenth century Maratha painting. Paper presented at the Australasian Institute for Maritime Archaeology Conference, Brisbane, 18 October.

De Ruyter, M. 2019 Fighting dhows of the Persian Gulf. Poster presented at the National Archaeology Student Conference, Adelaide, 1–4 October.

De Ruyter, M. 2019 *Kalba* and *dāw* in Khaliji art: Tracing extinct dhows in Arab and Persian iconography. Paper presented at the 53rd Seminar for Arabian Studies, Leiden, The Netherlands, 11–13 July.

De Ruyter, M. 2018 Ships of the Western Indian Ocean in Persian Manuscript Paintings. Poster presented at the International Symposium on Boat and Ship Archaeology, Marseille, France, 22–27 October.

De Ruyter, M. 2017 The Piratical Ship *Minerva*: Considering the archaeology of piracy in the Persian Gulf. Paper presented at the Australasian Institute for Maritime Archaeology Conference, Adelaide, 22–23 September.

NOTES ON THE TEXT

This thesis follows the style of the journal *Australian Archaeology* (version 9 dated 3 April 2020, https://australianarchaeologicalassociation.com.au/wp-content/uploads/2020/04/AA_stylesheet-Version-9-3-April-2020.pdf), as is standard in archaeology at Flinders University. Departures from this style are in the use of italics for ship's names, in the use of the *Macquarie Dictionary Online* for spelling and, given the subject matter, in the preference for BCE/CE rather than BC/AD.

Italics are used for non-English words and for specific watercraft typonyms adopted from another language, unless these words have been accepted into common English usage, such as with 'dhow'. In this way '*dāw*' is used for the particular watercraft type, while 'dhow' is the generic term for any vernacular wooden sailing vessel of the western Indian Ocean, although the two words are pronounced the same way.

The system of transliteration of Arabic and Persian terms follows that used by the International Association for the Study of Arabia (IASA) (https://www.theiasa.com/wp-content/uploads/2017/08/PSAS-Guidelines-for-Authors-2017-01.pdf). The spelling of Arabic surnames in the references, particularly with regards to the use of 'Al', follows the usage of the authors themselves in the original source. Similarly, place names in this text follow the accepted index used by the IASA in the *Proceedings of the Seminar of Arabian Studies* (https://www.theiasa.com/wp-content/uploads/2016/02/PSAS-Place-Names_edRW.pdf). The spellings of watercraft names for the most part follow those proffered in *A Maritime Lexicon: Arabic Nautical Terminology in the Indian Ocean* (Al Salimi and Staples 2019).

The toponym 'Persian Gulf' is used herein to denote the historical and cultural region that forms the focus of this study, although it is acknowledged that the term 'Arabian Gulf' is preferred by modern Arabian states. Where the shorthand term 'the Gulf' is used herein, it refers to the historical Persian Gulf in a scholarly rather than a political fashion and no disrespect or offence is intended. In *Australian Archaeology* style 'Indigenous' is always spelled with a capital.

Citations in the text in square parentheses prefixed by the letters A, B or D refer to that entry in the appropriate Appendix, such that [B4.3] refers to the fighting dhow model in the Science Museum, London, listed in the references as Anon. c.1850b.

LIST OF SHORTENED FORMS

ADM	Admiralty records
AIC	Art Institute Chicago
AKAG	Albright Knox Art Gallery, Buffalo
AKM	Aga Khan Museum, Toronto
AKTC	Aga Khan Trust for Culture, Geneva
BCE	Before the Common Era (alternative to BC)
BL	British Library, London
BLO	Bodleian Library, Oxford
BnF	Bibliothèque national de France [National Library of France]
BPU	Bibliothèque publique et universitaire de Genève [University of Geneva Public Library]
BSB	Bayerische StaatsBibliothek [Bavarian State Library, Munich]
CBL	Chester Beatty Library, Dublin
CE	Common Era (alternative to AD)
CL	Christie's, London
CMA	Chrysler Museum of Art, Norfolk
CNL	Cairo National Library, Cairo
DaK	Dar al-Kutub, Cairo
DCC	David Collection, Copenhagen
EIC	East India Company
FGA	Freer Gallery of Art, Washington DC
FLP	Free Library of Philadelphia
FM	Fitzwilliam Museum, Cambridge
GPM	Gulistan Palace Museum, Tehran
HEIC	Honourable East India Company
IASA	International Association for the Study of Arabia
IHO	International Hydrographic Organization

IMB	Institute of Manuscripts, Baku
IMJ	Israel Museum, Jerusalem
IOR	India Office Record
IOS	Institute of Oriental Studies, St Petersburg
IUK	İstanbul Üniversitesi Kütüphane [Istanbul University Library]
JRL	John Rylands Library, Manchester
LHASB	Library of the Hungarian Academy of Sciences, Budapest
MCA	Museum of Contemporary Arts, Tehran
MDA	Museum of Decorative Arts, Tehran
MET	The Metropolitan Museum of Art, New York
MFA	Museum of Fine Arts, Boston
MGP	Musée Guimet, Paris
MUCEM	Musée des Civilisations de l'Europe et de la Méditerranée, Marseille [Museum of the Civilisations of Europe and the Mediterranean]
MUL	McGill University Library, Montreal
NDNM	New Delhi National Museum
NLR	National Library of Russia, St Petersburg
NMM	National Maritime Museum, Greenwich
NRS	National Records of Scotland
NYPL	New York Public Library
ONB	Osterreichische Nationalbibliothek Bildarchiv, Vienna [Austrian National Library and Archives]
PAM	Portland Art Museum
PUL	Princeton University Library
RAM	Reza Abbasi Museum, Tehran
RAS	Russian Academy of Sciences Library, St Petersburg
RISD	Rhode Island School of Design
RMA	Revolution in Military Affairs
SBB	Staatsbibliothek zu Berlin [State Library of Berlin]

SL	Süleymaniye Library, Istanbul
TIEM	Türk ve Islam Eserleri Müzesi, Istanbul [Turkish and Islamic Arts Museum]
TNA	The National Archives, Kew
TPL	Tehran Parliament Library
TSK	Topkapı Sarayı Kütüphanesi, Istanbul [Topkapi Palace Museum Library]
UAE	United Arab Emirates

1 INTRODUCTION

1.1 Context of the research

1.1.1 Introduction to the study

This thesis examines how maritime societies under stress of violence adapted their watercraft designs and how this influenced their nautical traditions. More broadly, it considers how societies use their limited resources—material, social, cultural—to cope with unexpected or unplanned external pressures and how archaeologists might recognise and interpret such adaptations. New knowledge is generated by considering how correlates of maritime violence appear in visual and archaeological sources and how these correlates are detectable in the architecture of traditional fighting craft. The correlates of violence in the structures people make ashore are familiar through fortifications and defences like ditches, walls, obstructions and observation posts, but the correlates of violence in watercraft, structures long considered the most sophisticated technology available to pre-industrial societies, are less obvious. How the nautical technology of societies changes under pressure from violence may seem clear in monumental traditions that build ships like *Mary Rose*, *Vasa* or *Victory*, but is not so clear in smaller, vernacular traditions less well served by history, preservation or fortune.

The cases presented in this study are the dhow-building societies of the Persian Gulf after the European intrusion of the sixteenth century, when the Portuguese attacked and occupied Hormuz and other coastal towns. In the sixteenth century Europeans had better guns, better gunpowder and more solid, metal-fastened ships that were superior to existing Persian Gulf fighting craft (Chaudhuri 1985:139–141; Casey-Vine 1995:343–347). But by the nineteenth century these dhow-building societies had achieved an ‘instantaneous RMA’, or revolution in military affairs (Till 2018:171), that made them a menace to British commercial and political interests. The dhow societies were labelled ‘pirates’ and again invaded, this time with longer lasting consequences (Belgrave 1966; Onley 2009:3–10; Moyse-Bartlett 1955; Suzuki 2018). Between the sixteenth and nineteenth centuries Persian Gulf watercraft had made a transition from hull timbers predominantly fastened with ligatures to metal-fastened construction methods (Till 2018:16, 171), producing craft that were in some design aspects superior to European ships. This thesis shows how Persian Gulf societies achieved this transition partially as a response to the needs of maritime violence and demonstrates the effects of this transition on their shipbuilding traditions. Reconstructions of the now-extinct fighting dhows are proposed and their potential archaeological signatures considered.

1.1.2 Background

The idea that the Indigenous inhabitants of the Persian Gulf developed or adopted technology and behaviour that, by the eighteenth century, allowed them to challenge previously dominant European intruders at sea is an intriguing one. In this case, organised maritime violence acted as an influence or stressor on Indigenous watercraft traditions in the Persian Gulf between the sixteenth and mid-nineteenth centuries (Staples 2013:192–194). Organised violence has been shown to change societies in a number of ways: through the spread of hierarchical organisation adapted for military functions to other areas of society, through direct subjugation or 'coerced integration' of people and their traditions, and through the development of social organisation into more complex forms when directly threatened (Bossen 2006:97–100). Archaeological approaches to watercraft are fundamentally designed to study social change through the ability to 'relate observed technological change to its environmental and social causes' (Adams 2001:304). Social change manifested in watercraft traditions may then be observed as technological change during periods of stress, where violence acts as a form of 'selection pressure' (Zwick 2014:52–58). The approach of this thesis is premised on the meeting of these two notions—that variation in the construction, adaptation and use of watercraft for organised violence reflects changes in the social organisation of the human actors who used them. Social changes in the early modern Persian Gulf should therefore be observable through the medium of technological changes in Indigenous watercraft traditions instigated to meet the needs of organised maritime violence.

Previous ethnographic and archaeological research into maritime cultures has investigated the use of early modern Indigenous watercraft of the Indian Ocean—now collectively known as dhows—for commercial trade, fishing and pearling (Agius 2002, 2005, 2008, 2019; Davies 1997; Hawkins 1977; Hourani 1995 [1951]; Howarth 1977; Sheriff 2010). However, these sources offer little specific information on the martial uses of dhows and only superficially address cultural or social aspects of Indigenous organised maritime violence in the Gulf (Aguis 2002:58–66; Hawkins 1977:49–56; Howarth 1977:113–120). Yet it is clear from these accounts that the sophisticated fighting dhows of the early nineteenth century were superior to previous Indigenous craft initially encountered by the Portuguese three centuries earlier (Birch 1875:105–106; Low 1877:169–170; Teles e Cunha 2009:208–209). A typical early fighting craft had a relatively small hull propelled by oars, single mast, partial decks, forward-firing small-calibre gunpowder weapons and a crew employing firearms and archery (Fig. 1.1). By the nineteenth century, dhows from the Gulf had attained notoriety in British accounts as fighting craft:

> The Arab dhow is a vessel […] with ten or twelve ports, […] calculated for sailing with small cargoes, and fully prepared […] for defence, with decks, hatchways, ports, poop-deck, &c., like a vessel of war (Low 1877:169).

Figure 1.1 Vernacular watercraft of the Persian Gulf engaged in combat, from a sixteenth-century Portuguese manuscript (de Matos 1985:pl.XXI) [B1.3].

The early modern period from 1500 to 1850 saw major physical developments in Indigenous or vernacular fighting vessels, including structural changes that enabled the mounting of crew-served gunpowder ordnance, full decks with integrated stern rudder housings that protected the tiller and other defensive architectural features (Low 1877:169–170; Mondfeld 1979:31–33, 51–53; Staples 2013:192–194), and there appear few parallels with contemporary vessels used for other, more innocuous purposes. Yet by the end of the nineteenth century these types were extinct and the only surviving examples of fighting dhows were models in the Science Museum, London, including in particular the *dāw* (Figs 1.2 and 1.3). The prominent stern projection is lined with stanchions to support breastworks, that together with the enclosed deckhouse, full deck and substantial framing, give the impression of a vessel that at the time was called ‘defensible’ (Low 1877:169). Two large settee sails are carried on masts straining forward, secured to yards almost as long as the masts themselves, a simple and efficient rig designed for speed. The full deck supports eight carriage-mounted guns, four in each broadside. These are crew-served naval weapons trained through their own ports cut into the bulwark rather than swivel guns usually mounted on the gunwale as anti-personnel weapons (Fig. 1.1). The strength, resilience and stability required of a hull so arranged is fundamentally different to that of the earlier craft and the organisation required to operate it is correspondingly more complex. New and underutilised sources of archaeological, documentary and,

primarily, iconographic evidence are used in this thesis to show the technological differentiation in these fighting craft and the social changes and pressures that drove this process and were influenced by it, particularly those associated with organising maritime violence.

Figure 1.2 A model of a *dāw*, an 'Arabian pirate vessel', in the Science Museum, London (Anon. c.1850 [B4.3]).

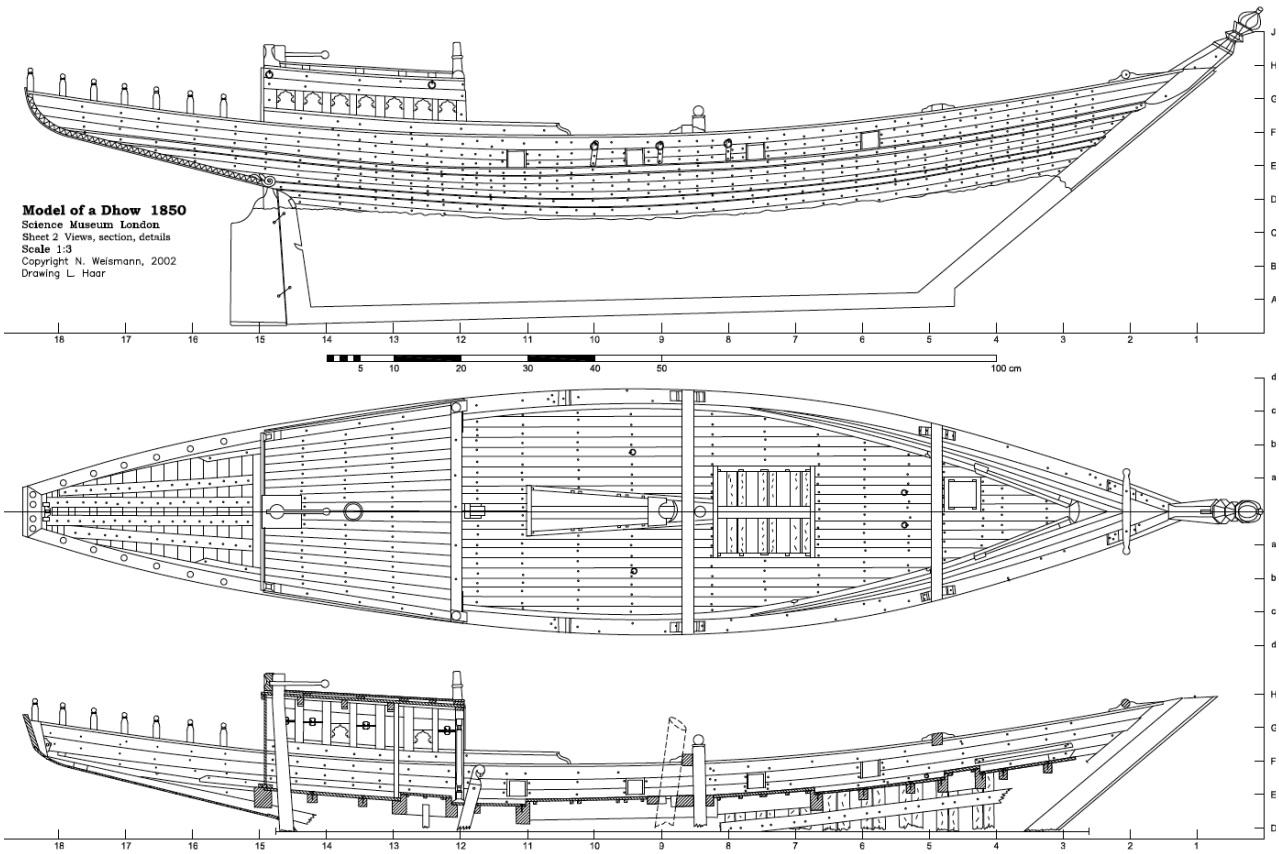

Figure 1.3 A plan of the *dāw* model from 1850 (N. Weismann 2002, with permission).

1.1.3 Research questions and aims

This thesis addresses the question of how changes made to vernacular watercraft in response to organised maritime violence in the early modern Persian Gulf affected Indigenous nautical traditions.

The subsidiary aims of this principal enquiry are to:

a) identify vernacular fighting craft and the correlates of organised maritime violence in the archaeological and historical record,
b) identify potential archaeological signatures of organised maritime violence,
c) reconstruct the forms of vernacular fighting craft of the Persian Gulf dhow traditions,
d) demonstrate how vernacular and imported watercraft were created, acquired and adapted to meet the needs of organised maritime violence, and
e) show how responses to organised maritime violence cause change in nautical traditions.

1.1.4 Significance

Knowledge of how dhow-building societies adapted to the requirements of organised maritime violence offers a unique view of social change; the conception and operation of vernacular fighting

vessels alone represents sophisticated organisational behaviour and the craft themselves are complex sociotechnical systems (Muckelroy 1978:230; Schiffer 2011:29–30). The development of fighting vessels and the organisation required for their effective deployment demonstrate the exchange of technology, ideas and cultural influence in the western Indian Ocean in the early modern period. The experience of maritime violence in Indigenous cultures is of similar importance to the monumental examples of early modern Western naval prowess and technology that have absorbed so much of the attention of maritime archaeologists (e.g. Bound 1995; Cederlund and Hocker 2006; Delgado 2019; Marsden 2009). Rapoport has argued that vernacular design should be studied as it constitutes an unequalled 'laboratory with a vast range of human responses to an equally vast range of problems; cultural technological, of researches (including materials), site, climate, ways of making a living and so on' (Rapoport 2006:181). The range of human responses to the pressures of violence at and from the sea warrant particular enquiry. The analyses presented here enable valid cross-cultural comparisons and the development of theory relating to vernacular design (Rapoport 2006:181), particularly in this instance regarding the technology of vernacular fighting craft. Fundamentally, this thesis demonstrates the relationship between technological differentiation instigated by Indigenous cultures to meet the needs of organised maritime violence and social or behavioural change.

The significance of this thesis lies in part in its original approach to the dhow-building culture of the Persian Gulf, by viewing its fighting craft as the means and its organisation as the ways of maritime violence, but also in considering violence as an effect on vernacular watercraft traditions in particular. Indigenous watercraft of the western Indian Ocean in general are poorly represented in the archaeological record and are almost absent in that of the Persian Gulf (e.g. Bain et al. 2014; Hunter 2014; Lane 2012). Historiographical discourse on the cultural unity of the Indian Ocean World has therefore lacked sufficient material evidence of some of the most significant behaviour of its constituents (Prange 2013). This research enhances both the currently inadequate archaeology and historiography of maritime cultural activity and technological differentiation in the Persian Gulf, as well as those ethnographic sources that concentrate mostly on the era since the fighting dhow fell into disuse and Indigenous organised maritime violence waned. By using primarily historical visual sources, previously inadequately examined and interpreted, and mostly unverified, this enquiry offers an historical anthropology to illuminate the dim material record of Indigenous ways and means of fighting at sea in the Persian Gulf. Much of the material and many of the images sourced for this study are previously unpublished, virtually unknown or have not been associated with studies of watercraft, which significantly advances claims to originality. Practically, this research also contributes to the potential identification of vernacular fighting craft in the archaeological record, offers refined classifications and reconstructions of the craft variously

documented in historical sources, and advances a model for identifying the correlates of violence in vernacular watercraft.

This thesis provides an original perspective on using Indigenous watercraft as fighting vessels and the social changes that this engendered, as well as a foundation for further research. By reconstructing the forms of vernacular fighting craft and identifying their potential archaeological signatures, it will aid in establishing the origin of shipwrecks within the region. In turn, new knowledge of organised maritime violence and its influence on craft traditions and material culture potentially provides unique and valuable insights not only into the cultures involved, but also for the development of models to apply to other cultures and time periods. The transition from maritime cultures based primarily on resource exploitation and trade to regimes reliant at least in part on coercion and violence at sea is evidenced in the technology of watercraft. The building and employment of more complex and expensive armed vessels required new or modified forms of social organisation. Cooperation between tribal groups, transfer of foreign technologies, military-style hierarchies of command and labour, and the reach and influence available to better equipped sea powers are social changes identifiable through the temporal, spatial, morphological and cultural changes in fighting vessels and the way they were used. The results of this enquiry challenge the notion that the maritime cultures of the Gulf were somehow stagnant and that their watercraft traditions changed little, instead demonstrating how change in Persian Gulf societies was reflected in the growing sophistication of fighting vessels and methods of organising maritime violence employed during the early modern period.

1.2 Conceptual foundations

1.2.1 Spatial, temporal and cultural context

The name used to describe the region of this study is politicised and disputed. The modern Arabian states of the southern shore of the Gulf use the name ‘Arabian Gulf’, while Iran prefers the ‘Persian Gulf’, and the simmering rivalry between these states makes an agreement unlikely (Abdi 2007; Bosworth 1980; Potter 2009:14–17). Scholars often follow the usage of their sponsors or choose a variant of the equally troublesome term ‘Arab-Persian Gulf’. Yet as one of the foremost scholars of the Gulf puts it, ‘in reconstructing the history of the region, it is not fruitful to engage in polemics such as whether the proper name should be the Persian Gulf or the Arabian Gulf’ (Potter 2009:14). Indeed, the body of water now known as the Red Sea was during the period under discussion also known as the ‘Arabian Gulf’ to differentiate it from the Persian Gulf (Potter 2009:15). So in this thesis, the term ‘Persian Gulf’ will be used to denote the historical and cultural region, as this is how it was most often known to inhabitants and intruders alike during the period under scrutiny and in the same manner that the historical boundaries and names of the states that enclose it have

changed with modern political usage (Boswell 1980:xxvii–xxxiii; Potter 2009:15–16). Where the shorthand term ‘the Gulf’ is used herein, it refers to the historical Persian Gulf in a scholarly rather than a political fashion and no disrespect or offence is intended. What then is the historical and cultural Persian Gulf?

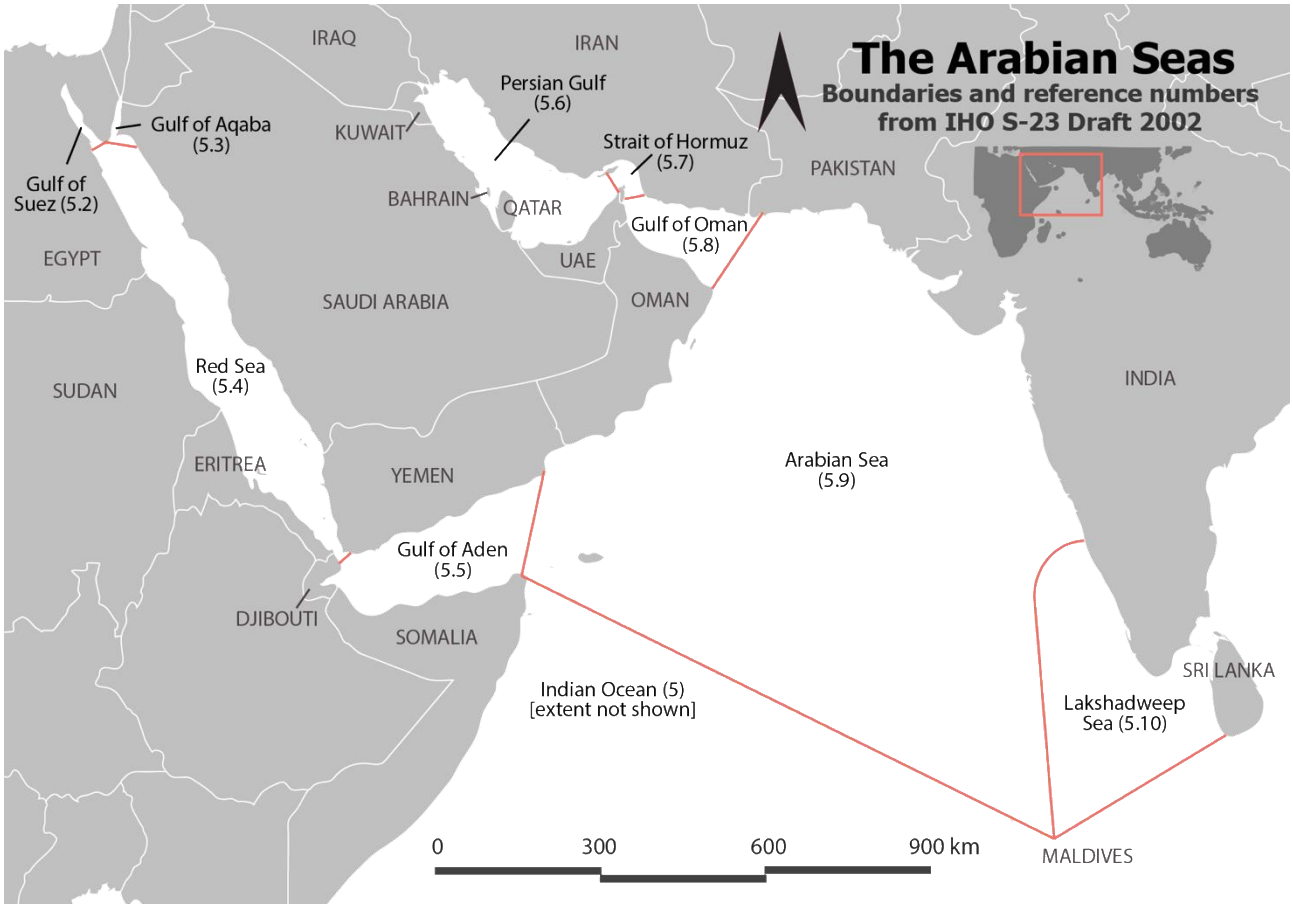

Figure 1.4 Modern boundaries of countries and seas in the north-west Indian Ocean (Source: IHO 2002:5–9).

In the latest draft of the *Limits of Oceans and Seas S-23* (2002), the International Hydrographic Organization (IHO) proposes the Persian Gulf to be bounded by the coasts of Iraq and Kuwait in the north, Iran along its north-eastern shore, Saudi Arabia to the west, and the United Arab Emirates to the south (Fig. 1.4). It is nearly enclosed by the Musandam Peninsula of Oman in the southeast (IHO 2002:5.6). The Gulf is adjoined to the east by the Strait of Hormuz (IHO 2002:5.7), which passes into the Gulf of Oman (IHO 2002:5.8), itself bounded to the east by the Arabian Sea (IHO 2002:5.9), as shown in Figure 1.4. While it is acknowledged that such divisions of space are problematic and disputed, this study adopts a broader notion of the Persian Gulf to include the Strait of Hormuz and the Gulf of Oman to more completely encompass the cultural region of ‘the Gulf world’ (Potter 2009:8). With the Gulfs of Suez, Aqaba and Aden, and the Red Sea (IHO 2002:5.2–5.5), the entire region of the north-western Indian Ocean becomes the ‘Arabian Seas’, which in Barendse’s original usage also extended to the waters off East Africa (2002:3). The Arabian Seas are the range of the vernacular watercraft now known as dhows.

The Persian Gulf littoral is bounded by marshlands in southern Iraq, the mountains of Iran that limit the coastal plain, a narrow strip of salt flats and mangroves that fronts the desert along the southern and eastern shores, the steep fjord-lands of Musandam that run north from the mountains of Oman, and the low, barren shores of the Gulf of Oman (Potter 2009:7–8). In contrast to this fixed idea, the Indigenous societies that inhabited this littoral region migrated freely both within it and also throughout the broader Indian Ocean, as this was a region in which 'boats and not land constituted capital' and the people, the *Khalijis*, were 'tied to the sea' rather than its barely habitable fringe (Lancaster and Lancaster 2011b:45–46; Potter 2009:10). *Khalij* is the shared Arabic and Persian term for the Gulf, and the Indigenous inhabitants are referred to as *Khalijis* (Beeman 2009:147). Khalijis share ways of life and traditions, rather than identities, and their connections with the sea 'set them apart from those living inland' (Potter 2009:12). The Khalijis are a mixture of Indigenous and creolised communities in which it is possible to identify Arab, Persian, African, South Asian, and even European, influences 'from ancient times' (Beeman 2009:148–149) (Fig. 1.5). Together, they form a '"spectrum" of mutual cultural influence', by which language, religion and other cultural characteristics distinguish them from those living beyond the narrow littoral zone (Beeman 2009:148). The cultural and spatial boundaries of this research are neatly combined in Izady's representation of the Persian Gulf cultural-historical domain (Izady 2008 [artwork]) (Fig. 1.6).

Figure 1.5 Khaliji mariners from Khark Island of what is now Iran, in a nineteenth-century photograph (detail from Thompson 1891c [artwork]).

The early modern period, defined here as from the beginning of the sixteenth until the middle of the nineteenth century (see Staples 2013:186), is used as the temporal boundary of this research. It was during this era that the vernacular maritime culture of the Persian Gulf came into sustained violent contact with extra-regional maritime cultures. The Chinese had visited the Gulf in force during the

early fifteenth century in ships armed with gunpowder ordnance, but this contact saw little violence and was unsustained (Sen 2016). Vessels from the Indian Ocean and South East and East Asia plied the routes along the Persian shore before this period, but usually in pursuit of trade (Vosoughi 2009:96–98). At the beginning of the sixteenth century, most ports in the Persian Gulf were under the suzerainty of Hormuz, which maintained a naval force of small vessels with Persian archers and small artillery pieces, as well as other ships taken up from trade (Birch 1875:105–106; Piacentini 2008:3–6), but other Indigenous groups in the region also used small, fast vessels—*tarārīd* (sing. *tarrāda*)—for multiple purposes, including fighting (Floor 2006:89–92; Margariti 2008:566–572; Prange 2013; Staples 2013:192–194).

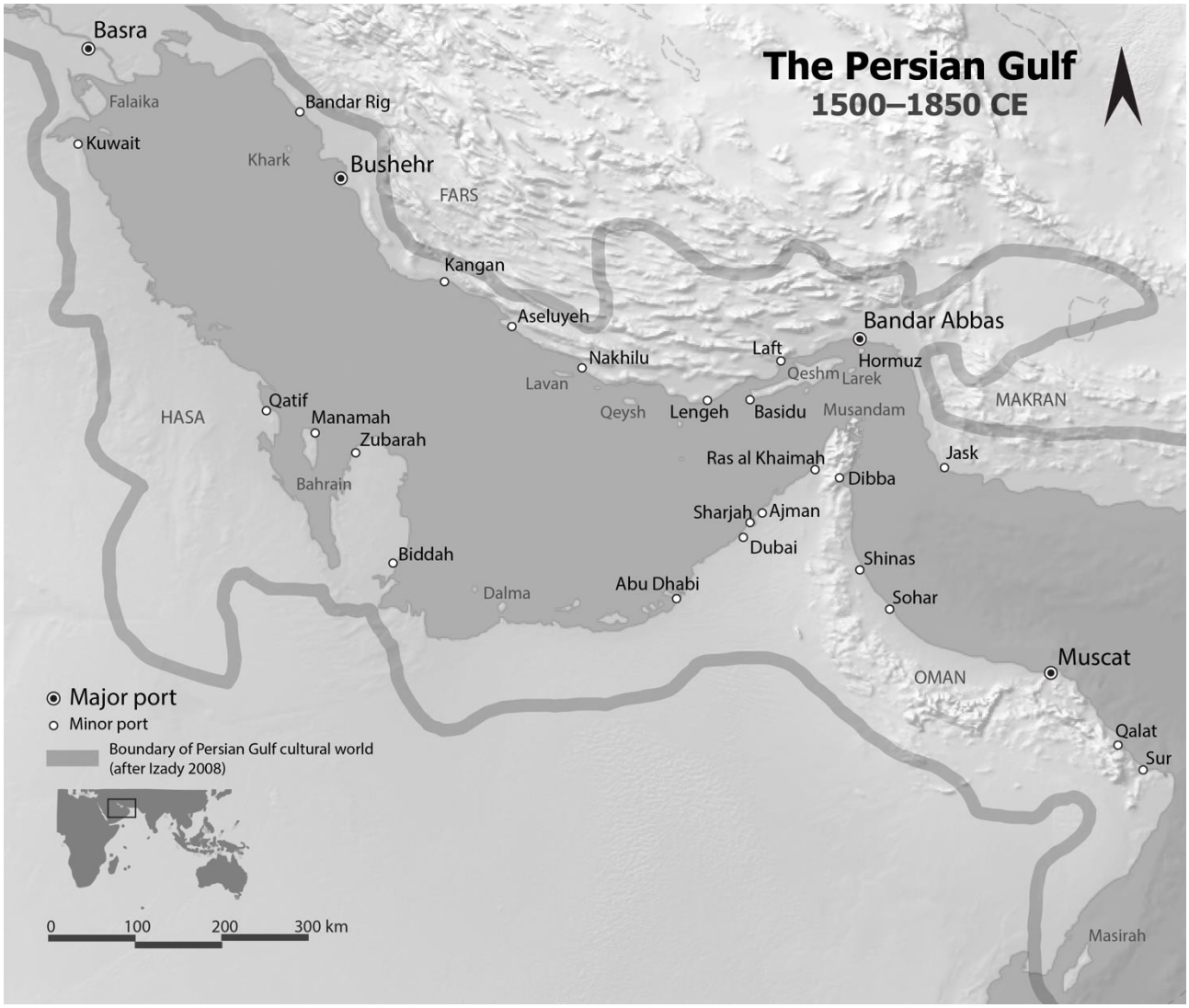

Figure 1.6 Coastal settlements of the Persian Gulf in the early modern period, showing the boundary of the Persian Gulf cultural world and relief (Basemap source: Natural Earth).

From the first seaborne contact with the Portuguese and Ottomans in the early sixteenth century, organised maritime violence in the Persian Gulf increasingly involved the use of Indigenous vessels against watercraft from foreign, primarily European, building traditions (Staples 2013; Sweet 1964:265–266). Lest this be seen as an issue of the obsolescence of oared, galley-type fighting craft,

it should be noted that European maritime states were still introducing fleets of oared fighting vessels to contest narrow seas in the late eighteenth century (Harris 1989; Huhtamies 2013, 2014; Johannessen 2013), and the Ottomans successfully used galley fleets against the Portuguese in the Arabian Seas in the sixteenth century (Guilmartin 1974:7–15). This study examines Indigenous fighting craft up until the latter half of the nineteenth century, as the agreement of maritime truces between Britain and the tribal precursor polities of Oman, the United Arab Emirates, Qatar, Bahrain and Kuwait effectively signalled the end of this period of Indigenous organised maritime violence (Onley 2009:1–10).

1.2.2 Organised maritime violence

The term ‘organised maritime violence’ is recently used to incorporate forms of warfare, piracy and privateering, regardless of sovereignty, legality, legitimacy, cultural origin or pecuniary intention (Antony 2014:127; Schilling 2012:27; Wilson 2008:454). The term is used sparingly in these sources, as shorthand to be understood in context: no expanded definitions are offered, nor is the preference for this term over its alternatives explained. Nevertheless, it is clear in these instances that ‘organised maritime violence’ is intended as a catchall for fighting at or from the sea. The deliberate use of this term, rather than a simpler and more widely understood alternative, in this research warrants a more detailed justification.

In the introduction to their global survey of historical piracy ‘and related forms of maritime violence’, Amirell and Muller include within their broad definition of piracy ‘various acts of maritime violence perpetrated, at least to a significant extent, for private gain and involving the use of vessels’ (2014:2).

> Such broadly defined piratical activity thus includes, in addition to piratical attacks against ships on the high seas (that is ‘piracy’ as defined by international maritime law), armed robbery against ships in waters under the jurisdiction of a state (including on rivers and in ports), coastal raiding through descent from the sea and state-licenced forms of private prize-taking, such as privateering and corsairing, both in times of war and peace (Amirell and Muller 2014:2).

This definition is simultaneously too broad to be restricted to piracy as an illegal activity, and too limiting in its extension of illegitimacy to other forms of maritime violence, as it includes privateering and prize-taking behaviour sanctioned by sovereign polities. Pecuniary interest may therefore be ignored in an attempt to develop a robust definition of organised maritime violence. Similarly, illegality in organised maritime violence, however that may be judged now, is a characteristic of particular forms of violent behaviour rather than an exclusionary condition.

Organised violence has been differentiated from interpersonal violence by the necessary presence of ‘structured and abstract entities, such as social movements, established institutions or functioning

social organisations which initiate, regulate and undertake violent acts' (Malešević 2017:18). Tilly's definition of collective violence involves at least two people who coordinate their actions as an 'episodic social interaction that immediately inflicts physical damage' (2006:118). While much prehistoric or tribal warfare involved multiple acts of interpersonal violence with relatively little organisation, the 'ever-increasing social mediation of violence' has followed technological and administrative advancements and has resulted in social organisations specialised in violence (Malešević 2017:18). Such social organisations exhibit 'effective and durable structural mechanisms', with 'internal legitimacy and a sense of solidarity' (Malešević 2017:17–18) and are therefore coherent groups or collectives that endure more than momentarily for the purpose of exercising violence. While the 'organised' crew of a trading vessel may collectively exercise self-defence, their group presumably existed for purposes other than committing violent acts; they may well have planned a defence, but avoided initiating any action that called on it. The majority of watercraft that plied the Persian Gulf in this period were armed to a certain degree for self-defence (Buckingham 1829:511), and therefore capable of being used for fighting, yet were rarely used to initiate organised violence.

The maritime element of this evolving notion is somewhat easier to define and follows Westerdahl's well known usage combining archaeological elements of seascape and landscape into the maritime cultural landscape, which 'signifies human utilization of maritime space by boat' (1992:5). The term 'dhowscape' is used in this thesis to refer to that maritime space in which humans used dhows, a cultural landscape that includes those elements at sea and ashore that signify human use of watercraft for the purposes of organised violence. Qualifying elements in this case would include the watercraft themselves; as well as the facilities used to construct, maintain, repair, arm and support them with naval stores, provisions and munitions; along with the cognitive constructions of maritime space such as are used for navigation and ritual (Westerdahl 2011:746). The use of maritime space by fighting vessels therefore also involves coastal fortifications, deliberate obstructions in shallow water and the exploitation of terrain for tactical advantage.

Having understood what constitutes *organised* and *maritime* in the context of this thesis, this definition turns to the notion of *violence*. While Tilly considers violence to involve physical damage to people or objects, including the 'forcible seizure of persons or objects over restraint or resistance' (2006:118), Malešević is less insistent on corporal physicality or intentionality, defining violence as:

> a scalar social process in which individuals, groups or social organisations find themselves steeped in situations whereby their intentional or unintentional actions generate some substantial coercively imposed behavioural changes or produce physical, mental or emotional damage, injury or death. (Malešević 2017:15).

Ambiguity abounds here and the identification of a particular definition of violence in archaeology is even seen as impractical as 'its meaning is relative to the society or culture being studied', prompting interdisciplinary approaches (Ralph 2102:2). Given the historical context through which this study approaches violence, insistence upon some level of observable application of force, or the threat and capacity to apply it, is warranted.

What sorts of activities then constitute organised maritime violence? Warfare, armed conflict, privateering, piracy and sea raiding, and their analogous Islamic forms (Bonner 2006:1–4), are all clear examples. Activities now known as asymmetric warfare, terrorism and insurgency, or even 'irregular naval warfare' (MacDougall 2014), are also included. These examples are all forms of organised violence, the differences being primarily in the level of social complexity, planning, legality and legitimacy. Acts of self-defence in the manner of the example above, and interpersonal, intimate and gendered violence like homicide and rape, are not 'organised' in this sense, although they may well occur as part of collective or organised violence. Organised maritime violence is a socially mediated, intentional and anticipatory act, rather than an interpersonal, arbitrary or reactionary one.

Organised maritime violence is unbounded by legal definition, unlike piracy or privateering. A definition is similarly unrestricted by the objective of the violence, such that pecuniary actions are considered together with ideological ones, and it even allows for multiple contributing motivations and pressures. For the purposes of this thesis, organised maritime violence will therefore be considered the socially mediated, collective, intentional and anticipatory use or threatened use of force at sea or ashore by a coherent, enduring group using watercraft and formed for the purpose of coercively imposing behavioural changes. The adjective 'fighting' is henceforth used to describe a vessel engaged in organised maritime violence, and the verb 'fighting' as shorthand for the activity itself.

1.2.3 Vernacular watercraft

The celebrated eighteenth-century naval architect Frederik af Chapman separated watercraft into two general groups: small vessels 'used in short voyages and narrow waters', and ships 'employed in distant voyages, and calculated for going out to sea' (Chapman 1820:125). Of the former, he observed:

> As the climate, the extent and depth of the seas, the position of the countries with respect to the sea and to each other, also their productions, are different in different countries, the proportion and form of these vessels, as well as the mode of rigging them, must necessarily depend upon the circumstances (Chapman 1820:125).

This idea that the environment, geography, available resources and tradition affect the 'proportion and form' of vernacular watercraft is fundamental to understanding why they became that way. This notion has been developed by archaeologists and ethnographers considering the nature of watercraft, viewing them as 'a manifestation of the maritime needs and aspirations of society, produced within a series of constraints that are both physical and metaphysical' (Adams 2001:300), or as 'the combined agency of both social and environmental factors' (Adams 2013:23). McKee identified the requirements for the development of watercraft as need, 'appropriate waters', craft skills and materials, and the factors affecting 'boatshape' as' environment, the type of work and the 'personality of boatmen' (1983:17–46). Adams' diagram (2001:301) (Fig. 1.7) shows these concepts as interrelated constraints, although he was careful to re-emphasise the fluidity of the connections (Adams 2013:23). These approaches collectively aim to identify the 'mechanisms behind the inheritable cultural phenomena that form a tradition' (Zwick 2014:65).

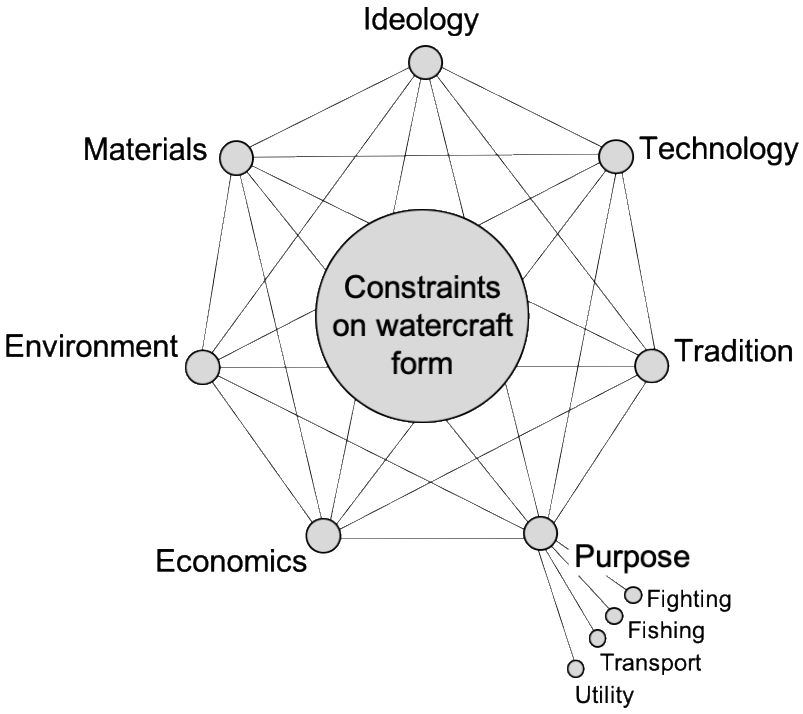

Figure 1.7 'Interrelated constraints on the form, structural characteristics, appearance and use of watercraft' (redrawn after Adams 2001:301), with Steffy's four roles or purposes of wooden ships (1994:10).

Steffy categorises wooden ships and boats by their function as transport, naval or fighting, fishing, or utility (1994:10). Enquiry into a discrete 'purpose' or function of vernacular watercraft—fighting in this case—must therefore consider the interrelated factors affecting its use. Indeed, Adams sees in this the fundamental importance of archaeological approaches to watercraft, in that 'change must occur if one or more of these constraints begins to operate in different ways or at a different amplitude', allowing one to 'relate observed technological change to its environmental and social causes' (Adams 2001:304). In such a way, this research relates the technological change in

vernacular fighting craft, observed principally through iconographic sources, to ‘environmental and social causes’, the latter primarily referring to the changing ‘ways’ and ‘amplitude’ of maritime violence.

While warships are rarely considered ‘vernacular’ because of their elite status within societies (Staniforth 2016:vii), the distinction between vernacular fighting craft and warships is semantic. The vernacular fighting craft discussed in this thesis were nevertheless elite vessels within their own cultural context. Vernacular watercraft may be described thus, that they should be readily recognisable as Indigenous: ‘a part of the local community’, by both those within and external to the community that built them, and that their form and dimensions follow established rules of thumb (Doran 1970:6–7; Evans and Smith 2016:3; Heath 2009:6–8). Vernacular design has long defied neat definition and has become understood by a combination of what constitutes ‘vernacular’ counterpoised with everything else (Heath 2009:6–8; Rapoport 2006:180). Vernacular design is local, Indigenous, ‘native or unique to a specific place’ (Al Sayyad 2006:xvii), rural (Asquith and Vellinga 2006:3), ‘a unique combination of tangible and intangible aspects of a place’ (Evans 2016:9), and akin to traditional and primitive style (Rapoport 1980:163). Vernacular has been seen as neither Western nor classical, but rather ‘non-monumental and pre-industrial’ (Asquith and Vellinga 2006:3), as contrasting with high-style and professional architectural design (Rapoport 2006:181), and ‘produced without the need for imported components and processes’ (Al Sayyad 2006:xvii). Consequently, watercraft could be considered vernacular if they exhibit a ‘degree of cultural and place-specificity’ (Rapoport 1999:56), or are ‘regionally distinctive, regionally representative, and regionally understood’ (Heath 2009:6).

1.2.4 Dhows as vernacular watercraft

Khalijis used watercraft sourced from the wider Indian Ocean region to meet, in part, the needs of maritime violence. These vessels are now known as dhows, but even this term is problematic, as it was uncommon until the nineteenth century and originally referred to a specific type of vessel now written as *dāw* by way of differentiation (Agius 2002:33–35, 2019:60–62; Cooper 2014:4059; Cooper et al. 2015:43–45; Davies 1997:19). Muckelroy identified the dhow tradition with ‘the Red Sea, Persian Gulf, and surrounding coasts’, but noted that the Arabs referred to none of these vessel types as a *dhow* (1978:135). The term ‘dhow’ is used herein in the later generic sense for ease of understanding rather than technical precision and includes ‘proto-dhows’, the culturally similar vessels in use before the nineteenth century. These watercraft varied in size from small open boats to large seagoing ships that could be built and serviced without resort to formal port infrastructure and are a collection of wooden vessels made to vernacular designs from the western Indian Ocean. This research will therefore employ the term ‘fighting dhow’ as a generic, albeit imprecise, name

for Khaliji operated watercraft, either vernacular or introduced, engaged in organised maritime violence.

The dhow traditions of the western Indian Ocean can easily be placed within these concepts of vernacular design and, during the period under consideration in this study at least, juxtaposed with European shipbuilding traditions. Vernacular design adopted and adapted elements of 'intruder' and colonial traditions—Chinese, Ottoman and European—while European naval architecture absorbed elements of vernacular design in the western Indian Ocean, thereby creating hybridised traditions, a 'new vernacular' (Heath 2009:9–19). This thesis investigates how the vernacular naval architecture of the Persian Gulf changed in the process of creating fighting craft. Had the initially more successful European and Ottoman fighting vessel designs been adopted by the Khalijis from the outset, this thesis would be a vastly different project. The apparent inconsequentiality of these foreign types invites a unique enquiry into the social effects of creating fighting craft from within a vernacular tradition.

1.3 Methodology

This research problem calls for a methodological approach designed to integrate a range of sources that offer evidence of organised maritime violence and to seek within this evidence the material or technological signatures of that violence. These technological changes and signatures must then be related to behaviour in the societies that organised the violence. The methodology adopted combines theoretical approaches, analytical techniques and methods for reasoning from the evidence presented.

1.3.1 Theoretical approaches

The theoretical approaches applied to this thesis explain how technological changes occur, how technology can be adapted to the needs of violence and how watercraft reflect the technical choices of users. Schiffer's concepts of technological change articulated as behavioural archaeology form the theoretical basis of this explanation (Schiffer 2010, 2011; Skibo and Schiffer 2008). Schiffer and his colleagues have studied technological change in archaeological contexts since the 1970s and have developed a behavioural framework to apply to questions that relate technological change to social change (Schiffer 2011:xv). This behavioural framework is based on eliciting the factors that affect decisions people made to carry out activities that influenced a particular technology's life history, as 'recurrent decisions made by similar groups, presumably affected by the same causal (contextual) factors, generate many patterns of technological change detectable in the historical and archaeological records' (Schiffer 2011:187).

An archaeologist may infer the adaptation of technology to the needs of violence through the appearance of correlates—those features or characteristics of societies, landscapes and material culture that together indicate the past presence of warfare or organised violence (Wileman 2009:53–54)—an approach taken to terrestrial sites by Wileman (2009), but more or less implicitly also by Keeley (1996), Malešević (2017) and Otto (2006). A similar approach is used in this thesis to identify the possible correlates of maritime violence in the seafaring Gulf societies, particularly within their watercraft traditions. As discussed to some extent already, Adams (2013), McKee (1983) and Steffy (1994) together explain how watercraft reflect the technical choices of their users. After developing a picture of the potential correlates of fighting at sea, the next move is to identify examples and evidence of them in culturally, temporally and spatially relevant sources.

1.3.2 Analytical techniques

The evidence for this is contained within the discourse created by the Indigenous inhabitants of the Gulf, by the intruders to that space, by power elites and colonisers, and by those who have observed or otherwise sought to interpret the maritime and martial cultures of the western Indian Ocean. This discourse is characterised by its 'intertextual' nature (Rose 2016:187–188), and comprises the materials by which people intentionally or otherwise record their interactions, observations and experiences of maritime violence—texts, images and material culture—and the remains that these activities leave in their wake—sites and artefacts.

The predominance of visual sources within this discourse has led to the adoption of the first form of discourse analysis outlined in Rose's *Visual Methodologies* (2016:186–219), a method used to 'explore how images construct specific views of the social world' (Rose 2016:192), which is suitable for interpretation of 'wide and eclectic ranges of textual materials, both visual and written' (Rose 2016:218). Analysis of content identified through a discourse analysis has been used effectively in works addressing historical iconography (Burke 2001; Jordanova 2012; Rose 2016:219), and implicitly in studies of historical maritime technology (Flatman 2007, 2009; Friel 1995; Martin 2001; Unger 1991b, Wedde 2000). Comparative analysis is a common archaeological approach described in detail by Smith and Peregrine (2011) that is used in this instance to identify how watercraft technology changed over time through a variety of techniques, including comparative naval architecture (e.g. Anderson 1921a, 1921b, 1921c), morphometric analysis (e.g. de Winter and Burningham 2001) and hydrodynamic performance analysis (e.g. Palmer 2003).

1.3.3 Argument, reasoning and inference

Drawing conclusions from the analyses discussed above and in Chapter 4 involves the use of the same behavioural archaeology framework that formed the basis of the theoretical approach to the

ways that technology changes (Schiffer 2010, 2011; Skibo and Schiffer 2008), but also Schiffer's (1996) earlier work on the formation processes of the archaeological and historical record. Rose (2016:24–47) offers methods for the critical assessment of iconographic material that can account for the biases inherent in the formation of the visual record. The approach advocated by Schiffer et al. (2017:1) in turn shows how strong cases of archaeological inference may be built through understanding the links between 'our analytic techniques and specific bodies of evidence'. Unger (1991b), Flatman (2007) and Wedde (2000) have each shown how to generate strong cases about maritime technology from numerically significant samples of high-resolution data. These methods will enable a strong case built on substantial evidence that demonstrates how changes made to vernacular watercraft in response to organised maritime violence in the early modern Persian Gulf affected Indigenous nautical traditions.

1.4 Structure

The structure of this thesis follows the order indicated above: that of identifying what organised maritime violence and its associated technologies look like in the context of the early modern Persian Gulf, then finding the evidence for these practices among the intertextual sources, interpreting the predominantly visual sources for signs of technological change, and presenting a concluding narrative and explanation by relating the observed technological changes back to Persian Gulf nautical traditions.

1.4.1 Sources

This thesis relies on direct and indirect evidence from archaeological, documentary, iconographic and ethnographic sources. Visual sources, both iconographic and material, are predominantly used in this research in conjunction with documentary sources produced by observers of fighting craft in the early modern Persian Gulf. There is little archaeological material that bears directly on the subject, but analogous and peripheral sites throughout the Indian Ocean illuminate aspects of early modern shipbuilding traditions and maritime violence. The ethnography of vernacular watercraft of the region from the nineteenth century acts as corroborative evidence but must be used with caution as it only indirectly relates to fighting craft or their organisation. Given the lack of other material evidence, iconography offers rich insights into technological changes in vernacular watercraft over the period and shows aspects of organisation not readily detailed in documentary sources. Nevertheless, critical interpretation of iconography is neither feasible nor advisable without the concurrent examination of primary documentary and material sources relating to it—the 'intertextuality' referred to above (Rose 2016:187–188).

The task of assembling the sources for this study has been made significantly easier by access to digital online repositories of primary sources, prominent among which is the Qatar Digital Library, ‘a vast archive’ of material relating to the historical Persian Gulf developed through the collaboration of the British Library and the Qatar National Library (Qatar Digital Library 2018). The National Library of France (Bibliothèque nationale de France, or BNF), the National Maritime Museum Greenwich, the National Archives of the Netherlands, and Archive.org, among many others, all offer digital access to primary and historical documents and images without which this research project would have been inconceivable within the limits of time and budget. The ability to use so many previously unpublished or virtually unknown sources for this study is a function of this digital access, which serves to emphasise the achievements of previous scholarship conducted before such access. Nevertheless, the catalogue compiled for this thesis is almost certainly incomplete and further relevant sources will become available as new material is periodically added to or digitised in archives, and private collections of documents, art and artefacts abound with levels of public access ranging from the nearly complete to the practically impenetrable. While detailed inclusion criteria are discussed in Chapters 4 and 5, the sources employed herein are chosen for their relevance to the subject matter from what was known and available during the study.

1.4.2 Chapter outline

This thesis is arranged in eight chapters and four appendices. After the present introductory chapter, Chapter 2 describes the dhowscape—those archaeological elements of seascape and landscape that signify human use of maritime space by dhow. This chapter identifies what is currently known about the fighting dhow and the societies that employed it and what is yet to be understood. The third chapter reviews the theoretical approaches of the study and shows how vernacular watercraft technology and correlates of violence can reflect the behaviour of societies that used maritime space for organised violence. The fourth chapter explains the methods used and shows how such disparate sources can be interrogated and interpreted to identify technological change over time. Chapter 5 presents the discourse analysis of archaeological, documentary, ethnographic and iconographic sources and describes the visual record used as the evidentiary basis for further analysis. Chapter 6 reports on the visual artefacts catalogued for this study and on correlates of organised maritime violence identified therein, showing how this activity appears—both directly and indirectly—in the visual record. Four centuries of intermittent violence at sea resulted in the deposition of substantial amounts of material culture on the seabed and littoral of the Persian Gulf, and this sixth chapter also summarises the potential archaeological signature of this process.

The seventh chapter presents the analyses of the content of the visual record by offering a new version of the dhowscape of the western Indian Ocean by form and function. Here, visual sources

give pictorial representations that inform recreations of the principal types of fighting dhow: the *kalbā*, *dāw*, *baghla* and the smaller combatants, the *battīl* and *baqqāra*. Chapter 8 presents a discussion of the dynamics of maritime violence with dhows following the theoretical basis established in Chapter 3, and in particular of concepts of vernacular design and the Khaliji dhow tradition. This discussion draws on the concepts of behavioural archaeology and shows how the particular behaviour of maritime violence was organised with dhows and how violence can act as a mechanism for technological differentiation. This last chapter directly answers the research questions posed above and argues that social change can result from the requirements of organised maritime violence, in doing so summarising the arguments presented in this thesis.

1.4.3 Appendices

Four catalogues append this thesis that each relate to organised maritime violence and vernacular watercraft of the Persian Gulf from the thirteenth to the nineteenth centuries. The earlier dates facilitate the identification of change in the period immediately following the initial Portuguese intrusion in 1507 by comparison with that preceding it. The appendices together represent the dataset that was used in this study and from which conclusions were drawn. They are included so that references to multiple examples may be made without encumbering the text with repeated similar references, definitions or explanations of terms and events.

Appendix A is an illustrated glossary that defines the terms, forms and shapes used to describe vernacular watercraft throughout this study. In-text citations in square parenthesis starting with the letter A refer the reader to entries within Appendix A. Appendix B lists, in the manner of an illustrated bibliography, the historical visual sources used throughout this study. This appendix lists only those sources used in this study and is neither an exhaustive nor a complete survey of all historical visual sources referring to watercraft in the early modern western Indian Ocean, as such a list is both unnecessary and beyond the resources of this study. The more 405 visual sources listed here comprise a corpus from which to analyse the organisation and activities of fighting watercraft. Individual entries are cited within the text in square parentheses starting with the letter B. Entries within Appendix B are categorised by medium and listed alphabetically by author or manuscript number as appropriate. Appendix C presents the coded data from the analysis of the visual corpus. Appendix D lists incidents of organised maritime violence that have been identified throughout this study and that have the potential to leave an archaeological signature of the event. The entries in each appendix include the relevant sources, which are not all repeated in text, unless they relate specifically to the discussion or a figure. This method follows the usage in Flatman's *The Illuminated Ark* (2007) and is intended to facilitate frequent cross-referencing as well as ease of identification.

1.4.4 Limitations

While the range of sources accessed during this research project constitutes one of the inherent strengths of the work, access has been limited to those materials in English, or at least catalogued in English, and some in Dutch, French and German. Other relevant historical sources exist in Arabic, Farsi or Persian, Modi, Portuguese, Turkish and French at least. Many of these sources have been reviewed or translated by authors who have subsequently published in English, but incidents relating to organised maritime violence or vernacular watercraft may well have been misinterpreted or left out altogether. From some of these sources, digital translation aids have helped efforts to use original documents, but finding sources still relies on accurate referencing, adequate cataloguing and appropriate search optimisation. A thorough review of all potential documentary sources is probably beyond the capacity of any single researcher within the temporal limits of a study like this.

Reliance on iconographic material, while again a particular strength, is another potential source of limitation in this research, although many of the issues are similar to those with documentary sources. While non-English languages, ineffective cataloguing, and insufficient key words or search optimisation have frustrated efforts to source relevant iconography, the public invisibility of many private art collections means that the material collected for this research is certainly not comprehensive. Art traders like Christie's or Bridgeman are unwilling to divulge information on the whereabouts of pieces purchased privately. Directly relevant works such as William Igglesden's *A Qawasim Bagalah off the Trucial Coast* and *East Indiamen engaging dhows off the Trucial Coast* (Christie's Lot 236, 13 April 2006), are currently unavailable to researchers because they were sold into private collections, and no digitally searchable forms exist online. There is no doubt many other relevant works of art, models, drawings, documents and artefacts in private collections, and many uncatalogued or unsearchable examples in public collections, both within the region and without, that could enhance the evidence used for this research. Of those images and models used in this research, only relatively few have been observed first-hand within the temporal and budgetary constraints of the project. Some, like the nautical petroglyphs at Jabal al-Jusāsiyyah in Qatar are significantly more informative when viewed in the original form and the insufficiency of resources to view them all first-hand must at least in a small way limit the scope and detail of the data used in the study.

1.5 Summary

The maritime societies of the Persian Gulf built and operated watercraft within their vernacular traditions as the means for trade, mobility and subsistence, but also for violence. By using a variety of sources, primarily many previously unpublished contemporary visual sources, this study demonstrates the degree to which these vernacular watercraft were specialised for violence, and

how their operators changed their behaviour to more effectively employ this specialised technology. This chapter has introduced the rationale for the research project, its scope and the approach that it takes. Subsequent chapters discuss in detail the context of the study, the methods and materials used, the results obtained by their application and the conclusions drawn from their analysis to present a strong case of archaeological inference. If it is accepted that violence is an integral part of the human experience, 'historically framed and socially dynamic' (Malešević 2017:10), then so should it be seen as integral to human traditions of using the sea.

2 DHOWSCAPES AND MARITIME VIOLENCE

Persian Gulf watercraft that were extinct before close observation and photography by Europeans in the mid-nineteenth century were effectively erased from the historical record by the insufficiency of Indigenous sources (Agius 2008:221). Modern notions of these earlier, now extinct, dhows are built primarily on historical records and analogy from modern-era ethnographic observation, rather than a strong archaeological base, oral history or Indigenous records. This chapter focuses on how the study of dhows, and of those in the Persian Gulf in particular, has progressed to this point, and the themes and diversions it has adopted along the way. Following Westerdahl's (1992:5) usage of 'maritime cultural landscape', the term 'dhowscape' is used in this thesis to refer to that maritime space in which humans used dhows and to all the elements of seascape and landscape that comprise that space. Violence was a significant element of the dhowscape, yet the last of Steffy's four major functions of watercraft—transport, fishing, utility and fighting (1994:10)—is reduced to little more than historical footnotes and chapters in the study of Persian Gulf watercraft, while the others have received far more substantial coverage (e.g. Agius 2002, 2005, 2008; Al-Hijji 2001, 2010; Carter 2012; Dziamski and Weismann 2010; Hawkins 1977; Hopper 2015; Howarth 1977). The reasons for this effective erasure relate to the ways and contexts in which the discourse of dhow studies was created. The following sections highlight the gaps relating to fighting craft and organised maritime violence in this literature on dhows and offer initial explanations for these silences. This chapter narrows its focus by beginning with the broad representation of watercraft in the Indian Ocean world and the Islamic notion of *milāḥa*, or seafaring in general, and then refining these discussions to focus respectively on the dhows of the Persian Gulf and on fighting at sea, or *baḥrīya*. The opportunities and limitations of the major sources of evidence commonly used in dhow studies—archaeology, ethnography and historiography—are discussed here, while the visual sources that may be used as further evidence are specifically reviewed in Chapter 5.

2.1 Watercraft in the Indian Ocean World

2.1.1 A 'complex and contested diversity': dhows in the Indian Ocean

The term 'dhow' is itself an agent of erasure, an 'English misnomer' hiding a 'complex and contested diversity' (Staples 2018:201). The imprecisely named, stereotypical 'dhow' represents the whole range of Western Indian Ocean wooden vessels, yet the term is oversimplified, Orientalist, Western-centric and technically incorrect. It is equivalent to calling all European wooden sailing vessels, regardless of size or rig, 'galleons', which may have been correct for one type of ship during a particular period of history but is not now and has not been for a long time. In the Arabian

seas, ship and boat names were used generically and specifically, regionally and locally, for large and small craft, or differently for large and small versions of the same hull form. Names changed over time as vessels evolved, were passed between cultures and languages—Arabic, Farsi, Hindi, Marathi, Urdu, Kumzari in the Persian Gulf at least—and were based on hull form, not rig, as was more often the case in European contexts. Names were used loosely by different people within the same society—builders, sailors, warriors, merchants, rulers—and by outside observers depending upon the level of interaction with the society involved. 'Dhow' now denotes any one of the broad range of Indigenous sailing craft operating in the western Indian Ocean, the term acting to 'cloud the differences, subtle or major, that distinguished these vessels from one another' (Al-Hijji 2010:11).

Traditional watercraft of the Arabian seas are universally known as dhows even though none of the types so distinguished is now 'known to its owners as a *dhow*' (Muckelroy 1978:135). The word 'dhow' has no equivalent in Arabic, where generics like *safīna* (ship), *markab* (vessel) or *qārib* (boat) are preferred (Khalilieh 1998:24–25; Staples 2018:202). Arabic texts from the late eighteenth and early nineteenth centuries demonstrate the use of the words *dāw* and *dawah*, in plural *dāwāt*, rendered in English by variants of the word 'dhow' (Taylor 2010:205), but the word may have been adopted in Arabic from an Indian source or even 'the Portuguese/Hindustani patois that prevailed in parts of India' (Taylor 2010:204). The word 'junk' was used in European sources to denote any large Indian Ocean vessel until late in the seventeenth century (Taylor 2010:204). Agius' extensive review of early and medieval Arabic sources identified over 130 terms and variants used for watercraft, including *junk*, but the closest to *dāw* is *zaw*/*zaww* (2008:393–397), a small to medium sized Chinese junk (2008:424). It is possible that the word *dāw* is derived from *zaw*/*zaww*, but the link is speculative and as yet unproven. Semantics aside, there have been more than eighty names used for dhows and their variants in the Persian Gulf, yet fewer that ten remain current (Agius 2002:13; Al Salimi and Staples 2019:27–124). The study of technology and design among this 'complex and contested diversity' has therefore been a tortured process of claim and counterclaim.

2.1.1.1 Early studies that describe dhows

Dhows have been subject to study as a class of watercraft for over two centuries (Staples 2018:201). Initial efforts at ethnographies of dhow cultures aimed at describing their watercraft. In the early twentieth century, efforts turned to systems of classification and discussions about shipbuilding influences, usually assumed to be European, yet were generally restricted to European or colonial sources, commonly British and French mixed with personal observation. Towards the late twentieth century more nuanced studies of dhow cultures emerged, encouraged by Prins' magisterial work on the dhow culture of Lamu (1965), the first major ethnographic study of the subject. The progress of

published works on dhows is illustrated in rough form in Figure 2.1 that uses a Google N-gram to show the frequency of occurrence of all books relating to the words ‘dhow’ or ‘dhows’ published in English in each year. While the limitations of using Google N-grams are acknowledged (Younis and Reips 2019), the diagram shows the trend of publication that can be loosely related to historical events, such as British anti-slavery patrols in the late nineteenth century. Studies from the 1950s began to use a broader range of sources, including Islamic texts, a practice pioneered in dhow studies at least in Albert Hourani’s *Arab Seafaring* in 1951 (Hourani 1995). The amalgamation of scholarly ethnographic practice, a range of Indigenous textual sources that venture beyond the colonial, methods that combine linguistic, archaeological and iconographic sources, and deep archival research have towards the end of the twentieth century resulted in some sophisticated studies of Indian Ocean watercraft. Foremost amongst these are Agius’ four major works—*In the Wake of the Dhow* (2002, second edition 2010), *Classic Ships of Islam* (2008), *Seafaring in the Arabian Gulf and Oman* (2012) and *The Life of the Red Sea Dhow* (2019), which establish him as one of the preeminent modern scholars of dhow cultures.

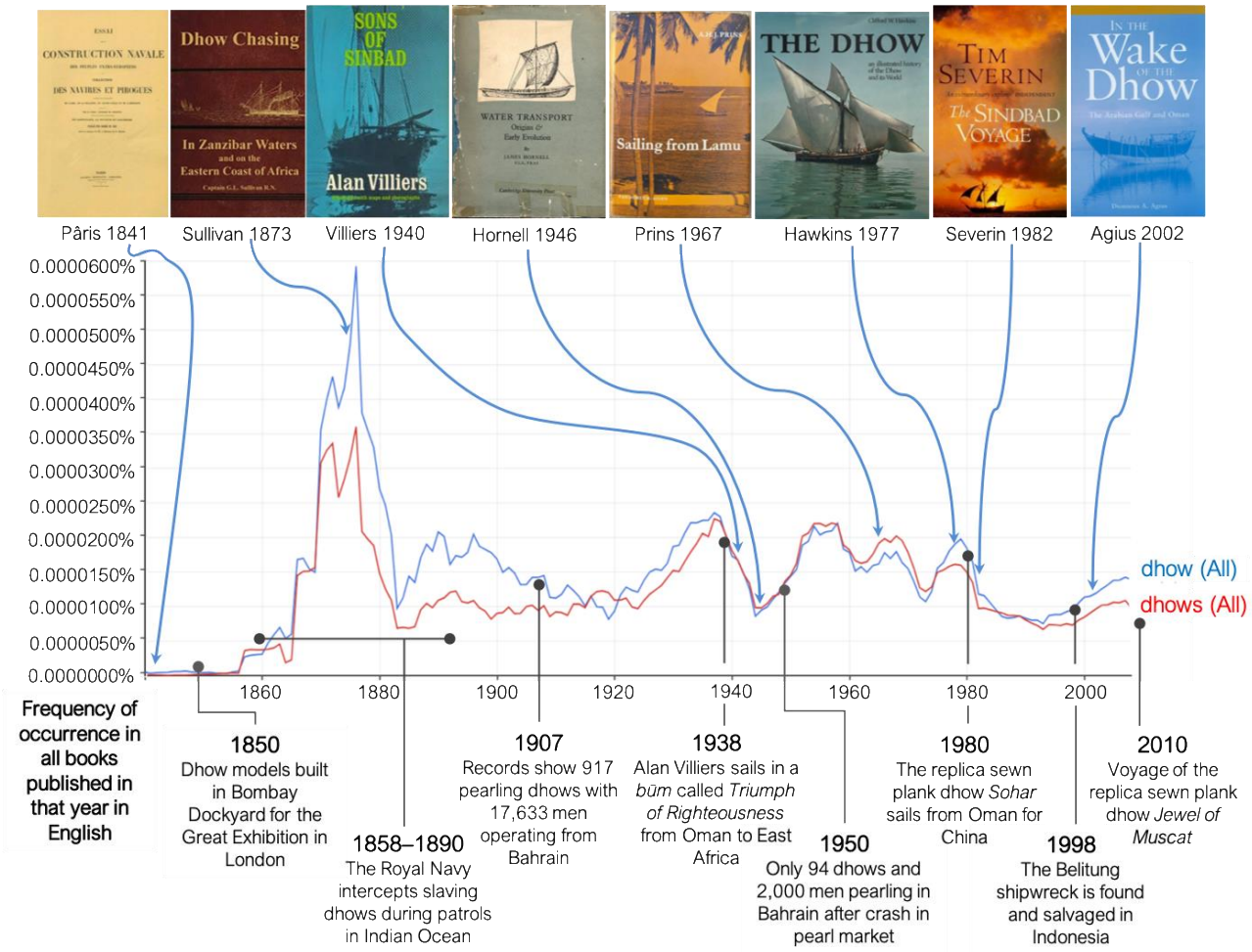

Figure 2.1 An annotated Google N-gram view showing the frequency of occurrence of the words ‘dhow’ or ‘dhows’ in all books published in English by year (source: Google 2019).

Pâris' *Essai sur la construction navale des peuples extra-européens* (1841) is the classic early description of watercraft of the western Indian Ocean, beautifully illustrated by measured drawings and engravings of vessels that Pâris either measured himself or took from knowledgeable local sources, such as the British shipwright Edye, although in this latter instance Edye misidentified the 'Arab dow' (Edye 1834:11, pl.XI). Edye's description of the 'Arab dow' (1834:11) is an accurate account of a *dāw* without the counter stern, although he illustrates the 'dow' with a *baghla* in the drawing on Plate XI, and confuses the *baghla* [A.2.2] with the *dangī* [A.2.8] both in the textual description (1834:12–13) and in Plate XII. Pâris subsequently illustrates the *baghla* following Edye's line drawing of a 'dow' (1841:pl.2), possibly because he did not measure a vessel of that type himself, but also with an engraving that much more faithfully illustrates the type and that is clearly taken from close observation (1841:pl.3). Perhaps as a result of the confusion generated by Edye's misidentification of the *baghla* as a *dāw*, and the fact that around that time the word became, in English at least, a generic rather than specific term, Pâris avoids the term 'dow' altogether, yet he describes and illustrates what is almost certainly a *dāw* as a ketch-rigged coaster (*caboteur*) from Malabar, shown in Figure 2.2 (1841:pl.18). The influence that Pâris' work has had on subsequent studies of watercraft of the region which have relied on his illustrations and descriptions is such that had he identified this *caboteur* as a *dāw*, research into the original type would likely have been far more advanced than it is currently.

Figure 2.2 Pâris' ketch-rigged coaster (*caboteur*, the two views of the larger vessel) from the Malabar Coast, a vessel that is almost certainly a *dāw* (Pâris 1841:pl.18).

Pâris' illustrations of other watercraft of the western Indian Ocean appear frequently in the scholarship of the dhow, and the longevity of the *Essai* is testament to the painstaking accuracy of his work; no subsequent work could better the range and detail of his illustrations until well over a century later. Nevertheless, the business of systematically describing dhows from observation was advanced over that time, prominently by Bowen (1952, 1963), Hornell (1920, 1926, 1942), Moore (1920a, 1920b, 1920c, 1940) and Wilson (1909). The description of historical or extinct types of dhows as a subject has been taken up by Moreland (1939a, 1939b), Nance (1914, 1920), and most influentially by Hourani, whose 1951 work *Arab Seafaring in the Indian Ocean in Ancient and Early Medieval Times* has been reprinted several times since (Hourani 1995 [1951]). These latter authors relied almost exclusively on textual sources like travellers' accounts and the limited iconography then available to scholars. Nicolle's (1989) survey of pre-modern iconographic information on Islamic seafaring demonstrates the limitations of the era before digital facsimiles and internet access as it identifies only 80 non-photographic sources with images of watercraft. By way of contrast, Flatman's (2007:19) survey of medieval European manuscript illuminations of ships identified 2,335 individual folios of this one form of iconography alone. The early works on dhows collectively provided the basis for, and initial attempts at, systems of classification of western Indian Ocean watercraft that combined historical and extant types based on the sources then available.

2.1.1.2 Systems of classifying dhows

The study of vernacular or Indigenous watercraft of the western Indian Ocean has since generated a substantial literature base, in which dhows are most frequently classified by origin. In a region that is not so easy to define culturally as it is geographically, many of these studies are necessarily broad in scope and general in character. Hawkins (1977), Howarth (1977), Mondfeld (1979), Moore (1940), Ray (2002) and Sherriff (2010) discuss dhows regardless of their cultural origin, which can be roughly grouped into Arabian, Persian, Indian or African. Other authors concentrate on the vessels used within these particular cultural groups, which nevertheless creates issues of definition; watercraft may derive their design and materials from, and be built and crewed by, different cultures, or indeed blends of cultures, within this broad region. For example, Agius (2002, 2005, 2008, 2019), Al-Hijji (2001, 2008), Hornell (1942) and Hourani (1995 [1951]) all address specifically Arab vessels, most of which were built from Indian sourced materials, some of Indian design and many crewed by people who may have identified themselves as something other than 'Arab'. In many such cases, the only thing that gave a vessel its cultural appellation was its port of origin, the bulk of its cargo or the cultural identity of the owner. Apte (1973), Edye (1834), Hornell (1920, 1946), Mookerji (1912) and Wilson (1909) similarly address the vessels of 'dhow cultures' along the western littoral of India, stretching from what is now Pakistan to Sri Lanka.

Vessel types are addressed elsewhere by geographic region rather than cultural origin. Agius (2019), Moore (1920a, 1920b), Nance (1914, 1920) and Weismann (2012) review vessels of the Red Sea, while Brouwer (1991a, 1991b) investigates specifically 'non-Western' traffic of the Red Sea and Gulf of Aden. Al Bastaki (n.d.) lists the vessels of the Persian Gulf, while Agius (2012), Al-Hijji (2001, 2008), Al Salimi and Staples (2019), Burningham (2019b) and Staples (2018) also consider their origins and development. When dhows are classified by geographic origin into Indian, Arabian, Persian or African types, the Arabian watercraft may be further subdivided into those from the Red Sea or Southern Arabia and those of the Persian Gulf, as has been Agius' practice in his *Seafaring in the Arabian Gulf and Oman* (2012) and *The Life of the Red Sea Dhow* (2019). Yet neither of these divisions are purely Arabic, as the Red Sea includes the African shore, and the Persian Gulf has both Arabian and Persian shores, so those vessels from the Persian Gulf might more properly be called Perso-Arabian dhows. These Perso-Arabian dhows have been studied both in their own right and within a broader Indian Ocean context.

These two themes of cultural and regional origins are further refined by studies of particular vessel types. For example, Al Salimi and Staples (2019), Burningham (2007), Hawkins (1977) and Hornell (1942) describe in detail individual vessel types that are found throughout the Western Indian Ocean, while Al-Hijji (2001), Cooper et al. (2015), Prados (1997) and Weismann et al. (2014) refer to vessels from Kuwait, Qatar, Yemen and Oman respectively. Despite the remarkable array of themes used to define watercraft within this literature—including function, design, building tradition, ownership and operating area—there is little agreement on the inheritable cultural phenomena that form the dhow tradition beyond wooden hulls and settee sails. Perhaps most confusingly, there is considerable variation in the names applied to the vessels themselves (Hornell 1942:31-32; Oman 1990:55; Staples 2018:202–205). Moore's tenacious pursuit of the origin of the dhow elicited a description of the last known dhow from a correspondent in the Red Sea in 1918, who confirmed: 'I have seen a Dhow; the essential difference is, that it has a pointed stern instead of a square one. There did not appear to me much difference in the lines of the bow' (Moore 1925:132–133). Moore (1925:133) also identified a critical limitation of ethnographic methods at the time, in that '[presumably Indigenous] informants were less describing what they knew, than supplying what they thought would be welcome'.

With few exceptions, for example Weismann (2002), authors use either culturally derived appellations for vessels or the terms applied by contemporary European observers on the basis of Indigenous informants. The difficulty of this is made plain by the word *dhow*, applied in the eighteenth century to a particular type of vessel (Agius 2002:33–35; Cooper 2014:4059; Cooper et al. 2015:43–45), but expanded in the nineteenth century as a generic term for any Indigenous

wooden vessel of the western Indian Ocean regardless of cultural origin (Gilbert 2011:65–66; Staples 2018:202). The etymology of Indian Ocean watercraft is a strong theme in its own right, with Agius (2002, 2008) in particular adding modern ethnographic rigour to the standard names given in Yule and Burnell's dictionary of Indian Ocean terminology, the *Hobson-Jobson* (1903) and other sources. Agius considers in detail the potential origins and borrowings of nautical and maritime words used in the *lingua franca* of the western Indian Ocean, in which Persian dominated until around the fifteenth century when it was gradually replaced or supplemented by Indian, Arabic and European terms (2008:361–384). In this way, and employing the assumption that words usually accompany technologies when 'borrowed' from their original culture, Agius uses language to show the probable origins of particular nautical technologies, such as the Arabic term *karwa*, derived from the Portugese *curva*, a knee used to support decks or frames (2008:370–371). The names used for particular types of vessels are temporally and spatially contextualised in this manner and potentially demonstrate influences on, or the origins of their design.

Studies of pre-modern nautical terminology in Arabic show that watercraft were roughly segregated by size—*qārib* for a boat, *markab* for a coastal vessel with oars and sails and *safīna* for a large ship with sails only (Khalilieh 1998:24–25). A *qārib* was generally restricted to coastal or inland waters, while the *markab* and *safīna* plied the inter-regional and long-distance routes (Khalilieh 1998:24–25). A further distinction is sometimes made in Arabic documents between riverine craft and seafaring vessels, although this is neither a clear nor a particularly useful characterisation (Khalilieh 1998:25–26, 35).

Systems of classification of modern-era dhows tend to emphasise function and shape as the distinguishing characteristics of watercraft types (Al-Hijji 2001:8; Oman 1990:55). Al-Hijji identifies six functions of dhows—deep-sea trade, coastal trade, fishing, pearling, lighterage and water carrying—and claims that the 'design and size of each type of dhow was strongly influenced by the function it was built to serve' (Al-Hijji 2001:8). Rowand (1915:2319) claims that at the beginning of the twentieth century there were 'about fourteen types of native craft which belong to the Persian Gulf proper' that differed only in 'size, rig, shape of stern, and length of keel in proportion to total length', and slightly in decoration. Other sources identify over 200 names of individual watercraft but give few technical details to differentiate them (Oman 1990:55). Rowand uses the recognisably modern names for these 14 craft over a century ago, and describes them all accurately, suggesting that these types were in their terminal form by that time. Of these watercraft, he assessed the *būm* [A.2.6] to have been the most common (Rowand 1915:2323), which in itself indicates significant technological change in the period before his report, as the type was only introduced from Kuwait at the end of the nineteenth century (Al-Hijji 2001:21).

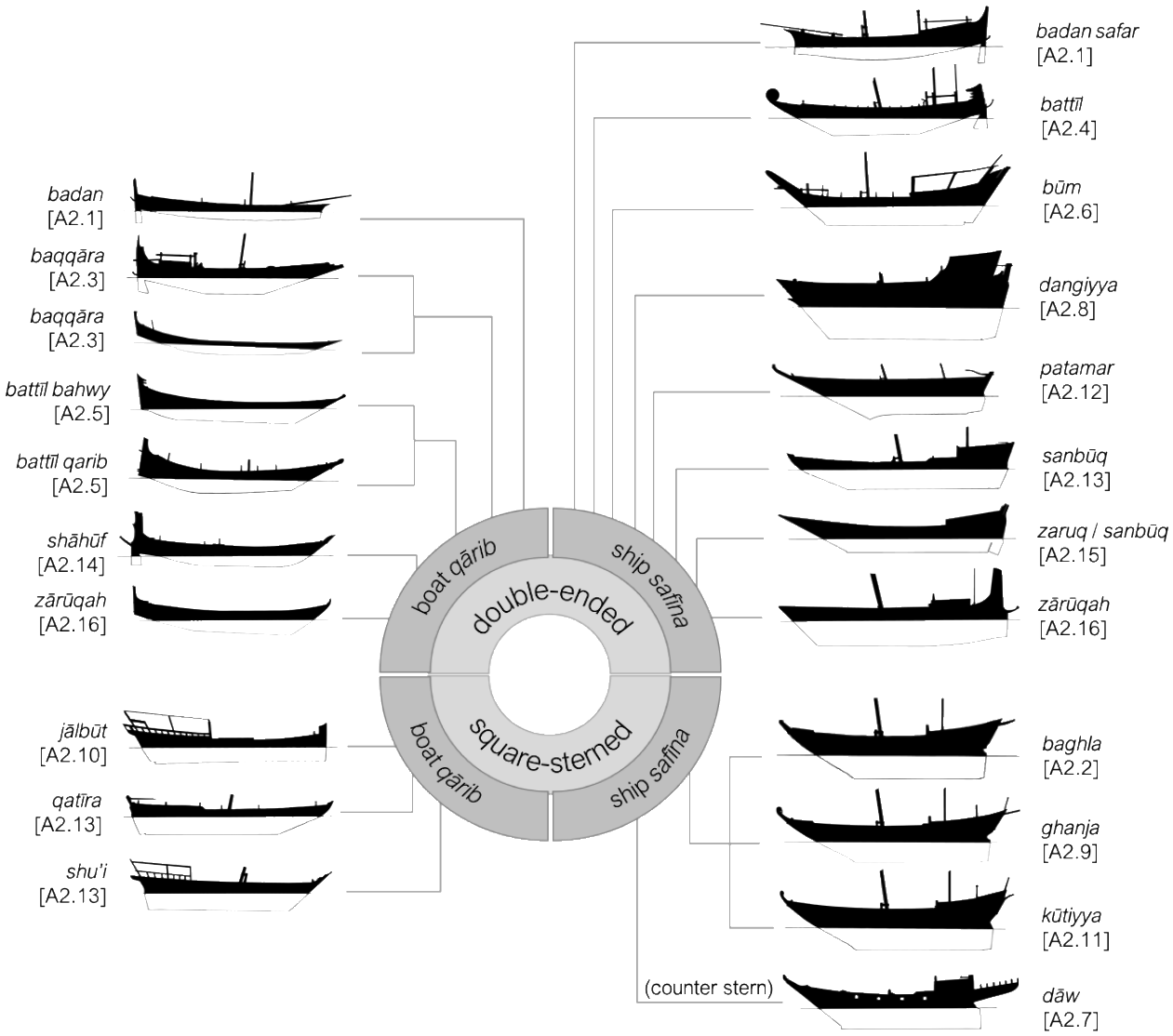

Figure 2.3 A classification of the principal types of dhows observed in the Persian Gulf, to which this review refers, by stern shape and size. Extended descriptions of each type are included in the indicated sections of Appendix A.

Hornell's *Tentative classification of Arab sea-craft* was aimed at clarifying a system that had in his opinion become confused by writers with no 'wide and intimate geographical knowledge of the Arab coasts', who had thus produced only narrow viewpoints (1942:11). This was an overly savage appraisal given his own inability to identify one of the standard watercraft of the age, the *battīl* (1942:33–34). The system of classification that Hornell offers is based on hull shape—those with a square or transom stern and those without, or double-ended (Hornell 1942:15). The latter were seen as the more 'ancient and primitive' types, while European influence was assumed in the 'revolutionary' attributes of metal fastenings and square sterns (Hornell 1942:22–23). Despite this obvious cultural bias, the shape of the stern has become the most important distinguishing feature of modern dhow classifications and is emphasised by some Indigenous boat-builders who differentiate types by whether the rudder is 'below the stern as in ships' or attached to it as in boats (Moore

1925:122–123). A glossary of the prominent Persian Gulf dhow types is included at Appendix A, and Figure 2.3 shows the basic classification of dhows employed in this thesis.

2.1.2 The Persian Gulf dhow tradition

2.1.2.1 Environmental influences

The nature of the environment in which a vernacular watercraft is conceived influences the materials from which it can be made and the manner in which it can be operated (Adams 2013:25–27). McKee (1983:19) specifically considered how the environment influenced the way boats were built and operated, referring to the 'influence of surroundings'. In the harsh and arid physical environment of the Persian Gulf, the influence of surroundings is inherent in the inadequacy of indigenous timber sources, the expense of fuel to work iron, the effect of sun and heat on timber and the reliance on oils to treat it, and the scarcity of fresh water resources, which account to a considerable degree for the design choices inherent in Khaliji watercraft and the ways they are operated.

Of all the constraints imposed on the construction of watercraft in the early modern Gulf, the deficiency of Indigenous timber resources must be considered the most severe and most challenging to overcome (Potter 2009:10; Staples 2018:205). This deficiency alone accounts for the diversity of types and sources of shipbuilding timber used in the Gulf, far beyond the seemingly ubiquitous western Indian teak, and the creation of specific networks of supply (Staples 2018:205–206). The *Epic of Gilgamesh* tells of the vast primeval forests of southern Mesopotamia in the third millennium BCE, but by 2,000 BCE these resources were destroyed through the effects of overexploitation and its resultant siltation and salinity (Perlin 2005:35–43). Mesopotamian states imported wood from the late third millennium BCE from Turkey, Syria, the Arabian Peninsula and India (Perlin 2005:40), establishing a practise that would last well beyond the destruction of Indigenous timber sources.

During the period covered by this study, wood for shipbuilding and construction was imported from India, and to a lesser extent East Africa (Agius 2005:29; Potter 2009:10). In India, Muslim merchants controlled many western Indian forests and much of the timber trade (Mann 2001:407–408), and Gulf networks ensured that this supply remained accessible despite colonial timber embargoes aimed at restricting the construction of fighting craft (Davies 1997:104, 191). The traveller Ovington observed of Indian teak in 1689 that 'the wood with which they build their ships would be very proper for our men of war in Europe; for it has this excellence, that it never splinters by the force of a bullet, nor is injur'd by those violent impressions, beyond the just bore of the shot' (Rawlinson 1929:166). The timber resources of the west coast of India were already stressed by the beginning of the nineteenth century as the East India Company established a shipbuilding enterprise

in Bombay and proclaimed a monopoly over teak and other specified timber to supply it (Mann 2001:406). British attempts to monopolise or disrupt the Indigenous timber trade subsequently failed, and control of the trade on the 2,000-kilometre-long west coast was virtually impossible, but increased demand led to 'devastating consequences' for forests as they were indiscriminately felled (Mann 2001:416–418). By the 1830s, the western Indian forests were overworked and supplies of hardwood timber sufficient for shipbuilding requirements dwindled while prices increased (Mann 2001:418). Reused or salvaged timber, especially of hardy teak, was an important source for maintaining watercraft. Irwin observed in 1777:

> This was the boat that went for wood yesterday, and we were astonished to see a fine timber on board, which she had picked up ashore. It is of teak, and being about 30 feet long, we conjecture it to be one of the beams of the unfortunate *Aurora*, which the sea has cast up again. The Arab thinks to get a good price for it, at some of the ports in this sea (Irwin 1780:98).

Nevertheless, the Gulf littoral boasted some limited timber resources, and serviceable baulks could be obtained from Oman and the foothills of the Musandam Peninsula, and from Acacia groves in other areas, although of much lower quality than Indian hardwoods and in insufficient quantities to supply the entirety of domestic boatbuilding needs (Agius 2005:31–33). Domestic sources were known for their short bores, although the natural crooks were used for frames (Agius 2008:143; Al-Hijji 2001:40–41). Mangrove wood, from once abundant coastal forests, was not usually preferred for shipbuilding, but the curved pieces were sometimes used for frames (Agius 2005:35). Recycled timber from old, wrecked and salvaged craft was also a significant source for shipbuilding (Agius 2008:143).

Economically important date palms were widespread in Arabia, cultivated in groves near settlements and oases, (Chao and Krueger 2007:1077), and provided products for which Khaliji society has found myriad uses, up to 360 according to an ancient Persian proverb (Johnson 2016:12). Almost every part of the plant was used, and small fishing craft, *shāsha* in eastern Arabia and *wāriyya* in the northern Gulf, could be built in a day almost entirely from date palm products (Agius 2005:25; Ziolkowski 2000). The leaves, fronds, wood and fibres of date palms were used to make other nautical products like fish traps, floats, roofs and shade enclosures, mats, baskets and ropes (Agius 2005:116; Chao and Krueger 2007:1081). Nevertheless, these sources of timber and construction materials were together insufficient for the development of martial fleets, as failures by the Persians, Ottomans and Omanis to establish significant domestic naval building programs in the early modern period attest (Potter 2009:10).

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Figure 2.4 Collecting fresh water from submarine springs off Bahrain in 1911, with a wooden *tankī* in the vessel on the right (16 March 1911, Cartier Archive © Cartier).

The major constraint on human exploitation and use of maritime space in the early modern Gulf was access to fresh water (Potter 2009:9–10). Indeed, the provision of fresh water became an entire maritime industry in its own right, with hundreds of watercraft servicing the daily needs of the all but dry island of Hormuz in the sixteenth century, where the destruction of watercraft in the initial Portuguese attack in 1507 drove the price of water up by a factor of 20 (Floor 2006:21–23). Specialised water carrying dhows operated in Kuwait to bring water to the coastal ports in large wooden *tankīs* (Al-Hijji 2001:26, 74). Fresh water discharged from submarine springs off the coast of Bahrain, collected in skins as shown in Figure 2.4, was an important source until the mid-twentieth century (Moosdorf and Oehler 2017:339–340). 'This area has a number of undersea springs whose sweet water is brought to the surface via hollowed out palm trunks. Boats of all types come here to replenish their drinking supply' (Pedersen 2015b:160). Larger craft often carried their own water tanks, but these held water only for the crew, while passengers had to supply their own, usually in waterskins or jars (Burkhardt 1829:344). An adequate supply of fresh water onboard would therefore have been a limiting factor in operating heavily manned fighting craft. The arid climate and poor vegetation in general created reliance on marine resources and made fish an important energy source, including as fodder for domestic animals (Al-Hijji 2010:11–12, 113), for 'even their goats are fed on the refuse' of fishing (BL IOR/X/10309:f.7v). Fish also served as a source of oil for preserving wooden watercraft (Agius 2008:141), in some instances giving the fresh

water stored aboard a ‘peculiarly unpleasant taste’ (Buckingham 1829:524). Indeed, the barely inhabitable littoral environment of the Persian Gulf encouraged a maritime rather than a terrestrial culture (Potter 2009:10).

2.1.2.2 Construction methods

Dhow construction, *sina’at al-sufun* in Arabic, in the Persian Gulf developed amongst communities where most people were reliant on the sea for their livelihood (Al-Hijji 2010:11). In the ‘rather simplistic and linear’ standard narrative of dhow construction, Indigenous watercraft of the Gulf were shell-first vessels fastened exclusively with organic materials, coir and wooden dowels, prior to the intrusion of the Portuguese in the early sixteenth century (Staples 2018:204). While these construction methods continued well into the age of European intrusion, and even in some cases into the twentieth century when hybrid fastenings that combined organic ligatures with metal fasteners were still observed (Fig. 2.5), this narrative ignores much evidence to the contrary (Burningham 2019b:147; Staples 2018:204, 2019:315). Staples offers a convincing counter-narrative to the impression that dhow traditions were ‘static and timeless’ (208:205), in which change was slow and vessels had been the way they appeared now for centuries (e.g. Bowen 1951b:5; Pedersen 2003:17, 2015:158). Nevertheless, the structural characteristics of these vessels enabled their classification as part of a homogeneous craft tradition (Burningham 2019b:141–142). Only in the modern era have ethnographers like Al-Hijji (2001) and Agius (2005, 2010) studied the actual construction of dhows at the building site rather than from the finished vessel, as is made clear by the absence of any detailed historical reference to dhow building. Conclusions drawn about construction techniques and influences in the absence of such ethnohistorical evidence should be considered conjectural at best.

An enduring feature of the heterogeneous watercraft tradition of the Arabian seas, and of the Persian Gulf in particular, is the fastening of the wooden planks of the shell by ligatures in a fashion now referred to as ‘sewn’ (Burningham 2019b:145). Much like the word ‘dhow’ itself, the term ‘sewn plank’ is technically deficient and potentially misleading. The word ‘sewn’ has long been recognised as inadequate in this regard, given its association with needle and thread, and may correctly be applied to watercraft whose shells are constructed from hide or bark (McGrail and Kentley 1985:xi). The technique of boring planks prior to connecting them with continuous ligatures together in a shell is more properly ‘lacing’, as one does with a shoe (Hocker and Ward 2004:165; Polzer 2009:64 note 1). Given the continued use of the term by the foremost authorities on the technique in Indian Ocean watercraft (Burningham 2019a; Ghidoni 2019; Staples 2019; Staples and Blue 2019; Vosmer 2019a), and the prevalence afforded by longevity, the word ‘sewn’

is used in this thesis as a loose analogy for lacing planks with ligatures, without implying they were pierced by a threaded needle.

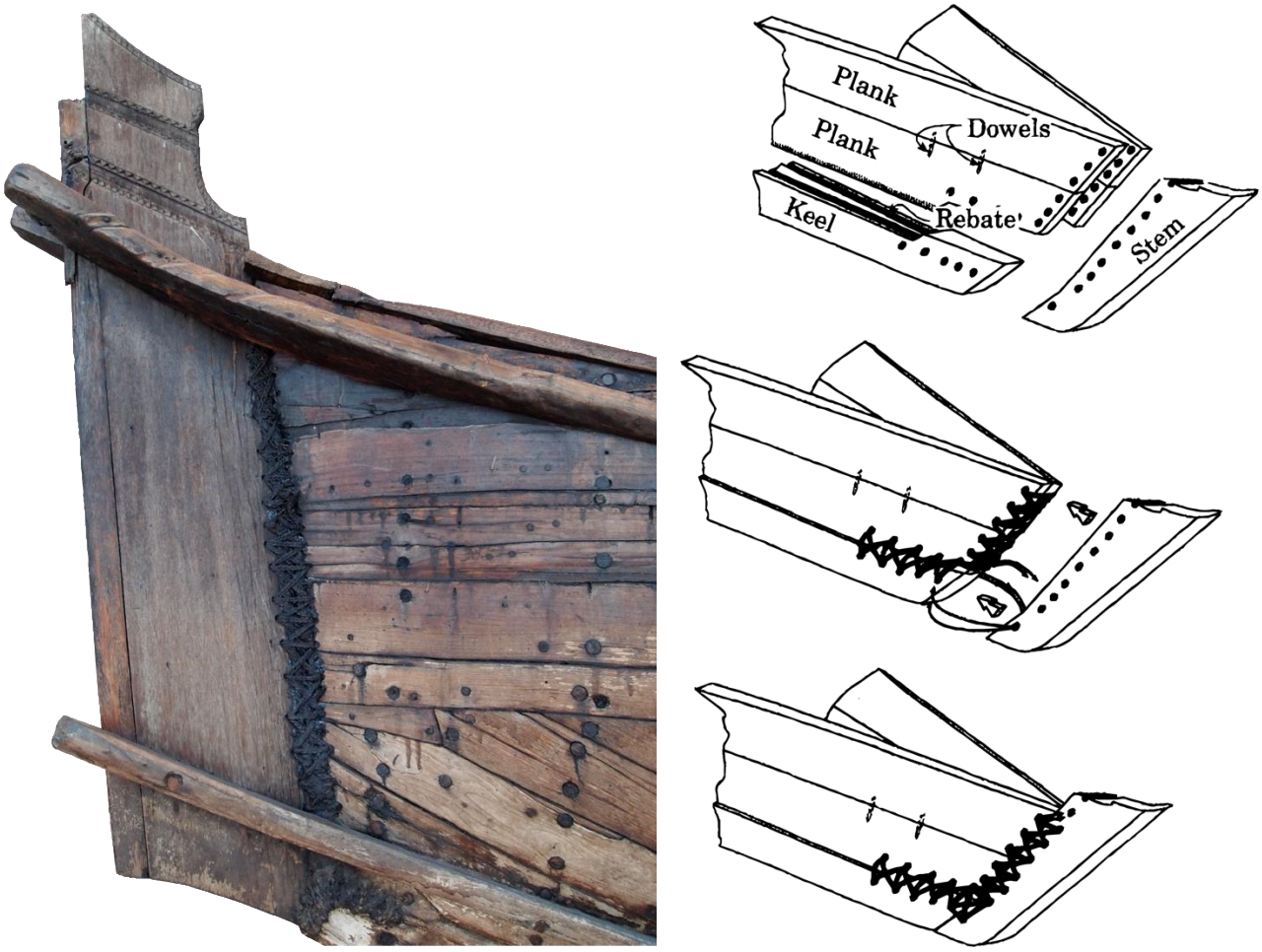

Figure 2.5 Hybrid fastening, showing (left) a sternpost sewn (technically laced) to the metal-fastened hull of a *battīl qarib* (Image: M. de Ruyter 2019, courtesy Sharjah Maritime Museum), and (right) the procedure for fastening the planks to the stem and forefoot by ligatures (after Vosmer 1997:229, fig.16).

The transfer of watercraft traditions around the coast of the Persian Gulf was facilitated by migrations of entire communities, who brought with them building skills in the forms of experienced master builders and shipwrights (Al-Hijji 2010:12). The master builder (*ostad*) employed a number of shipwrights (*qallaf*) as assistants or apprentices (Al-Hijji 2010:17). Youths from shipbuilding families were exposed to building traditions by observation and experience from a young age, as there was no book learning or formal education (Al-Hijji 2010:18). This vocational education involved learning the peculiarities of each vessel type, or of those in which the family specialised, through proportions and rules of thumb, and probably through the construction and testing of scale models similar to those in Figure 5.14. Familiarity with the material, tools and traditions of building watercraft would grow with this exposure, and apprenticeship as a shipwright could eventually lead to a role as a master builder, although Al-Hijji states that only around five per cent of shipwrights made that transfer (2010:18–19).

Experience and reputation preceded some master builders and shipwrights, as particularly fine examples of dhow building had their ‘fame and beauty extolled in all the ports around the western Indian Ocean’ (Al-Hijji 2010:19). The relocation of a ‘famous’ master builder to another port was a noteworthy event in the maritime culture of the Gulf, where personal honour and reputation mattered a great deal (Al-Hijji 2010:13). It was in this way that a builder’s signature in individual vessels was recognisable to other knowledgeable observers in the region, as in the case of a plundered Bahraini *baqqāra* [A.2.5] in 1819 that was recognised by Omanis as having been built in Kuwait (BL IOR/R/15/1/19, f.77v). The subtle ways that builders ‘signed’ their watercraft are not explained in historical documents, but, as in this case, Indigenous inhabitants were far more adept at recognising the regional origin of otherwise homogeneous boat designs than the European observers who created the majority of documentary records from this period. These architectural signatures, distinguishable to the degree of individual builder, were important elements of the vernacular watercraft building traditions in which individual craft were sometimes considered ‘real masterpieces’ (Al-Hijj 2001:106).

2.1.2.3 Technological influences

A common early view of shipbuilding traditions in the Arabian Sea holds that Indigenous vessels developed little and slowly until the arrival of Europeans. Muckelroy (1978:135) claims that modern dhows ‘reflect in various degrees the influence of European techniques’ and that ‘before contact’ in the fifteenth century, vernacular watercraft were constructed shell first in a carvel-planked method with organic fastenings. Hornell (1942:37) claims that there is no evidence of improvement in the proto-dhows of the pre-intrusion era and that the arrival of Europeans sparked a ‘revolution’ in shipbuilding and even a ‘race for naval supremacy’. He goes on to assert that the ‘most important consequence flowing from the contact of Arab mariners and shipwrights with the Western intruders’ was the introduction of metal fastenings to Khaliji watercraft, which led in turn to the adoption of the square stern (Hornell 1942:37). Hornell posits that European influence radiated from shipyards like Bombay that employed Indigenous shipwrights and carpenters, and from here Arab merchants acquired dhows of ‘greatly improved design’ with more substantial framing (1942:39). While this assertion may have merit in a limited sense, the notion that the British started the process by building Indiamen in Bombay is demonstrably false (Staples 2018:204). The argument asserting European primacy over metal fasteners and square sterns in the Indian Ocean (e.g. Johnstone and Muir 1962) is at best simplistic and at worst ignores evidence to the contrary (Burningham 2019b:147, 152–153; McGrail 2004:76–77; Staples 2018:204, 2019:315).

There were several other potential sources of technological exchange in the Arabian seas prior to, or roughly simultaneous with, the Portuguese intrusion at the start of the sixteenth century that should

be considered. The mixing of dhow traditions with the 'junk' traditions of East Asia is a possibility, given the frequent traffic across the Indian Ocean and the strong Chinese presence in the Arabian Seas in the fifteenth century (Agius 2008:382; Burningham 2019b:143–144). Warships built in the Red Sea to counter the Portuguese in 1507, and which later operated in the Persian Gulf, were joint ventures employing Venetian carpenters and Ottoman resources and crews (Agius 2008:257), and Ottoman influence during the sixteenth century at least must have been evident (Staples 2018:203). Linguistic evidence indicates a variety of Persian, Indian, East African and European influences on Arabian shipbuilding (Agius 2008:370–372; Staples 2018:203). There is sufficient archaeological, linguistic and textual evidence to indicate that there were far more influences on the dhow traditions of the Arabian seas than just the Portuguese intrusion.

2.1.3 People of the dhow

The Abbé Carre observed of the Kailo Arabs from tribal areas in the northern Gulf in the 1670s: 'now they are 3,000 strong with some 400 vessels, of which each family owns two or three. They use them for war, pearl-fishing, and to go to Basra for dates, rice, corn, and nearly everything else necessary for life' (Fawcett and Burns 147:103). While this indicates a lack of specialisation in watercraft among the Kailo at least, it also shows a proportion of people to watercraft of roughly ten to one in a maritime tribe. Population density has been shown to have an influence on the design of vernacular watercraft. In his classic study *Working Boats of Britain*, McKee observed that 'population density may determine whether a boat is used for commerce or subsistence' (1983:28). He found that on lightly populated coastlines in the UK, those with fewer than 25 people per square mile, boats are more likely to be used part-time for both fishing and transport (McKee 1983:28). In well-populated areas with more than 250 people per square mile, McKee observed that vessels tended to become more specialised for particular full-time roles (McKee 1983:28). In areas with a population density between these figures, boats were employed as 'general purpose' vessels (McKee 1983:28), in the manner of Steffy's 'utility' category of wooden boat hull design (1994:10). If this situation is replicated in the Persian Gulf, one may expect a higher degree of watercraft specialisation in the areas of relatively higher population density. The imprecision of historical population data negates absolute estimates of population density as achieved by McKee, so relative estimates must suffice for the current purposes.

Estimates of the total population of the Persian Gulf cultural world, the area shown enclosed in Figure 1.6 (Izady 2008 [artwork]), are made troublesome by the lack of consolidated records or coverage of archaeological studies, the seasonality and mobility of the Indigenous populations, and the ubiquity of transient and forced labour (Floor 2006:17). Floor estimates that Hormuz, the largest city in the Gulf at the beginning of the study period, housed a population of 40,000 at the most, and

likely fewer (2006:15–16). The population of Basra, the second largest city in the Gulf after Hormuz, at the beginning of the sixteenth century was variously estimated at 16,000 to 24,000, and by the end of that century at around 20,000 (Floor 2006:142). The population of Bandar Abbas during the seventeenth century is estimated at 9,000, Muscat is estimated to have housed 5,000 people at the beginning of the seventeenth century, and Bandar-e Kong reportedly at least 1,800 (Floor 2006:251, 335, 436). While the populations of these five major ports waxed and waned with the fortunes of occupiers during the early modern period—the island of Hormuz was superseded by the mainland port of Bandar Abbas during the late seventeenth century—they were generally always more populous than the surrounding coastal settlements. Tribal estimates offer an indication of population outside of these major urban areas, and a Dutch survey of the Gulf in 1756 reports 6,000 Huwala men on the Persian shore west of Bandar Abbas and around 4,000 men in Kuwait, but nowhere else could muster more than 500 seagoing men (Floor 2007:23–38). The Imam of Muscat in 1756 retained 500 fighting men, slaves and mercenaries for the most part, but formerly counted 4,000 under his charge (Floor 2007:38), giving some indication of the problems with population estimates based on figures like these. After his survey of the Gulf in the late nineteenth century, Miles estimated the coastal population of some of its regions. He estimated the coastal population of what is now northern Oman and the UAE at 700,000 people (Miles 1919:380), and of the southern coast of Oman to Yemen of 300,000 people (Miles 1919:383). His estimate of the pearl fishery in the late nineteenth century included between 3,000 to 5,000 boats and up to 40,000 men (Miles 1919:414–415). The coastal population of the Persian Gulf cultural world was therefore probably closer to one million people in the sixteenth century, rising to nearly two million by the end of the nineteenth century.

2.2 *Milāḥa*: seafaring in the Persian Gulf

Milāḥa is an Arabic term denoting ‘navigation’ or ‘seafaring’, and it has both broad and narrow applications, the former referring to the wayfinding art and the latter to seafaring practice in general (Soucek 1990). In this study, *milāḥa* is used in the broad sense of Islamic seafaring. ‘Islamic’ here refers to activities undertaken under the cultural purview of a society with leadership professing Islam (Cooper 2014:4055), as was the case with the Persian, Arabian, Ottoman and Mughal societies operating in and around the Persian Gulf in the early modern era from the fifteenth to the nineteenth centuries. In this way also, watercraft constructed on the Persian and Arabian shores of the Persian Gulf, Arabian Sea and Red Sea can be considered examples of Islamic material culture (Insoll 1999:1–15).

Khalilieh studied Islamic documents, including the Geniza manuscripts, travel accounts and the writings of jurists, from the period 965–1508 C.E. to compile a major work on Islamic maritime law

(1998). Khalilieh shows how Islamic seafaring and ships were organised according to religious and legal edicts, and, importantly for the present study, how maritime warfare was organised and governed in the period immediately before the European intrusion in the Indian Ocean (1998:116–127). Other scholars contribute to a broad understanding of historical Islamic seafaring, particularly Agius (2005, 2008, 2010, 2019), but also Barendse (2002, 2009) and Hourani (1995 [1951]). The Islamic sources upon which these scholars rely are, with the notable exceptions of a few navigation texts, largely written by political and religious elites rather than seafarers and as such contain few informative physical descriptions of past watercraft (Cooper 2014:4061), although the collective discourse does provide valuable information on their operation and organisation.

2.2.1 Trade and transport

Agius identifies three levels of classification of trade or transport vessels in the Arabian seas—riverine, coastal and sea-going—although the distinctions were rarely absolute and many vessels ventured further than their nominal category indicates (2008:297). Long distance or deep-sea trade by dhow, known as *al-safar* in Arabic, holds 'the place of honour' in most seafaring communities in the Gulf (Al-Hijji 2010:51). Sea-going vessels were commonly owned by a single proprietor, who, either themselves or through an agent, appointed the master (*nakhoda*) for a voyage, although often voyages were conducted on an owner-operator basis (Kalilieh 1998:37–45). Other members of the officers and crew included navigators, helmsmen, a cook, a scribe, a carpenter, able seamen, servants and armed guards, the latter embarked for protection (Kalilieh 1998:45–47).

The coastal entrepôt or redistribution trade in the Gulf is known as *al-qita'ah* (Al-Hijji 2010:93). Lighterage, the transfer of goods and cargo from vessels at anchor to the shore, was common in most ports lacking dock facilities and where larger vessels could not approach the shore (Al-Hijji 2010:99). The practice of transporting fresh water in the arid Gulf was a particular trade that eventually led to the introduction of specialised craft in Kuwait in the early twentieth century with compartments to hold multiple water tanks and low sides to facilitate loading, (Al-Hijji 2001:26; 2010:103). Large ocean-going vessels embarked small boats to enable access to the shore and to act as lifeboats (Agius 2008:306–307; Kalilieh 1998:35). Early contact period accounts describe coastal craft, including those transporting fresh water to Hormuz, almost universally as *tarrāda* (pl. *tarārīd*), a generic term also used in Portuguese accounts to describe small fighting vessels (Agius 2008:307).

The economic reality of the carrying trades in the Gulf was highlighted to British observers who, to recover their allegedly stolen property, tried to impose blockades on coastal tribes that salvaged cargoes from wrecked or distressed ships:

> The day past [sic] in conversation on the subject, I on my part claiming the property, and Ben Croosh in showing the impossibility of recovering it from people whose country afforded nothing but fish, and a few dates, and who existed by carrying freight for others, and whose Shaikh was not more than the other heads of families, who obeyed him or not as they pleased, that if the war was continued we would certainly distress them much, but they would draw their boats on shore where we could not hurt them, and they would wait patiently whilse [sic] the expense of the [blockading] vessels was more than the values of the cargoes [to be recovered] (Al-Qasimi 1995:61).

2.2.2 Fishing and resource extraction

Al-Hijji considers *sayd al-samak*, the practice of fishing, the 'most visible and enduring' of maritime cultural activities in the Persian Gulf (2010:112). Significant Islamic-period deposits of pelagic fish species, particularly sailfish, at sites in the UAE indicate the use of watercraft to operate drift nets and lines in open water (Beech 2003:304–305), probably beyond the range or endurance of raft-boats like the date palm *shāsha* that was used in lagoons, reefs and coastal waters (Ziolkowski 2000:9). McIvor (1881) describes in detail the various fishing practices common in the Gulf at the end of the nineteenth century, which are notable here only for the ways that watercraft are used and the products that use generated. Fresh, salted or cured fish with onions and dates and a small portion of rice or barley 'constitutes the staple food of the majority of the poorer class of natives, Arabs and Persians, inhabiting the seaboard all round the Persian Gulf' (McIvor 1881:54). As with pearling, fishing was a seasonal activity that slowed in winter as lower water temperatures discouraged some fish species (Al-Hijji 2010:113). Numerous regionally specialised methods of fishing were employed using nets, lines, traps fenced with stakes, and pots or baskets deployed from the shore or from a range of small craft, including the *baqqāra*, *battīl*, *būm*, *jālbūt* and *badan*, and smaller craft like the *shāsha* (Al-Hijji 2010:113–115; McIvor 1881:55–57). Fish provided such 'a vital part of the staple diet of the maritime community' that Al-Hijji surmises this dependence led to the development of watercraft in the first place (2010:11–12, 113).

The practice of pearling was known in Arabic as *al-ghaws*, although this more properly refers to the pearling season (Al-Hijji 2010:25–27), became one of the most prominent and widely recognised maritime activities in the Gulf until its eventual displacement by Japanese cultured pearl farming in the 1930s (Fig. 2.6) (Al-Hijji 2010:49–50). Pearling was a seasonal activity 'unrivalled in its impact', as it consumed the effort of so many members of maritime communities (Al-Hijji 2010:25). Beset with uncertainty and the vagaries of weather and quality of catch, pearling was nevertheless 'a centuries-old pillar of the traditional Gulf economy' (Al-Hijji 2010:25). For four months of the year from June to September, as well as some weeks of pre-season work, almost all male members of many coastal communities of the Gulf were engaged in the practice, 'leaving behind only the women, children, the elderly and the infirm' (Al-Hijji 2010:25). The major part of

the practice of pearling involved diving from vessels anchored on pearl banks to collect shell, where each diver was weighted by a stone while remaining connected to the vessel by a line tended by a hauler (Al-Hijji 2010:29–31). Pearling was an onerous practice that resulted in frequent casualties and health defects (Al-Hijji 2010:30), and so 'consumed' human resources, sometimes at an alarming rate.

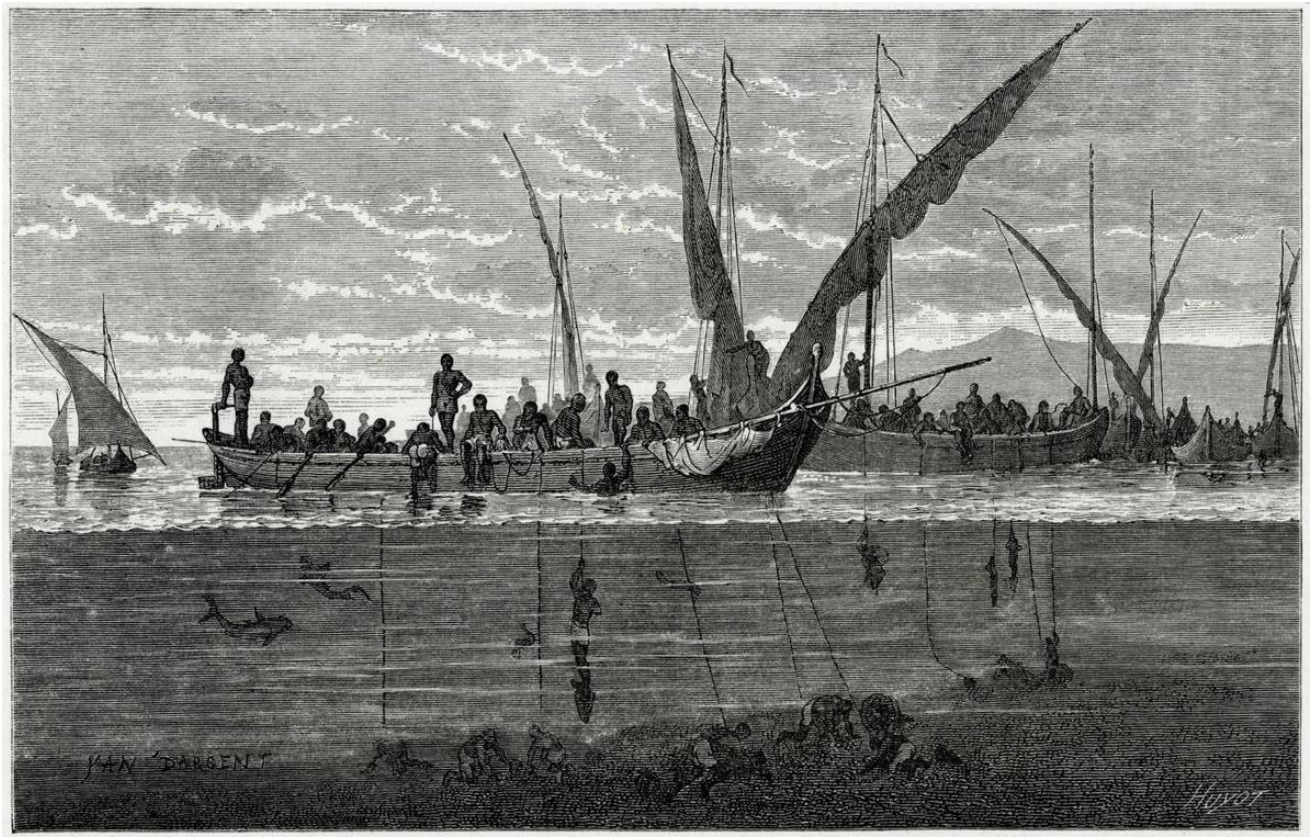

Figure 2.6 A pearling fleet in operation in the Persian Gulf in the nineteenth century, showing the divers working the seabed tended by haulers onboard (D'Argent 1870 [B1.56]).

2.3 *Baḥrīyya*: fighting in the Arabian Seas

The violent Portuguese intrusion of the Persian Gulf in the sixteenth century created an insurgency in response (Teles e Cunha 2009:207–208), during the initial phases of which the original Indigenous polities were outclassed in fleet tactics and only the stronger and more specialised Ottoman squadrons could compete (Teles e Cunha2009:211–212; Vosoughi 2009:98–99). Further European intruders and local groups with shifting loyalties and varying naval capabilities eventually replaced the Hormuzis, the incumbent Indigenous hegemon, and their Portuguese allies in the seventeenth century (Peterson 2009:278; Vosoughi 2009:98–99). From this quagmire arose a number of Indigenous maritime powers which were able to exercise influence and project force beyond their notional territorial boundaries, including the Omanis from the seventeenth to the nineteenth centuries (Risso 2001:310; Staples 2013), the Persians during the eighteenth century (Axworthy 2011; Floor 1987), and the Qawasim around the turn of the nineteenth century (Davies

1997). The British characterisation of some of these powers as pirates enabled them to justify their own maritime violence, although Khaliji organised violence could well be seen as 'lawful resistance to foreign intrusion and a cultural response to maritime competition' (Potter 2009:3). The primary element of this cultural response was the capacity to fight at sea. As the historian of British involvement in the Persian Gulf, J.B. Kelly, observed in 1968:

> Command of the sea is the prerequisite of power in the Persian Gulf. Only twice since the decline of the Abbasid Caliphate [1258 in the Persian Gulf, 1517 in Egypt] has a single state succeeded in imposing a hegemony upon its waters, and in both instances the state concerned was a maritime power—the kingdom of Portugal in the sixteenth century and the empire of England in the nineteenth (quoted in Peterson 2009:277).

The Arabic term *Baḥrīyya* is used in a classical sense to denote specifically the Arab navy until the era of the Fatamids, the navy of the Mamluks of Egypt or the Ottoman navy, but in a general sense the word simply means 'navy' or 'naval' (Agius 2008:245; Ayalon 1990), a force organised for maritime violence. The term is used in this thesis to differentiate the elements of seafaring societies employed in organised maritime violence from the other elements of *milāḥa* discussed above.

2.3.1 Systems and practice of maritime violence

This section reviews the practice and organisation of maritime violence in the centuries immediately preceding the Portuguese intrusion in 1507 and the period from 1507 until the agreement of maritime truces with the British in the nineteenth century. Of the period preceding the Portuguese intrusion, Agius comments:

> From Muslim sources, it may be discerned that the *baḥrīyya* in the east [the Indian Ocean] was not so structured as it was in the Mediterranean. There was no naval policy and strategy dictated by the Caliphate and the naval requirements of the Caliphate were not, as in the west, necessitated by the defence of Muslim territories against a stubborn enemy (2008:246).

The sources covering the period from the Islamic conquests (seventh century CE) until the arrival of the Portuguese build a picture of relative stability in the Indian Ocean, occasionally punctuated by maritime violence in the form of warfare, raids and troop movements, of which the Muslim sources 'have little information, if any, on warships or their formation in sea battle' (Agius 2008:249; Prange 2013). The general system of warfare in the Persian Gulf replicated that of the Mediterranean—based on massed fleets of oared galleys. The northern European system practised by the Portuguese was based on sailing warships that carried larger gunpowder weapons and the distinction is shown in Figure 2.7. Guilmartin is careful to emphasise that the different vessels played distinct roles in these two systems of warfare, and that it is therefore inappropriate to make direct technical comparisons between one type of vessel and the other, which would be 'inherently misleading' (Guilmartin 1974:7). Indeed, he considered analysis based on the assumption that

sailing warships always bested oared warships as ‘conceptual fallacy’, and provided sufficient examples in the early modern Indian Ocean at least to demonstrate that the opposite was the case (Guilmartin 1974:7).

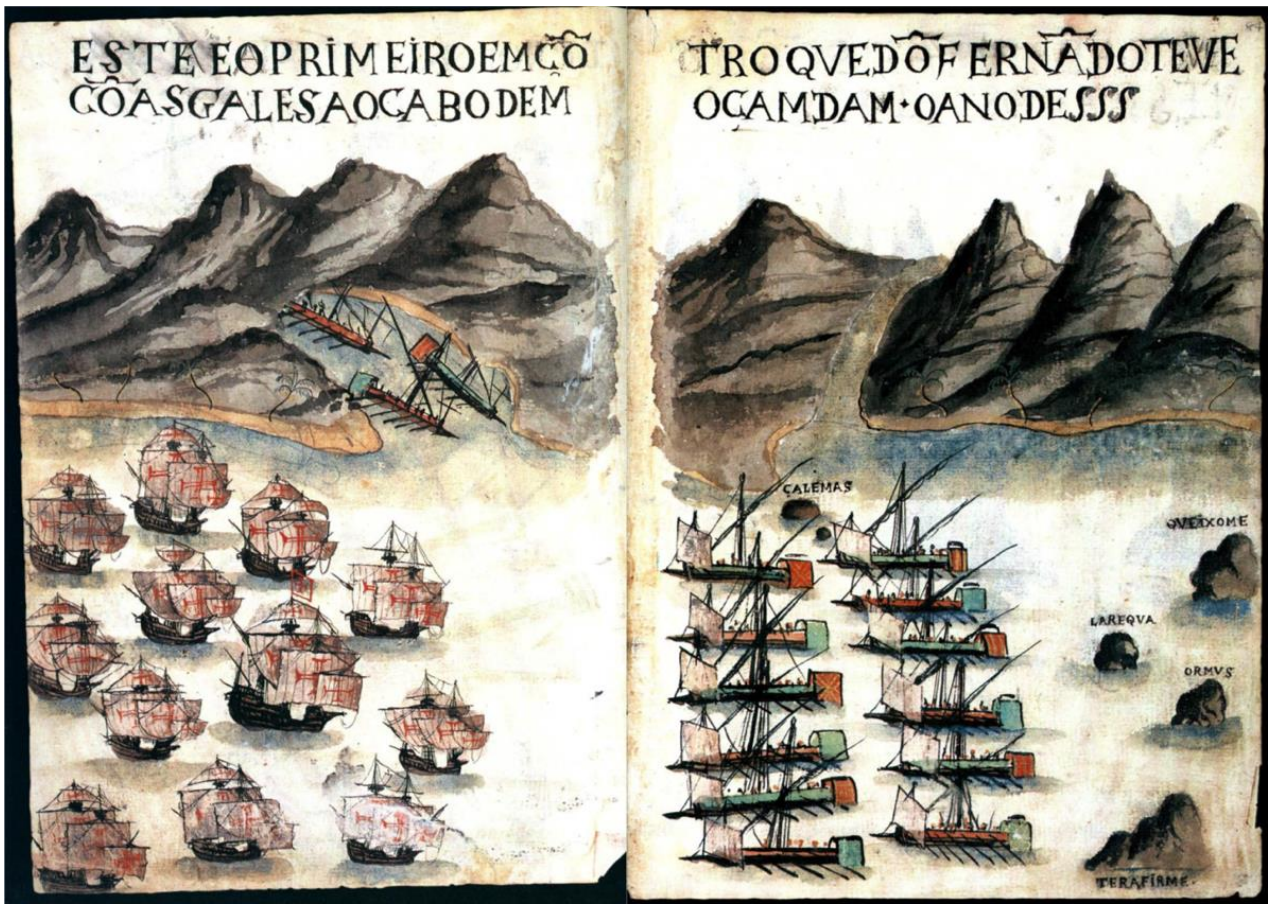

Figure 2.7 Portuguese forces on the left, representing the northern European system of warfare with sailing vessels, meet and later defeat Ottoman Indian forces using the Mediterranean oared galley system in battle off Musandam in the Strait of Hormuz in 1554 (Anon. c.1564:ff.83v–84r [B1.3]).

Northern European navies continued to employ fleets of oared warships in narrow seas well into the nineteenth century (e.g. Harris 1989; Huhtamies 2013, 2014), emphasising the point that different martial technologies were used to take advantage of spatial and environmental constraints. Nevertheless, because of its lack of endurance and seakeeping ability, the oared galley was an ineffective open-water weapons system and fleets of predominantly oared vessels remained necessarily ‘tethered to the shore’ (Palmer 2005:2). Oceanic voyages were of course made in longships fitted with sails, but the structural requirements of oar power limited the size, capacity and endurance of such vessels. Systems of naval warfare based on oared fighting ships therefore offered limited maritime extensions of land warfare, ‘more amphibious than truly naval’ (Palmer 2005:22), rather than the ability to indefinitely command the sea or project power far beyond the limited horizons of narrow seas.

The influence of geography on the efficacy of pre-modern sea raiding is known from examples in the Mediterranean (Pennell 2001:55–56), and in many ways parallels the study of terrain in military geography. Geographical features like narrow straits or island groups that act to concentrate shipping into target rich environments, when coupled with secure refuges where raiding vessels were 'protected from retaliation' (Pennell 2001:56), created an ideal environment for sea raiding. Poverty, religion and politics provided motivation for this form of organised violence, while geography influenced opportunity, tactics and targeting (Pennell 2001:56).

There were no Islamic or Indigenous theorists of early modern maritime warfare in the Gulf whose records have survived, so notions of sea power, naval forces and organisation must be constructed from extra-contextual Islamic sources and from the observations of outsiders, usually Europeans. Indeed, the whole notion of sea warfare is little covered by Islamic authors, whose works consist mostly of maritime analogies of the principles of land warfare (Khalilieh 1998:116). While the Qur'ān avoids mention of naval warfare, the technique of analogy (*qiyās*) allowed Muslim jurists to establish some basic rules governing the conduct of warfare at sea (Khalilieh 1998:119).

The study of organised violence in Islamic societies, such as that of the Khaliji, is a contentious subject, particularly with regard to terrorism and the notion of *jihad* (Insoll 1999:128). In a general sense, *jihad* (literally 'struggle') is incumbent on all Muslims and is meant as either an internal spiritual pursuit or an explicitly military practice of warfare (Dampier 2017:2), yet it is altogether far too simple to consider all Islamic violence as *jihad* (Insoll 1999:130). Karegedik (2017) offers a more nuanced exploration of Islamic influences on organised violence. The practice of *ghazwa*, or raiding, is a lower level military practice rooted in the tribal conflicts of pre-Islamic Arabia (Dampier 2017:2; Karagedik 2017:166–167), and is considered different from 'warfare', as it aims more at 'plundering and discouraging the enemy' rather than 'definitively destroying him' (Karagedik 2017:167–168). Confederations of tribes even formed *ghazi* (raider) states in the early Islamic era and used their positions on the frontiers of the Islamic world to enable an economic model based on religiously inspired predatory violence (Dampier 2017:2). The notion of the *ghazi* raiding for booty and loot with a simultaneous religious and military purpose retains a strong influence on the practice of organised violence in Islam (Dampier 2017:2–3). The sort of organised violence that European intruders in the Arabian seas labelled 'piracy' was in many instances likely a form of culturally condoned *ghazwa* (Risso 2001:295).

The rules of engagement enunciated by Muslim jurists allowed Muslim vessels to act in self-defence of Islamic territory or property, and in a state of war, to freely engage 'enemy' vessels on the high seas, even including commercial vessels (Khalilieh 1998:120–121). In the latter instances, Muslim forces were obliged to seize the vessel and cargo rather than fire it (Khalilieh 1998:121).

These provisions may account for acts that non-Muslim Europeans and Indians considered piracy, the justification for which relied on definitions of ‘war’ and ‘enemy’. For many Muslims, anywhere outside the abode of Islam was considered the ‘realm of war [*dār al-harb*]’ (Khalilieh 1998:117). Heard-Bey, an historian of the United Arab Emirates, suggests that religious war was carried on by Islamic forces in the Gulf in response to the ‘unnecessarily cruel’ atrocities of the Christian Portuguese in the sixteenth and seventeenth centuries (Fig. 2.8), and that Khalijis little understood the difference between Portuguese and later Christian intruders (2007:282–283), an explanation also offered in Risso’s examination of maritime violence in Persian Gulf (2001:295). Other explanations for Islamic violence at sea consider it a form of taxation related to territorial claims, or an economic response to the disruption of Indigenous trading networks by European intruders (Sheriff 2010:8–10).

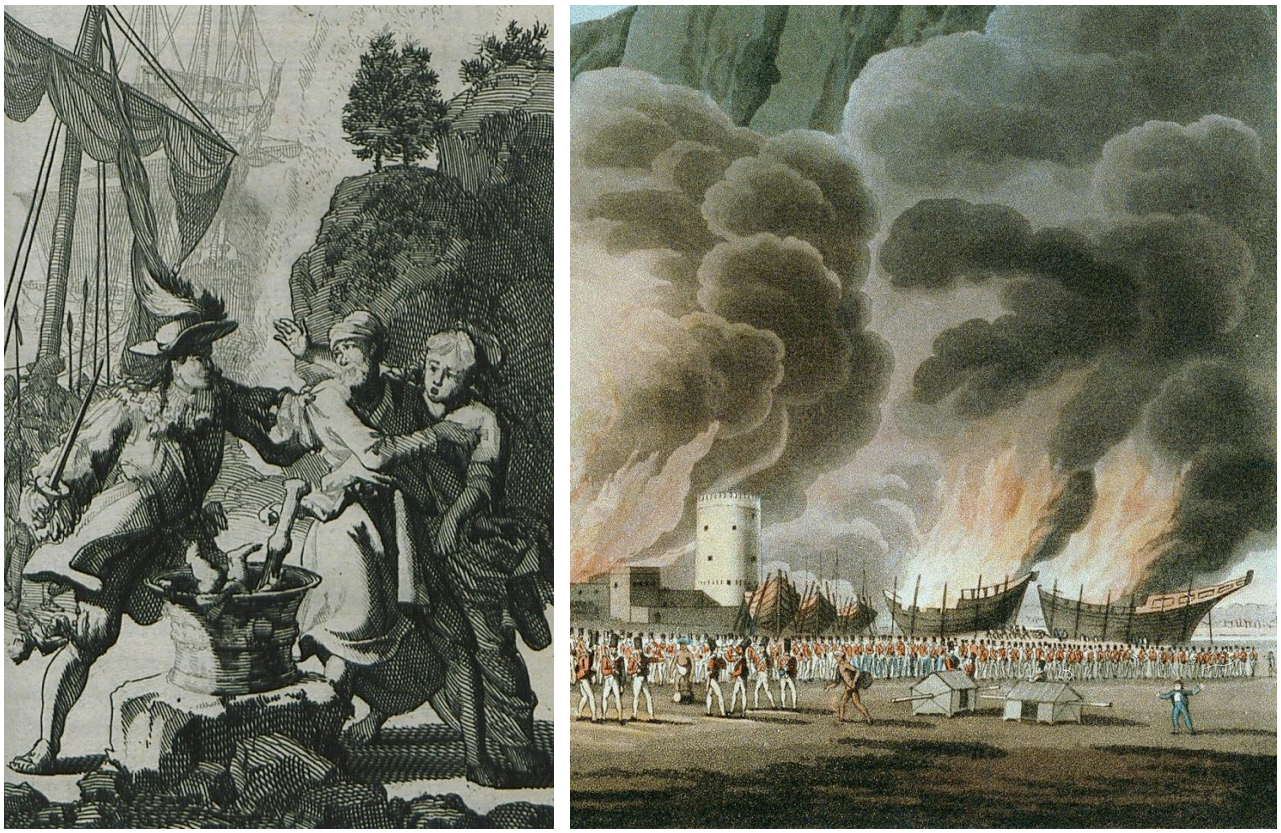

Figure 2.8 Alleged atrocities of Christian intruders in the predominantly Islamic Persian Gulf: left, a depiction of Portuguese commander Ruy Friere de Andrade’s seventeenth-century cruelty against Khaliji civilians (Thévenot 1727:619) and, right, the destruction wrought by the British raid on Ras al Khaimah in 1809 (Temple 1813f [detail] [B1.132]).

The study of organised maritime violence in the pre-modern Persian Gulf has been inhibited by its representation as piracy, an activity undertaken by groups ‘generally lawless and indiscriminate in their predations’ (Sweet 1964:263). Wilson’s standard history of the Gulf is a case in point, in which he reduces Arab maritime society to a ‘dominion of piracy’, an ‘evil’ requiring obligatory suppression by the ‘courageous men’ of Britain’s ‘Eastern Empire’ (1928:195). The notion that the

Khaliji participants in organised maritime violence were something other than ‘pirates’ was first espoused at length by Sweet (1964), followed somewhat emotively by Al-Qasimi, the heir of the Qawasim and ruler of Sharjah, particularly in his *The Myth of Arab Piracy in the Gulf* (1988; Davies 1997:65–66), and most recently, and more effectively, by Risso (2001) and Suzuki (2018). These later studies emphasise the colonialist, Orientalist and frankly racist approaches of the standard British works on piracy in the Gulf (Belgrave 1966; Kelly 1968; Low 1877; Moyse-Bartlett 1966; Wilson 1928).

Sweet set out to show that this essentially British view of Khaliji maritime violence as piracy was ‘at best an example of the failure of understanding a different system of law’ (1964:264), behaviour alternatively viewed as ‘a seaward extension’ of *ghazwa* or raiding (Risso 2001:295). Potter suggests that this ‘piracy’ was alternatively ‘maritime warfare’ in which land-based tribal conflicts and the practice of levying tolls for protection—*khuwa*—was transferred to sea (2009:3). Risso considers such behaviour to be understandable ‘in a harsh, arid climate and among disadvantaged ports’, while acknowledging that from the British perspective, ‘it was still criminal’ (Risso 2001:295). Indeed, as Risso (2001:295) further points out, there was no equivalent term for ‘piracy’ in Arabic that carries the same emphasis on illegality, ‘a situation that goes a long way to explain any lack of mutual understanding about maritime violence’. Al-Qasimi (1988:xiii) challenges the conclusions of the British historians whose prevailing account of Arab ‘piracy’ he sees as a ‘deliberate misrepresentation’ of history, having presented ‘falsehoods and rumours as irrefutable facts’. This apparent bias in the historiography of maritime violence is not limited to British or European sources, as an Arabic chronicle of the eighteenth century describes the actions of the Qasimi enemy as ‘plunder and torment’, while Omani compatriots raided and conquered (Risso 2001:300–301). Yet still, there are few studies that describe how these maritime forces, howsoever defined, were organised for violence, but some impression may be drawn again from extra-contextual Islamic sources and extra-cultural observers, and from consideration of the tribal warfare from which it derived.

2.3.2 Organising maritime violence

In considering military organisation in the development of the Saudi state in the nineteenth century, Rosenfeld (1965:75) discusses the move from the ‘self-created warrior bands’ of kin societies to specialised militaries that monopolised the use of force and organised and exploited the productive means of societies within their control. The ‘warrior nomads’ of the desert-dwelling Bedouin considered the settlers who inhabited the desert fringes, including those on the coasts, to be ‘inferior’, both in terms of honour and in martial ability (Rosenfeld 1965:76–77). Coastal ‘fringe’

settlements in the Gulf were often fortified in the period before the Portuguese intrusion (Agius 2008:254), a practice reflecting the threat from raiders from the sea as much as from the interior.

Regardless of their supposed inferiority, coastal peoples served as armed guards on commercial voyages in the Indian Ocean to protect vessels on passage or in foreign ports from enemies or pirates (Kalilieh 1998:46). This provision was important in the Arabian seas even before the European intrusion, and the specialised 'maritime warriors' or 'ship's warriors' carried weapons, including fire pots or grenades (Kalilieh 1998:46). Van Linschoten describes the employment of Arabs and Abyssinian slaves as sailors and soldiers in Portuguese ships sailing from the west coast of India (Burnell 1885:267). The Arab mariners commonly took their wives and children on voyages as well, an occurrence sufficiently note-worthy in the early modern world to warrant an illustration in Van Linschoten's *Itinerario* (Fig. 2.9) (Van Linschoten 1600:61–62). The Arab mariners were led by the chief bosun, or *muqaddam*, an Arab who served Portuguese officers (Burnell 1885:267). In the absence of 'ship's warriors', the crew were obliged to defend the vessel in the event of an attack (Kalilieh 1998:46).

Figure 2.9 Armed Arab mariners, 'to whom the Portuguese trust their ships and in which they also live with their wives' (van Linschoten 1600:61–62, f.27).

The admiral of a fleet had jurisdiction over matters involving the distribution of booty (*ghanīma*) and the treatment of captives and functioned much like a '*caliph* at sea' (Khalilieh 1998:117). Admirals of fleets and captains of ships were authorised to issue safe-conduct passes to non-Muslim mariners as required, even those captured in battle (Khalilieh 1998:121). The division of spoils was

a complicated matter with much divergent advice (Khalilieh 1998:122–125), and was likely to have been influenced by local practices for remuneration of voyages. In the case of immanent defeat, most Muslim jurists allowed naval warriors the choice of abandoning the ship to die by drowning or remaining aboard to die by flames (Khalilieh 1998:120).

Some early medieval Arab writers in Egypt distinguished between warships and commercial vessels, the former 'equipped with fighting men and weapons for waging wars against the enemy', although the differences in structure or form are not clear (Khalilieh 1998:25–26). During violent crises, Muslim governments were 'authorized by law to seize ships anchored at ports, regardless of whether their owners were Muslims or non-Muslims' (Khalilieh 1998:117). Agius, in his *Classic Ships of Islam*, describes several types of medieval Islamic fighting craft but most of these are from the Mediterranean and only the *tarrāda* and *ghurāb* appear to have been common by the beginning of the sixteenth century (2008:328–357).

When the Portuguese arrived in the Gulf the Khalijis could only offer resistance in ships taken up from trade and small craft like *tarrādas* (Agius 2008:255–256; Birch 1875:105–106). The principal performance characteristics of these early fleets were the smaller crafts' ability to carry warriors at speed for smaller craft, and the larger crafts' sufficient solidity of structure to enable the mounting of guns. In this way, all vessels identified as *tarrādas*, merely fast small craft, and any larger merchant vessels with cannon or capable of mounting them, would be candidates for inclusion in a war fleet on the basis of necessity (Khalilieh 1998:117). This was the usual situation at the time in the Indian Ocean and there appear to have been few vessels actually specialised for combat. Portuguese sources imply that the only competent combat vessels in the Gulf in the sixteenth century were Ottoman galleys and that the *tarrādas* used by Khaliji forces were bested by Portuguese *fustas*, themselves minor galleys of 10 to 15 oars and small gunpowder weapons (Birch 1875:105–106; Low 1877:169–170; Teles e Cunha 2009:208–209). The fighting dhow of the nineteenth century, as exemplified by the Science Museum model (Figs 1.2 and 1.3), was a much bigger craft with a full deck, bulkheads and strengthening structural elements, broadside gunports, a solid superstructure aft and a fighting platform projecting from the transom (Low 1877:169–170; Mondfeld 1979:31–33, 51–53). It is this transition to watercraft specialised for organised violence that is the central concern of this thesis and also where the documentary record appears weakest.

In his early twentieth-century survey of the watercraft of the Persian Gulf, Rowand found that, while many of the larger vessels were 'prepared by internal equipment for defence' and carried one or two guns for saluting purposes, 'war vessels are not now found in the Gulf' (1915:2319). As well as the fourteen types of extant dhows, Rowand identified the 'Tranki' and 'the true Arab dhow' as extinct craft 'not now seen in the Gulf', the dhow being similar to the *baghla* [A.2.2], with a stern

projection ‘being its peculiar characteristic’ (1915:2321). Even very recent surveys of Persian Gulf watercraft define them in terms of ‘transport’ as if this was their only function, while simultaneously acknowledging the dhow as ‘a dynamic carrier of culture, religion and ideas’ (Staples 2018:201). Staples’ 2018 survey of ‘vessel typologies and construction materials’ lacks any indication of specialisation for fighting in the dhow traditions of the Persian Gulf. The best examination of early modern fighting craft from the Gulf is undoubtedly Davies’ *The Blood-Red Arab Flag* (1997), although this is primarily an investigation into the veracity of the ‘piracy’ label applied to the Qasimi tribal federation at the turn of the nineteenth century, rather than a cultural history of organised maritime violence. While Davies (1997:228–230) describes the fighting vessels used by the Qasimi in the Arabian seas from the end of the eighteenth century and some of their methods of employing them, he stops short of explaining the origins or technological differentiation of the vernacular fighting craft of the Persian Gulf.

The specialised fighting dhow therefore remains elusive, overshadowed by the association with piracy and the untested assumption that the watercraft employed for maritime violence were essentially armed versions of otherwise common craft, a notion reflecting contemporary prejudice (Davies 1997:229). Fighting dhows were relatively uncommon if the few relevant watercraft surveys available are a good indication (Agius 2005:97–108; Floor 2007:23–38). The same luxury of sources that attends the study of warships in Western traditions is by definition absent with vernacular fighting craft, particularly those of the Persian Gulf, so scholars like Davies (1997), and even Al-Qasimi (1988, 2003, 2015), a direct descendant of those accused of piracy, rely primarily on historical textual documents written mostly by non-Indigenous intruders.

These representations of Islamic forms of naval warfare and raiding go some way towards outlining the organisation of maritime violence in the Gulf, but offer little in the way of solid example, nor do they expand much on the watercraft employed. Nevertheless, it is clear that Khaliji societies demonstrated ‘regional and ecological specialisation in maritime technology and activities’ in attempts to exercise seapower (Sweet 1964:265). Clarification of this ‘specialisation’ in ‘technology and activities’ is lacking from literature on the subject, and this prominent gap in knowledge forms the fundamental focus of this study. How were the technologies and activities of the Indigenous inhabitants specialised for organised maritime violence, and what does such specialisation say about their societies? Indeed, what does this say for the process of forcible and violent colonial contact with European societies, a perennial topic of archaeology across a multitude of contexts?

2.4 The discourses of the dhowscape

2.4.1 Documentary evidence

The Persian Gulf today is synonymous with the extraction and passage of oil and the wealth that ensues, with frequent wars and the near constant threat of violence. The Gulf is often characterised as a maritime highway, where the extracted fossil fuels of Arabia and Iran are shuttled off to become the lifeblood of modern society, if they can be moved without interference from wars and revolutions of nationalism, religion, and terror (Potter 2009:3,17). Reduced to this level of simplicity, the maritime space of the Persian Gulf becomes a conduit by which needful things are warily moved through a savage landscape of conflict and threatened violence. In this version, the maritime space of the Gulf is neither a place nor a destination itself, but a 'no man's land' to be traversed as quickly as possible with a minimum of losses. This is an outsider's view, and one that pervades the early modern historiography of the Persian Gulf, which was written predominantly by outsiders (Potter 2009:3). Awareness of this potential bias is an essential prerequisite to any balanced review of the ways in which evidence of historical activity in the Gulf has been created.

Work focussing on Indigenous participation in the historiography of the Gulf is a relatively recent phenomenon originating in the latter half of the twentieth century, and much of it has been co-opted to the causes of nationalism, regime legitimacy and sectarianism (Potter 2009:3–4). The historiography that can be based on Persian sources is 'limited in scope and closely corresponds with political developments in the region' (Vatandoust 2014:74). Attention to the Gulf in Persian sources only began after 1834, when the British presence was increasing along with trade to and between Persian ports (Vatandoust 2014:77). At this time scholars were commissioned to 'study the geography as well as the economics and social aspects of the south, particularly the northern shores of the Persian Gulf' (Vatandoust 2014:75). Similarly, Arabic sources are primarily oral historical documents that produced narratives no less contested than those based on the outsiders' views (Bishara 2014:48–49). This 'paucity of local documents' explains to an extent the reliance on foreign sources generated by intruders and colonisers—the Portuguese, Dutch, Turkish and, mostly, English (Bishara 2014:48). Where these outsiders have recorded the views of Indigenous peoples there are jewels, such as Miles' recording of local memories of the *kalbā* and *dāw* in the early twentieth century (1919:414), but the details that have been lost must be considerable.

> Arabic sources are, for example, surprisingly limited in their descriptions of past watercraft: the level of detail disclosed by even the few archaeological and ethnographic boat studies conducted so far is vastly greater than anything surviving in written sources (Cooper 2014:4061).

Observations of fighting dhows were recorded in a range of formats—travelogues and journals, official political reports and correspondence, intelligence reports and battle summaries—and less

often as direct ethnographic research. Relevant primary sources exist in a number of languages: Portuguese, Turkish, Dutch, German, French, Arabic, Gujarati and Marathi, but principally English. The British India Office Records (IOR), many of which are becoming available online through the Qatar Digital Library, and others now found in the Maharashtra State Archives in Mumbai, contain official British documents from the eighteenth and nineteenth centuries that refer to encounters with fighting dhows. Barendse (2002, 2009), Brouwer (1991a, 1991b) and Floor (2006, 2007, 2014) have profitably mined Dutch and Portuguese archives. Casale (2010) has investigated Turkish archives and Agius (2002a, 2005 and 2008) has specialised in examining Arabic sources. Apte (1973), Sheikh (2009) and Weismann (2002) have published works based on material from Indian languages. This variety of sources introduces its own problems, particularly when considering detailed descriptions of watercraft.

Many travelogues and journals were originally published in Dutch, German, French or other European languages and only later in English translation, a process by which accuracy was undoubtedly diminished or lost. This is identifiably the case with Carsten Neibuhr's *Voyage en Arabie* (1776) and Guillain's *Voyage* (1856), in which the original French or German is far more detailed than any subsequent English translation. The majority of journals and travelogues of the period of interest here are, however, available in English and contain useful images or descriptions of Indigenous vessels (e.g Baldaeus 1703: 566, 574 and 633; Conant 1806:106; El Abbassi 1816b:34–36; Elwood 1830:347; Irwin 1780:69–76; Morier 1812:plates ii–v; Osbeck et al. 1771:205–207; Owen 1833:231–232; Parsons 1808:169; Stocqueler 1832:1–2 and Wellsted 1840:1–8). While not in the same genre as travelogues, British observers' reports of maritime societies employing fighting dhows are based on official records (e.g. Miles 1919:414; Pelly 1865; Vaupell 1846:98–100; Wellsted 1844 and Whitelock 1844a, 1844b). Challenges with these historical documentary sources potentially lie in the veracity of references to fighting vessels, and the varying maritime, martial and cultural experience of the observers. These limitations are similar to those that afflict iconographic sources in other contexts (McGrail 2004:3), but can be overcome by careful research and analysis, and are mitigated by their aggregate value. The historiography of the Persian Gulf is a prime example of a textual discourse that may be considerably enlightened by intertextuality, the use of a variety of other types of sources, such as visual and material evidence.

2.4.2 Archaeological evidence

Archaeological evidence from the Persian Gulf that bears directly or indirectly on organised maritime violence in the early modern Persian Gulf is available in several forms. Shipwrecks from the Arabian seas offer primarily indirect evidence, as a Persian Gulf watercraft wreck from the early modern period is yet to be excavated. Underwater battlefield sites should offer pertinent insight, but

as yet none have been properly identified or studied and museum ships and replicas are generally from the period after the senescence of fighting craft. Nevertheless, archaeological remains in coastal sites like ports and fortifications, along with petroglyphs and graffiti, help to construct knowledge of cultural landscapes of violence.

2.4.2.1 Shipwrecks and battlefields at sea

There are a number of publications aimed at reviewing the state of maritime archaeology in the Indian Ocean and its constituent seas, but none that deal principally with the Persian Gulf. Babits and van Tilburg (1998:137–138) published a bibliography of maritime archaeological sources of 'The Arabic World' in 1998, noting that no areal studies had yet been made, and that existing studies were 'preliminary and often unavailable in English'. Lane's (2012:9) survey of 'previous archaeological research on shipwrecks and the maritime archaeology of the Western Indian Ocean and southern Red Sea' was devoid of sites in the Persian Gulf. While it appears that Lane's survey implicitly included the Persian Gulf (Lane 2012:fig.1), the absence of any excavated shipwrecks there relegated the Gulf to only peripheral interest. A 2014 survey of Indian Ocean maritime archaeology in the *Encyclopedia of Global Archaeology* fails to mention or cross-reference any sites or investigations in the Persian Gulf (Hunter 2014), although lack of space may have been a consideration here. Nevertheless, further entries in the *Encyclopedia* on 'Islamic and Maritime Archaeologies' (Cooper 2014), 'Archaeology of the Sasanian Empire' (Farahani 2014), 'Arabian Peninsula: Islamic Archaeology (Petersen 2014), Iran (Aksan 2014; Rugiadi 2014), and Iraq (Starzmann 2014), and Palaeolithic human dispersal in the Middle East (Shidrang 2014; Shipton and Petraglia 2014) provide additional space. Petersen's contribution on the Arabian Peninsula includes a section on maritime and coastal archaeology that briefly reviews excavations in ports as they relate to trade, pearling and fishing (2014:299–300). Still, the returns of a search for Persian or Arabian Gulf maritime sites in these sections are meagre and lead to the conclusion that the entire assemblage of archaeological material on Islamic seafaring is 'relatively modest' (Cooper 2014:4058). The Persian or Arabian Gulf also fails to rate a dedicated entry in the *Encyclopedia*.

The limited archaeological evidence of Arabian seafaring in the western Indian Ocean, combined with results of modern ethnographic studies, has been used to conclude that the construction methods of the dhow building tradition remained relatively unchanged for 'at least 1000 years' (Belfioretti and Vosmer 2010:116). The direct archaeological evidence for this conclusion are data from the commercially salvaged ninth-century Belitung shipwreck, assumed to have been built in Oman (Flecker 2000, 2008), re-used ship timbers of the eleventh to fifteenth centuries from al-Balīd on the Arabian Sea coast of Oman (Belfioretti and Vosmer 2010), and other timbers from Quseir al-Qadim on Egypt's Red Sea coast (Blue 2006, 2011:505–507). Despite an assessment of long term

continuity, the assumption that watercraft of the western Indian Ocean proto-dhow tradition were exclusively sewn-planked before the arrival of Europeans has been cast into doubt by these finds (Blue 2011:505–507; Green 1996:107–108).

The only licensed archaeological excavations of known Islamic shipwrecks in the western Indian Ocean are the eighteenth-century Ottoman shipwreck at Sadana Island in Egypt (Blue 2011:504–505; Cooper 2014:4057; Ward 2001), and the similar wreck at Umm Laj on the Red Sea coast of Saudi Arabia (Zazzaro et al. 2016; Zazzaro et al. 2017). These were apparently unarmed Ottoman pilgrim transport or cargo ships, and therefore are of little direct relevance to this study, although they do demonstrate the eighteenth-century use of nails in Red Sea shipbuilding (Zazzaro 2017:139). The excavation of a Portuguese warship wrecked in 1503 on Oman's southern Arabian Sea coast (Casimiro 2018; Mearns et al. 2016) provides an overview of the European armament technology initially brought to bear on Indigenous watercraft in the Persian Gulf. Nevertheless, the Persian Gulf is, quite literally, littered with the wreckage of ships, and while almost all of those known are less than a century old (Fig. 2.10) (e.g. Al-Naimi et al. 2012; Bain et al. 2014; Blue et al. 2014; Khakzad and Moosaie 2019; Pederson 2015b; Phillips et al. 2001; Tofighian et al. 2011), reports of an excavated shipwreck in the Persian Gulf are yet to be published.

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Figure 2.10 A 3D rendering of a dhow wreck site in Qatar. Note the engine block and metal tanks at the centre left (Maritime Archaeology Trust 2017 https://sketchfab.com/maritimearchaeologytrust/collections/qatar).

Other shipwreck sites provide indirect evidence that is relevant to this study. The fifteenth-century Thaikkal-Kadakkarappally boat from south-west India shows that iron fasteners were already established in the Indian Ocean before the arrival of the Portuguese (Tomalin et al. 2004). The *Quedagh Merchant* was an Indian merchant vessel built in Surat in the late seventeenth century, captured by the pirate William Kidd and eventually wrecked in the Caribbean (Hanselmann 2019).

An investigation of the shipwreck gives some insight to the construction methods employed in Surat, from where many Persian Gulf watercraft were sourced, in the seventeenth century (Hanselmann 2019:116–133). Similarly, the description of a cannon-armed seventeenth century Indo-Portuguese shipwreck off Goa allows a view of maritime practice in those waters (Tripati et al. 2001; Tripati et al. 2004:1240–1245).

Pedersen has identified the potential of battlefield sites underwater in the Persian Gulf when surveying the northern waters of Bahrain, where Ottoman and Portuguese forces clashed in the sixteenth century (2015b). 'A number of ships were supposedly destroyed in this battle, and archaeological research in the fields of warship construction and maritime related endeavours could be well served by the discovery of the remains of the conflict' (Pedersen 2015b:159). Given uncertainty over the location of the battle, and the limitations of the methods used, it is not surprising that no evidence was found underwater (Pedersen 2015b:159–160). The wreck of a potential fighting vessel was found earlier in the twentieth century near Abu Mahir Fort on Muharraq Island, including five cannons and evidence that the keel and other timbers had been damaged by fire (Pedersen 2015b:165–166). The cannons were recovered and are now displayed outside the Fort, as shown in Fig. 2.11, but the wreck itself was covered by a concrete wharf and is otherwise unrecorded (Pedersen 2015b:166). This is the only known instance of a pre-modern watercraft wreck or site in the Gulf with such armament.

Figure 2.11 The guns at Bu Maher Fort, Bahrain, recovered from a now-destroyed nearby underwater site that included wooden ship remains that had been damaged by fire (Carter et al. 2011:78, fig.30).

2.4.2.2 Maritime cultural landscapes

In common with other maritime states, some Gulf countries produce maritime histories that draw on archaeology and ethnography, both within their borders and regionally (e.g. Al-Hijji 2010; Facey and Martin 1991; Hellyer 1998). These studies generally consider maritime connections through artefacts found in coastal sites, such as Al-Khor Island in Qatar (Carter and Killick 2014), Dibba in the UAE (Jassim and Yousef 2014), Falaika in Kuwait (Pieńkowska 2015), Julfar in the UAE

(Hansman 1985), Kish in Iran (Whitehouse 1983), Qalhat in Oman (Rougeulle 2010), Siraf in Iran (Khakzad et al. 2015; Whitehouse 1983, 2009) and al-Zubārah in Qatar (Cooper et al. 2015; Richter et al. 2011).

A separate range of archaeological studies focus on individual maritime practices. Fishing as a cultural practice has been studied through shell and bone deposits on the shore (Beech 2002, 2003, 2010; Méry et al. 2008), and also include fishtraps (Pieńkowska 2015; Searjeant 1968). The Persian Gulf hosts one of the oldest pearl fisheries in the world and this practice has attracted considerable archaeological attention, although mostly of remains on the shore (Carter 2005, 2012; Charpentier et al. 2012). The use of beachrock (*farush*) or marine aggregates has also been assessed from an archaeological perspective (Beech and Al Shaiba 2004; Bowen 1951a), as has access to freshwater seeps in coastal areas (Pedersen 2015b:160). Nevertheless, the only extensive maritime cultural landscape studies so far within the bounds of the Persian Gulf cultural world were conducted by Blue et al. on the Omani island of Masirah (2014) and Zakeri and Habib on the island of Hormuz (2013).

Some archaeological work on the shore has studied sites specifically associated with organised violence that are connected to maritime landscapes. Kennet's study of the watchtowers of Ras al Khaimah in the UAE is a classic in this regard (1995), building to a degree on earlier Indigenous studies (i.e. Kharkhur 1992). Studies of other coastal fortresses and defences, such as Bu Maher in Bahrain (Carter et al. 2011), Bithnah in the UAE (Ziolkowski and al-Sharqi 2009), and Luluyyah in the UAE (Uerpmann 2017), help build a picture of maritime landscapes of defence and violence in the Gulf. Nevertheless, archaeologists are yet to find any significant remains of watercraft associated with violence, or of their building sites or other operating structures associated with them.

Maritime cultural landscapes formed by Khalijis can also be identified by petroglyphs, and to a lesser extent by graffiti. The al-Jusāsiyyah site in Qatar is the most significant in this regard and when surveyed in the 1970s by a Danish archaeological team included 141 glyphs that could be identified as watercraft (Kapel 2017:121). This site has received considerable attention in archaeological studies (Facey 1987; Hassiba et al. 2012; Hawkins 1987; Kapel 1983, 2017; Pelling et al. 2015), as it is the most extensive collection of presumably Khaliji petroglyphs uncovered in the Gulf. This attention has included a controversial assessment that the glyphs represent Viking ships (Isitt 2007), a notion since thoroughly rebutted (Taylor 2014). Maritime graffiti is also present in many older buildings, mostly forts, throughout the Gulf. Kenderdine and Vosmer's 1994 extensive survey of maritime graffiti in Oman remains the most useful source on this topic.

2.4.2.3 Museum ships and reconstructions

Wooden watercraft have been preserved in museums throughout the Gulf and in Europe, but they are mostly from the twentieth century and are often inadequately provenanced (Cooper et al. 2020; Dziamski and Weismann 2010:14–25). One example with a known and researched history is the Omani *ghanja Fatah al Khair* built in 1951 and now on permanent display in Sur, Oman (Dziamski and Weismann 2010). Yet even in this case it proved difficult to reconstruct the ship's history, as Khaliji mariners did not keep logbooks, and other documentary sources were ambiguous or confused (Dziamski and Weismann 2010:38–43). Most of the larger 'historical' museum watercraft on display in the region are in fact reconstructions, including the Kuwaiti *būm Al Muhalab*, the original of which was destroyed during the Gulf War of 1990–1991 (2010:18–21).

Many maritime or ethnographic museums in the region retain examples or collections of historical watercraft and reconstructions. One of the most significant examples is the Qatar Museum's collection of at least 26 planked wooden craft and five logboats, although these craft have established histories only since the 1920s (Cooper et al. 2018:421; Copper et al. 2020:377–378). The majority of this collection was scanned by laser in 2013 and the results can be seen at Figure 2.12, yet while the authors of that study acknowledge that some of the larger types were historically used as fighting craft, the prevailing narrative of the Qatar Museum is that these craft represent the country's transport, fishing and predominantly pearling heritage (Cooper et al. 2018:421). Other museums and displays in the region incorporate craft of similar types and ages, and it is even common in coastal towns to see watercraft placed on roundabouts or other civic structures 'as testament to the maritime character of the area' (Dziamski and Weismann 2010:16). Many vernacular craft on display in the region have been recorded and published (e.g. Cooper et al. 2018; Cooper et al. 2020; Dziamski and Weismann 2010; Weismann 1998; Weismann et al. 2014; Weismann et al. 2019), yet none have been definitively identified or displayed as fighting craft.

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Figure 2.12 Photorealistic models developed from laser scans of the Qatar Museums collection of watercraft, the largest of which—the *battīl* on the far left—is 36 m long overall (Cooper et al. 2018:430, fig.8).

While some of these craft are reconstructions built specifically for museum display, other projects aim to use reconstructions for experimental archaeology. Staples (2019) provides a review of three

projects to replicate medieval sewn-plank craft from the Gulf. Tim Severin's *Sohar* of 1980–1981 and the *Jewel of Muscat* of 2008–2010 were both based on thirteenth-century manuscript illustrations and, in the latter case, on the salvaged remains of the Belitung shipwreck (Severin 1985:279; Staples 2019:315–319). The *al-Hariri Boat* is a 'hypothetical representative reconstruction' of the ship in the Schefer manuscript of 1237 in the French National Library [BnF MS Arabe 5847, f.119v] (2019:328:329). While these medieval reconstructions have provided considerable insight to the operation of watercraft from the Gulf traditions and baseline their capabilities before the sixteenth century, they are only of indirect relevance to this enquiry. There have been other studies of more ancient watercraft and reconstructions that are beyond the scope of this research (Vosmer 2003a, 2003b, 2008). Reconstructions of modern era craft, like the Kuwaiti *būm Al Muhalab*, are based on craft built after the period of this study or, as in the case of the *beden seyad* shown in Figure 2.13, on Pâris' drawings from 1843 (Ghidoni 2019). This latter case is an excellent example of experimental archaeology providing much useful information about the construction and operation of watercraft that is not available through other source, albeit of a relatively small sewn-plank fishing craft.

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Figure 2.13 The scaled reconstruction sewn-plank *bedan seyad*, based on Pâris' drawings from 1843, on display in the National Museum of Oman (Ghidoni 2019:362, fig.2).

2.4.3 Ethnographic evidence

Blue (2003:334) defines maritime ethnography as 'the study of contemporary maritime cultures and their materials, through first-hand observation', one major application of which is to draw analogies

between ethnographic data and interpretations of archaeological materials. This approach is relatively common in archaeological studies in general and has been used extensively in relation to the watercraft of the Arabian seas, including to draw some dubious analogies. The primary examples of these are the assumptions that watercraft technology changed little in the pre-modern era because contemporary dhows appear antiquated (e.g. Bowen 1951b:5; Hornell 1942:37; Pederson 2003:17, 2015:138), and that square sterns and nails are signs of European influence (Johnson and Muir 1962; Muckelroy 1978:135). While these opinions are based on observation of contemporary dhows, the analogies thus drawn to historical watercraft lack evidential rigour and are generally based, not on archaeological finds but on textual, including visual, sources. While the former assumption has been upheld in a general sense by recent archaeological work (e.g. Belfioretti and Vosmer 2010), the latter has been substantially refuted (Blue 2011:505–507; Green 1996:107–108), suggesting that maritime ethnographic analogy in the Arabian seas is a developing art. This apparent weakness is compounded in this case by the absence of any modern observations of fighting craft by ethnographers, and only one recorded observation of a *dāw* since the 1850s (Moore 1925:133). The lack of archaeological data of any watercraft from the early modern Gulf therefore limits the utility of ethnographic analogy.

Instead of this sort of broad analogy, Blue (2003:335–337) emphasised ethnography that investigates the function, technology, material resources, environment, economy and socio-religions contexts in which watercraft are produced, and then compares these attributes of similar types of craft over a wider area. Agius has applied this strategy most competently to dhow-building societies in the Persian Gulf (2002, 2005) and the Red Sea (Agius 2019; Agius et al. 2010; Agius et al. 2016), and Al-Hijji to a more limited extent in Kuwait (2001, 2010). Vosmer's work, principally in Oman, has also produced ethnographic studies of relevance here (1997, 2019; Vosmer et al. 1992). Other recent studies of wooden watercraft or maritime communities of the Arabian seas also provide useful data by adopting methods along the lines suggested by Blue (Lancaster and Lancaster 2011b; Prados 1997; van Rensburg 2010; Weismann 1998; Weismann et al. 2019). They provide ethnographic insight into the construction and operation of watercraft in the same environment in which fighting dhows were prominent. According to McGrail (2003:18), these sorts of ethnographies provide direction for historical studies, prepare archaeologists to encounter signatures of particular vessels and interpret evidence of their use, inform interpretations of missing elements and generally improve familiarity with the subject.

Ethnographers or observers from the twentieth century, especially the early part, also provide relevant data, although not in the manner suggested by Blue. Significant among these are observers who travelled in dhows and wrote about their first-hand experiences (e.g. Conan Doyle 1963;

Ricciardi 1980; Villiers 1940) and, in the cases of Villiers and Thesiger particularly (Facey et al. 2006; Thesiger 1994), engaged in extensive photography. Codrai (2003), Hawkins (1977) and Howarth (1977) also published useful ethnographic observations accompanied by extensive photography. These works by twentieth century observers of the Persian Gulf are, however, exclusively in a narrative style and none approach the academic standards of recent ethnographers like Blue. The single work from this period that does, Prins' excellent study *Sailing from Lamu: A Study of Maritime Culture in Islamic East Africa* (1965), relates to the Swahili rather the Khaliji dhow tradition.

2.5 The missing pieces of the dhowscape

The missing elements of knowledge regarding the early modern vernacular watercraft traditions of the Persian Gulf relate to changes in the cultural and spatial distribution and development of particular craft traditions, and the relative obscurity of anything other than Arab traditions. The most obvious example of such an activity is fighting or 'piracy', while slaving and smuggling are also progressively less conspicuous. Al-Hijji, one of the foremost Indigenous maritime ethnographers of the Gulf in the modern era barely mentions these activities (2010). Similarly, the spatial distribution of craft traditions observed in the Gulf in the modern era may inaccurately reflect the distribution of early modern craft traditions. The current preponderance of Arab traditions, or those claimed to be so, in the nautical architecture of the Gulf tends to overwhelm other potential influences like Persian, Ottoman, Indian, European and even Chinese that may have been more prominent in the earlier era.

The ships of European and classical societies, and more recently those of Asian empires, have become venerated relics, yet the humbler vernacular fighting craft produced in smaller societies peripheral to the core imperial states have attracted much less attention. This is despite their theoretical ability to inform us about behaviour in the same ways as the more sophisticated warships of the imperial and colonial powers. Nationalism, valorisation, jingoism, financial capacity, academic tradition, site formation processes, capacity and public awareness each have roles to play in the current state of affairs, yet few of the world's most celebrated maritime traditions are as devoid of academic scrutiny as is the martial dhow tradition in the Arabian Seas, and in the Persian Gulf in particular. Studies of the dhow tradition rarely dedicate an entire chapter to the fighting forms of these vessels, most often much less, and the majority are content to merely acknowledge the previous existence of 'pirate' craft. The reasons for this are clear—a profound lack of incontrovertible evidence. There are no wrecks, no preserved museum ships, no identified building sites, few battlefields of note, prejudiced or one-sided documentary accounts, images and representations of other craft rendered familiar through frequent use, and the complete absence of

fighting vessels in any ethnographic studies of the modern era. Yet for the last three centuries of the pre-modern era at least, the Indigenous societies of the Persian Gulf sought to adapt or redesign their watercraft, or incorporate the designs of others, specifically for fighting. The model *dāw* in the Science Museum suggests that to some extent at least they were remarkably successful. This research seeks to explore the observable influences of violence on vernacular watercraft of the early modern Persian Gulf, and through this review, to show the limitations of available archaeological and documentary sources. The next chapter reviews the visual sources used to construct the discourse of the dhowscape that offer further evidence of fighting dhows.

3 THEORETICAL APPROACHES TO VERNACULAR FIGHTING CRAFT

Archaeology is premised on using material sources to study behaviour and social change (Adams 2013:49). Where there is a paucity of material sources available, as in this case, visual sources cannot stand completely in their stead due the inherent limitations already discussed, and expanded on below, as 'a representation of a ship is not the ship itself' (Wachsmann 2019:6). Yet there remains value in using visual sources to study behaviour and social change, particularly when other archaeological sources are unavailable, limited or underdeveloped, as is often the case with archaeological studies of watercraft (Wachsmann 2019:1–5). The theoretical approaches discussed in this chapter and the analytical techniques discussed in Chapter 4 allow archaeologists to draw inferences from visual sources that can supplement those drawn from material sources. The theoretical basis of this study relies on concepts of how watercraft represent complex technologies subject to change by the behaviours of the people who make and operate them, and that organised maritime violence is a form of behaviour observable through its correlates in these technologies.

3.1 Behavioural archaeology and technological change

The theoretical concepts espoused in this section draw heavily on the approach to technology as behavioural archaeology. The behavioural archaeology thesis, advanced by Schiffer and others (Schiffer 2010, 2011; Schiffer and Reid 2017; Skibo and Schiffer 2008), considers the development and change of technology over time as a sequence of processes that may be inferred from the archaeological record. While behavioural archaeology concepts are rarely explicitly applied to nautical archaeology, they are nevertheless recognisable in works that consider how the technology of watercraft changes over time (e.g. Adams 2013; McKee 1983; Nowacki 2006). An explicit discussion of technology as behavioural archaeology forms the basis of the methodological approach used in this research, and prefaces the discussion of other approaches to vernacular watercraft discussed in this chapter.

3.1.1 Vernacular watercraft as technology

The initial approach to vernacular fighting craft in this study draws on the notion that they comprise a form of technology. Schiffer (2011:29) defines categories of technology as 'material, component, product, complex technical system, process, and aggregate technology.' He uses the examples of a dugout canoe as a simple product and a cruise ship as a complex technical system, although 'clearly there is a continuum between a complex product and a complex technical system, and there are no rigorous criteria for making the distinction' (Schiffer 2011:30). In turn, he defines a process as a

discrete set of related or integrated activities that, among other things, ‘operates any technology’ (Schiffer 2011:30). ‘Discrete processes, chained together in parallel and series combinations, make possible product assembly’ (Schiffer 2011:30), or, in this case, the operation of a fighting craft. ‘An aggregate technology is any set of similar technologies’ where ‘the members of that set may have similar or closely related manufacture processes, have similar functions, and in some cases share general performance characteristics’ (Schiffer 2011:30). The technology considered in this study conforms to this categorisation as follows: the individual watercraft types—*battīl*, *kalbā*, *baghla*, *dāw*—constitute ‘complex technical systems’, or at the least ‘complex products’, that are operated by processes ‘chained together in parallel and series combinations’—fighting—that together represent an ‘aggregate technology’ as a set of watercraft of similar functions and performance characteristics—vernacular fighting craft of the Persian Gulf. In this way, the vernacular watercraft of the Gulf engaged in organised violence can be considered as a technology that was subject to change over time.

3.1.2 Elements of performance

The second major assumption of this study is that the technology of vernacular fighting craft changes over time through the choices made by people seeking to achieve particular performance requirements. In Schiffer’s scheme (2011:22–40), the production or modification of a vernacular fighting craft is considered a type of activity, defined as ‘the patterned interaction among two or more interactors—particularly people and artefacts and sometimes externs’, where externs are considered to be ‘*unmodified* phenomena of the natural environment’ (Schiffer 2011:23, emphasis in original). The ‘activity’ of fighting with dhows in this case involves Khalijis operating their vernacular fighting craft in the Persian Gulf and Arabian seas, although there are a range of individual activities that could each constitute ‘fighting’. Recall the definition of organised maritime violence offered in the Introduction: ‘the socially mediated, collective, intentional and anticipatory use or threatened use of force at sea or ashore by a coherent, enduring group using watercraft and formed for the purpose of coercively imposing behavioural changes.’ Any specific activity, or ‘patterned interaction among two or more interactors’ (Schiffer 2011:13), that contributes to organised maritime violence is relevant here. The ‘natural environment’ of this activity includes a range of phenomena—the externs which affect the performance of organised maritime violence. The ways that externs affect the design of vernacular watercraft was mentioned in section 1.2.3 and are discussed in further detail in section 3.2. Unmodified phenomena of the natural environment such as sea state, tidal movement, prevailing winds, water and air temperatures, rainfall, natural harbours and visibility all affect the types of activities available to people operating unpowered vernacular watercraft.

In the behavioural archaeology approach, the interactions that make up the activities of organised maritime violence require each specific interactor 'to carry out one or more performances' (Schiffer 2011:26). A simplified example in this instance would be fitting weapons to a watercraft without it losing buoyancy or stability—effectively its competence as a watercraft. The weapons and unmodified watercraft are artefacts, the relevant phenomena of the marine environment are the externs and there are people doing the fitting, each an example of an interactor that must perform a role in the activity. In Schiffer's (2011:27) definition, 'the performances necessary for the conduct of an activity are known as the performance requirements'. In order for the fighting craft to remain competent in this example—i.e. to meet their performance requirements—each interactor in the activity 'must possess relevant performance characteristics', defined as 'a capability, competence, or skill that could be exercised (or come into play) in a given interaction' (Schiffer 2011:27). The outcome of the activity would change with the characteristics of each interactor, such that larger weapons, less experienced shipwrights or a higher sea state would result in the fighting craft having a more constrained operating capability or of losing it altogether, both cases of a failure to achieve the initial performance requirements. Many of the correlates of organised maritime violence discussed below in section 3.3 are activities undertaken in response to performance requirements.

3.1.3 Observing social change through nautical technology

The third principal theoretical assumption in this thesis is that social change is observable through changes in the technology of watercraft used for the same or similar purposes. Adams (2013:49) shows that changes in the ways that watercraft are produced and used—'as technology; as social practice; as expressions of maritime enterprise and of social needs'—can explain 'aspects of change in past societies'. This is put another way in Dolwick's (2008:16, emphasis in original) exploration of the notion of the 'social' in specifically nautical technological change, where he posits that watercraft were '*socially* shaped just as much as they were *socially* shaping'. While humans acting intentionally were certainly involved in creating, acquiring and adapting watercraft for organised violence, there were other 'non-social' elements—like Schiffer's externs (2011:23)—at play as well. The exact causal relationships between social actors, artefacts and externs will in most cases remain uncertain and conclusions about social change instead rely on evidence-based associations that may be contradicted by later research (Dolwick 208:35–36). For instance, the conclusions reached in this thesis about associations of changing technology and societies might be challenged by significant archaeological evidence apparently to the contrary. But the nature of 'social' is that it is expressed in networks and relationships that often do not leave physical traces or artefactual evidence, and the term itself is used to 'refer to associations and connections as well as displacements, translations and transformations' (Dolwick 2008:37). Change in complex

technology, regardless of what *caused* it, is therefore *associated* with change in the societies in which it was developed and used. The task in this thesis is to identify extant evidence for the particular case of the fighting dhow and to show how this was associated with changes in Khaliji societies, particularly in the ways they built and operated their vernacular watercraft.

3.2 Vernacular watercraft design

3.2.1 The dynamics of form of vernacular watercraft

Vernacular watercraft, as discussed in section 1.2.3, are regionally distinctive craft exhibiting cultural and spatial specificity (Heath 2009:6), designed by informal, pre-industrial methods that constitute a building tradition. Adams (2001:301) considers that the 'craft *tradition* within which the vessel is constructed will embody a system of ideas about what boats and ships are and how they should be designed and constructed'. The dhows of the early modern Persian Gulf conform to these ideas of vernacularity and tradition—they were 'regionally distinctive craft' built or adapted through a 'system of ideas' about watercraft form and function. It is the task of this section to explain how this system of ideas, and in particular the performance requirements, may be inferred from the way vernacular watercraft forms change with function.

Figure 3.1 shows a model of the dynamics of form in vernacular watercraft—how they can change over time yet remain vernacular—and represents the conceptual framework of 'vernacularity' that informs this research. This model incorporates concepts from Heath's (2009:9–19, fig.1.15) 'Dynamics that shape vernacular form', Schiffer's (2011:98–119, fig.8.8) 'A general model of the design process' and Adams' (2013:22–28, fig.2.1) 'Interrelated constraints on the form, structural characteristics, appearance and use of watercraft', with some additions and modifications. Heath's folk, popular and highstyle inputs have been modified to represent existing forms of watercraft that provide the basis for the vernacular dynamic. Exogenous forms include those from highstyle or elite naval architecture constructed from plans, extra-regional forms and transplanted or idiosyncratic forms that are insufficiently culturally syncretic to qualify as vernacular. Each of these input forms may appear as physical examples, or equally well as the cognitive experiences, memories and rules of thumb typical of technological diffusion. The original elements of Heath's (2009:fig.1.15) regional filter—'climate, materials, topography, ethnicity, character, values, social class, cultural memory'—conform to the technical and social constraints described by Schiffer and Adams' 'interrelated constraints' of environment, materials, ideology, technology, tradition and economics. Schiffer's 'performance preferences' merge with Adams' 'purpose' to describe the intended use of the watercraft. Heath's 'individual as conveyor' of vernacular form is Schiffer's designer and

Adams' implicit shipbuilder, a person or group of the place in question who makes the technical choices to create, modify or adapt the watercraft.

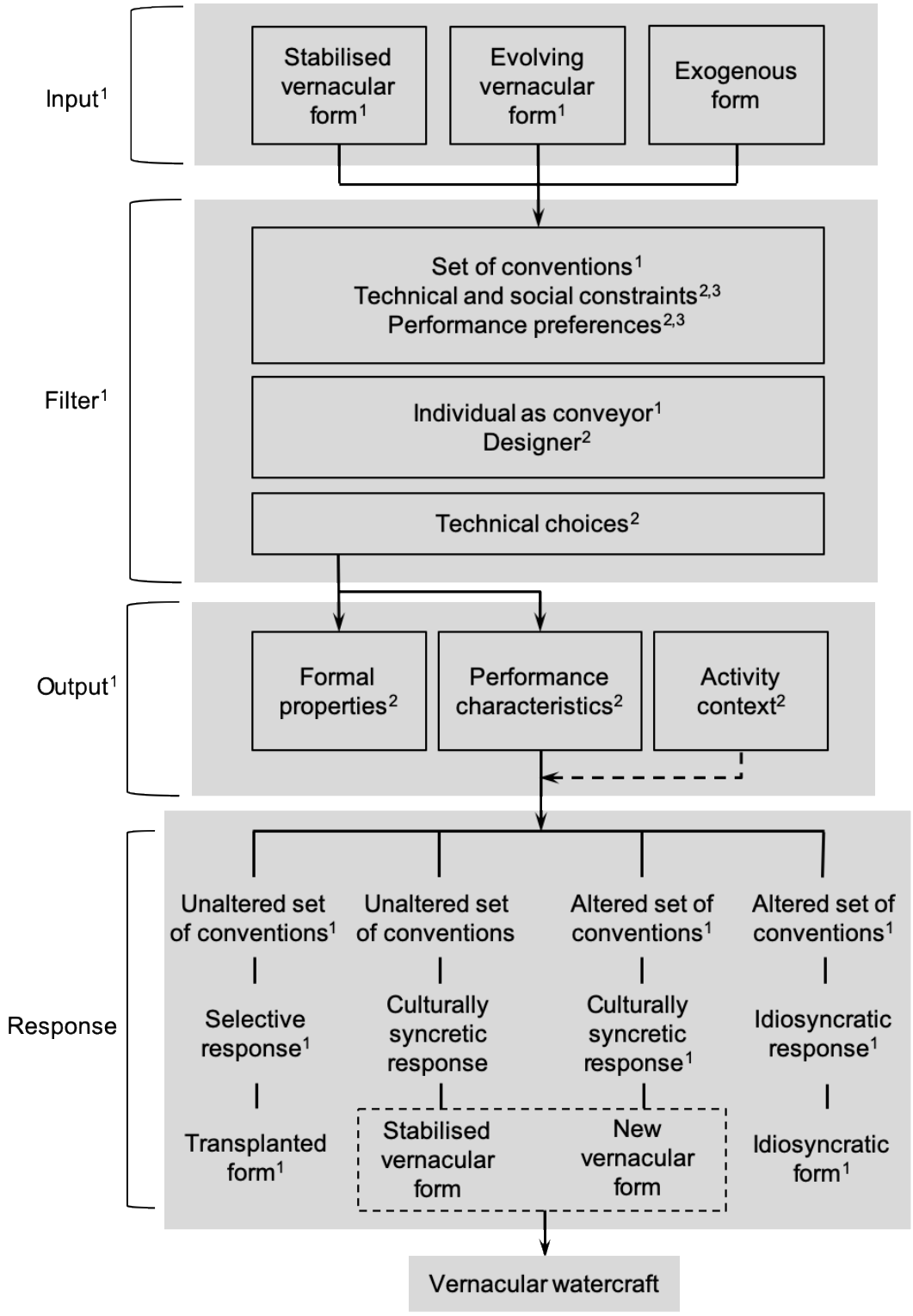


Figure 3.1 The dynamics of form in vernacular watercraft (Sources: [1] Heath 2009:9–19, fig.1.15; [2] Schiffer 2011:98–119, fig.8.8; [3] Adams 2013:22–28, fig.2.1).

Watercraft are the output that results from inputs modified by the regional filter that have formal, measurable properties and observable performance characteristics that may vary from the original performance preferences. Similarly, the experienced activity context may not be as envisaged,

particularly if watercraft are designed for one purpose and used for another, as is often the case with vernacular fighting craft. The response phase determines what types of forms result—either stabilised (folk) or new vernacular forms that are a 'product of a place, by a people, for a people'. Idiosyncratic responses result in individual or one-off forms that are a 'product of a person, by a person, for a person' and transplanted forms arise when a selective response shifts them to a new context (Heath 2009:5), such as when a vernacular form is recorded and copied by a naval architect. Vernacular watercraft result from a culturally syncretic response in which 'representative numbers of people within a region embrace aspects of a unique building response in a collective and consistent manner' (Heath 2009:12). The stabilised or folk forms of vernacular craft are based on an unaltered set of conventions that originally informed design, these forms being closest to stasis. A culturally syncretic response to an altered set of original conventions results is a new vernacular form that is characterised as evolving rather than stable. This latter situation generates change in forms of vernacular watercraft and the present study is concerned with how organised maritime violence influences this dynamic.

3.2.2 Vernacular fighting craft as sociotechnical systems

The form of vernacular watercraft can be influenced by organised maritime violence when exogenous forms are exposed or become available through combat, capture or access to new sources of supply. The physical exogenous form—the complete vessel—can be excluded from the vernacular dynamic as long as characteristics of it can be expressed as performance preferences or technical choices, such as weapons, structural elements or construction methods. In turn, the performance preferences that influence a design include the intended use or uses of the watercraft and reflect the degree of specialisation for a particular task. If these uses include fighting in any manner then the requirements of organised maritime violence may be reflected in the technical choices made by the designer, unless the vernacular 'set of conventions' already meet the new requirements or other constraints are more prominent. Organised maritime violence may also influence these constraints by changing the environment in which vernacular forms are generated. For instance, the materials, technology and finances available to generate watercraft could change during a conflict or period of extended violence, such as during the generally ineffective British-imposed timber embargos on Persian Gulf societies in the early nineteenth century (Davies 1997:189–19).

Further constraints determine the effectiveness of wooden vessels employed to operate a gunpowder armament, as watercraft were during the entire period under consideration here. Ships and boats could and did operate as fighting craft armed with nothing more than the personal weapons of those who sailed in them, but this mode required little adaptation of existing vernacular forms. However,

the introduction of crew-served gunpowder weapons—the variety of smooth-bore muzzle- or breech-loaded guns and mortars referred to as cannon—required adaptation to accommodate their mounts, operating spaces and associated recoil forces (Adams 2013:76–78, 94–95, 97–98; Gardiner and Lavery 1992:148). Nowacki (2006:4) identified a number of 'design objectives' that enabled sailing frigates and ships of the line to operate as gun platforms and that together determined a fighting craft's 'gun-power'—the number, calibre and capability of effective guns. These design objectives may in turn be considered the interrelated factors or performance preferences that determine a wooden watercraft's ability to bear a gunpowder armament—stability, seaworthiness, resilience, strength, manoeuvrability, weatherliness and speed, shown together in Figure 3.2.

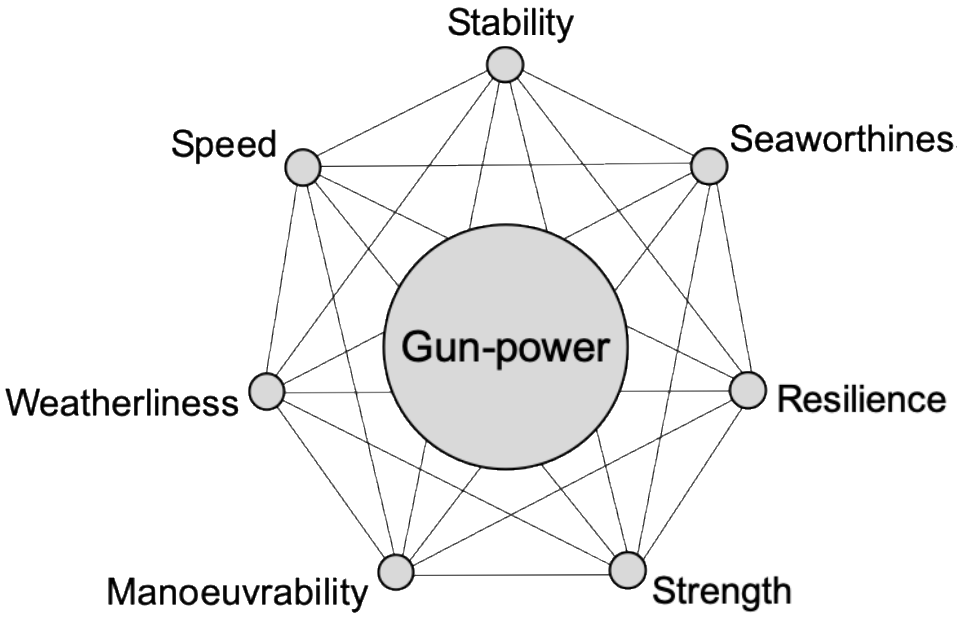


Figure 3.2 The interrelated factors that determine the ability of a wooden watercraft to bear a gunpowder armament (after Nowacki 2006:4, fig.3).

The imposition of static and dynamic loads by guns required stability of a watercraft hull so that it was neither so stiff as to induce abrupt accelerations in roll nor so tender that the guns were ineffective when heeled under a press of sail. Watercraft should be sufficiently seaworthy to perform in the intended environment, sufficiently resilient to sustain operations in a variety of conditions and strong enough to absorb the weight and shock imposed by the operation of the armament. Manoeuvrability entails the ability to keep a course and turn on command, weatherliness is the ability to sail close to the wind, and speed is of fundamental importance to fighting craft, enabling both tactical dominance and survivability (Nowacki 2006:5). Just as Adams' (2013:22–28, fig.2.1) constraints influence the form of vernacular watercraft, Nowacki's attributes represent interrelated and sometimes competing performance preferences for vernacular *fighting* craft and influence the form they take.

The form of a fighting craft and the technology incorporated in its design combines with other social and environmental factors to determine its effectiveness as a fighting platform. Understanding the constraints on the form of vernacular watercraft and the ways these forms may change is the basis of the framework upon which this study is built. These factors together form a sociotechnical system. Schiffer's (2011:30) concept of complex products and complex technological systems has already been introduced, although he offers 'no rigorous criteria' for distinguishing between a product and a system in this case. Considering watercraft as systems is a familiar approach in nautical archaeology and Muckelroy considered watercraft in their archaeological contexts as complex machines that formed an element of 'a military or economic system' and a 'closed' society (1978:216). Building on this concept, Pomey (2011) advanced the notion that a ship can be considered an architectural, functional and social system. A system in this sense has been defined as 'a set of interrelated elements that functions as a unit for a specific purpose' (Furnham 1974:74), an idea taken into the maritime domain specifically to model the elements that contribute to the function of a ship (Grech et al. 2008:19–25). In the view of Grech et al. (2008:23), a sociotechnical system model shows 'how various factors interact to influence system performance', while Schiffer's (2011:30) 'complex technological system' consists of 'interacting components and products'. The various approaches of Muckelroy (1978), McKee (1983), Nowacki (2006), Grech et al. (2008), Pomey (2011), Schiffer (2011) and Adams (2013) are all in effect describing the same thing—watercraft as sociotechnical systems. For the purposes of this research then, vernacular fighting craft will be considered sociotechnical systems that demonstrate the interaction of people, artefacts and the environment.

3.3 Correlates of violence in vernacular watercraft

3.3.1 Identifying organised maritime violence

Once the notions of technological differentiation as behavioural archaeology and the dynamics of form in vernacular watercraft are established, the next move in this research problem is to show what organised maritime violence might look like in dhows. How does a maritime society organise for violence and what would this look like in the material and visual records? How can behaviour be inferred from historical records of sociotechnical systems? Identifying material correlates of a behaviour in a technology, the traces or signatures of it, is 'clearly necessary for archaeological inference' that must account for 'the entire range of relevant processes that form the historical and archaeological records' (Schiffer 1996:5). This section reviews the potential correlates and signatures of organised maritime violence so that their trace may be discerned in visual sources to aid archaeological inference.

Identifying the occurrence and influence of organised violence in prehistoric, 'primitive' and pre-literate societies presents a problem that has long vexed archaeologists (Keeley 1996:3–24; Wileman 2009:1). A lack of documentary sources and the rarity of 'smoking gun' type finds in the archaeological record limit the available direct evidence for organised violence, most particularly in maritime environments. The Indigenous societies of the early modern Persian Gulf are effectively rendered pre-literate for much of the period under consideration by the paucity or inadequacy of documentary evidence of maritime violence (Cooper 2014:4061), as the incomplete, sporadic and dispersed nature of the documentary record replicates to a degree the problems faced by archaeologists studying pre-literate societies. Models based primarily on material evidence can assist in the recognition of the 'correlates of war', or the 'causes, occurrences and results' of organised violence (Wileman 2009:53). While such models and approaches are based on interpretations of a relatively more significant archaeological record of organised violence in terrestrial contexts than currently exists for the early modern Persian Gulf, their nature is such that they may be applied, with sufficient caution, to other societies. Indeed, Wileman (2009:53, emphasis in original) warns that a study employing such an approach 'be approached with caution and the acceptance that correlates are only useful in *combination* and in *context*, and that interpretations based upon their presence or absence are only ever conditional'. This approach is nevertheless useful for the present study, as the correlates of violence are potentially as readily apparent in maritime as in terrestrial contexts. There is further advantage in the correlates of war approach as it considers organised violence as a behaviour rather than an incident or a series of events (Wileman 2009:2).

3.3.2 Preconditional, preparatory, functional and resultative correlates

Wileman has categorised the correlates of war as causal, preparatory, functional and resultative (2009:53–54). Causal correlates are the prerequisites for organised violence that 'indicate appropriate conditions for conflict' (Wileman 2009:6). This study is more concerned with the technological preconditions for organised violence than the causes, which are debated at length elsewhere (e.g. Wileman 2009:6–10), so these initial correlates will be referred to herein as 'preconditional'. Preparatory correlates are the 'actions taken by societies to prepare for aggression or defence' (Wileman 2009:11). Functional correlates relate to evidence of tactics and strategies, the 'organisation, tools and procedures' that are signified by 'evidence of the immediate effects of violence' (Wileman 2009:35). Resultative correlates demonstrate the medium- to long-term effects of war (Wileman 2009:45). Under these four categories, Wileman identifies correlates relating to terrestrial conflicts (Wileman 2009:53–54), which may be applied to societies that operate watercraft from coastal settlements, exploit marine resources, trade and communicate by sea, and incorporate the sea in concepts of space and territory—in short, maritime societies like the Khaliji.

The approach of identifying attributes of watercraft associated or correlated with their use for organised maritime violence enables a more systematic and rigorous analysis of the development of Indigenous watercraft over this period than do anecdotal assessments. While the sources reviewed in the previous chapters give some implicit hints of such functional attributions, particularly in reference to dhows, this section draws on sources that report and review the archaeology of sail or oar-powered wooden fighting craft, as well as sources that discuss or theorise their tactical employment on the basis of naval architecture, to identify other possible correlates of organised violence in vernacular watercraft traditions. While most of the correlates of violence in vernacular watercraft identified though this method are contextually dependent rather than universal principles—indeed some appear contradictory—they can be ordered along the lines of the four categories of preconditional, preparatory, functional and resultative.

3.3.3 Preconditional correlates of organised maritime violence

While the causal correlates of maritime violence in this case may be 'lawful resistance to foreign intrusion' or 'a cultural response to maritime competition' (Potter 2009:3), the preconditional correlates are simply defined. Preconditional correlates that 'indicate appropriate conditions for conflict' (Wileman 2009:6) exist within a maritime cultural landscape, signified by 'human utilization […] of space by boat: settlement, fishing, hunting, shipping and its attendant sub-cultures' (Westerdahl 1992:5). These are:

a. *Access to navigable water*: A society should have access to, or be accessible by, navigable water as watercraft are a required element of organised maritime violence.

b. *Capacity to build or acquire watercraft*: Even if it has no watercraft to begin with, a society should have the financial, political and organisational capacity and resources to acquire or build them.

c. *Capacity to operate watercraft*: A society should be able to operate and maintain watercraft through possession of relevant skills, practices and social organisation.

d. *Performance preferences for fighting with watercraft*: A society should demonstrate a performance preference for fighting with watercraft, perhaps at the expense of investing in terrestrial martial technology or defences, or in other activities in watercraft (Nowaki 2006:4–5; Schiffer 2011:115).

3.3.4 Preparatory correlates of organised maritime violence

e. *Proliferation of embarked weapons*: The number, types and quality of weapons embarked, and the move from mélee (hand-to-hand) to ranged (stand-off) weapons, are indicators of specialisation for violence. The proliferation of personal weapons used to reduce opposition to boarding, or to

defend a ship against it, indicates readiness for combat. The ‘weaponisation’ of watercraft by an increased provision for ranged weapons beyond personal firearms, particularly cannon and their mounts, is indicative, as is the introduction of bespoke weapons specialised for watercraft. The presence of more weapons than is usual for mercantile voyages or a particular type of vessel may be a similar indicator of the intention to do violence (e.g. Bamford 1973:32; Borgens 2017; Bound and Sharpe 1995:46; Brown 1995:114–115; Delgado 2019:16, 53; Eliav 2013; Galili and Rosen 2014:124–126; Guilmartin 1974:157–175, 2005, 2007; Hamilton 2006:150; Lavery 1987:84–86; Page and Ewan 2015:269–273; Smith 1995).

Figure 3.3 A *fusta*, a vernacular fighting craft used by the Portuguese and their enemies in the Arabian seas in the sixteenth century, showing a structurally integrated mélee weapon at the bow (3.3.4f), protection for the rudder and helm at the stern (3.3.4f), gunpowder weapons (3.3.4e), significant propulsive power (3.3.4i) and a large ensign (3.3.4j) (van Linschoten 1600:46–47, f.9).

f. *Watercraft structures that facilitate employment of weapons or defence*: The incorporation and permanence of defensive structures, such as high sides and ends, thickness of wales and timbers, decks and hatches, compartmentalisation, internal divisions, bulwarks, stanchions for breastworks, as well as the increase in fittings for temporary defences—breastworks, shields, boarding nets, spikes or spears ranged outboard—indicate specialisation for violence. A counter stern can protect

the rudder head from ‘effects of shot and sea’ (Lavery 1987:13). Angled or curved sides make it difficult to board. An increase in structural elements designed to aid in the deployment of these weapons—high castles, decks and platforms, and ports through which to direct them, is also indicative. The development of more rigid structures and more stable platforms better support weapons. The prevalence of structurally integrated mélee weapons, like rams or spikes as shown in Figure 3.3, may also be prevalent (e.g. Adams 2013:149–151; Alertz 1995:150–151; Delgado 2019:14, 79–80; Fernández-González 2006; Guilmartin 2011:130–131; Hutchinson 1995:22–23).

g. *Strengthening watercraft to accommodate weapons and tactics*: Watercraft may be strengthened to better accommodate the loads imposed by weapons and their users, or be required to carry great weight, including massive timber structures, or be lightly built but ‘cleverly reinforced with braces and knees [for] strength’ (Delgado 2019:70). Indeed, the transition from lapstrake or clinker planking to carvel and the introduction of square rather than rounded sterns may have been related to the requirement to accommodate guns (Adams 2013:76–78, 94–95, 97–98). Vessels may also require strengthening to accommodate increased propulsive power, or unusual cargos such as horses for amphibious lodgement, or to survive repeated beaching during raids (e.g. Deglado 2019:15, 34, 64, 78; Eriksson 2018; Fernández-González 2006).

h. *Change in watercraft building standards*: The use of expensive, high-quality materials and sophisticated construction methods or exceptional craftsmanship are signs of the prestige nature of fighting craft. Conversely, watercraft may be built in haste during or in preparation for conflict, or made from low-quality materials such as inadequately seasoned timber, or prefabricated to be built quickly and to make up losses. There may be evidence of faster shipbuilding times or of building under pressure, such as the lack of finish and the use of shortcuts in vernacular vessels. Standardisation and the use of moulds or templates for mass production, or the standardisation of vessels, weapons or equipment within a fleet are common indicators of militarisation. The pace, number and variety of structural changes made to traditional craft may indicate changed priorities. An increase in the variety of watercraft, the degree of specialisation of watercraft within a tradition and the experimentation with new types would also potentially indicate the effects of organised violence. The introduction of foreign or more efficient vessel types can sometimes indicate interim requirements, necessity or capture. The high costs of building ships encouraged their use in both peace and war, as might be indicated by temporary fittings and weapon mounts (e.g. Adams 2013:70, 96; Delgado 2019:39–40, 55–56 64, 67, 76; Switzer 1998:185–187; Turner 2016; Walker 1995:137).

i. *Watercraft form enabling tactical employment*: The most common forms of fighting craft emphasise speed with high length to breadth ratios—‘longships’—and forms may be changed or

simplified to this end. The characteristics of long, ‘sleek’ and light watercraft forms that demonstrate better hydrodynamic efficiency and manoeuvrability usually distinguish martial from mercantile uses. Flexible, shallow-draught or flat-bottomed light craft that can operate over the shore and in shallow waters are a preferred form for raiding and are often open craft propelled by oars. The use of low-sided craft can aid disembarkation as well as stealth in sheltered waters (e.g. Delgado 2019:24, 52, 55, 61, 63, 66–67; Evans 2007:90–91; Riccardi 1995:20; Turner 2016:29–30). Conversely, increases in size, ‘roundness’ and height usually create greater strength and enable larger and more elevated superstructures for fighting or the embarkation of more personnel to overpower opponents (Delgado 2019:19, 69–70, 79). An increase in propulsive power or the presence of excessive propulsive power beyond the requirements of domestic service—large banks of oars, manpower intensive sailing rigs, increase in canvas area and similarly high installations of generative power—can indicate specialisation for violence (e.g. Guilmartin 1974:194–201; Turner 2016:31–33).

j. *Watercraft symbolism related to violence*: The display of explicit martial symbolism, such as battle ensigns and larger or more numerous flags and regalia, sails emblazoned with martial devices, larger figureheads and intricate carvings and decorations, the use of ‘warpaint’ and camouflage, or the inclusion of accoutrements like shields mounted outboard, form conspicuous displays of martial capability. The use of flags and symbols for inter-ship communication and identification may indicate specialisation for collective violence. Building large, prestige vessels as symbols of power or ‘flagships’ generally projects violent capabilities or intentions (e.g. Adams 2013:87, 96–97; Delgado 2019:11, 15; Glover 1998:55–59; Martin 1995:44).

k. *Construction of coastal defences and stockpiles*: Construction of coastal fortifications as defensive measures against attack from the sea, and of palisades and pilings to fortify seaward approaches, indicates preparation for defence. Correlates ashore may also include fortification of dwellings or villages and the provision of surveillance of the sea—watchtowers and occupation of heights—as well as an increased use of cover and concealment of watercraft along the shore. An increase in readiness through stockpiling stores, provisions and munition, and the provision of protected building places or berthing facilities, indicates readiness for violence. Evidence for the manufacture of weapons or munitions in ports and maintenance of associated magazines or stockpiles are obvious indicators (e.g. Garcia 2009; Delgado 2019:57–58, 71; Skowronek and Ewen 2006:255, 265).

l. *Change in deployment patterns or readiness of watercraft*: An increase in the number of people participating in voyages, a higher person per voyage ratio, or other indirect evidence of high onboard occupation—such as more utensils, cooking implements, weapons or body armour—can

indicate adaptation for violence. The employment of convoy behaviour and gathering for mutual support is a common reaction to threat, not only in fighting craft, and smaller vessels can raft together to make a more stable fighting platform. The introduction of discipline as a function of watercraft operation, such as was required to effectively employ ramming tactics in oared warships or to operate crew-served weapons like carriage-mounted cannon, indicates specialisation for violence. The employment of stealth—operating without mast or sails, and the use of small, low, oared vessels as a counter-surveillance technique—indicates readiness for violence (e.g. Delgado 2019:12, 28, 60, 65; Wilde-Ramsing 2006:193–195).

These preparatory correlates can suggest the emergence of a 'sub-culture' of organised maritime violence within a maritime cultural landscape (Westerdahl 1992:5).

3.3.5 Functional correlates of organised maritime violence

m. *Remains of damaged watercraft*: Watercraft damaged by explosion, fire, or shot are obvious potential indicators of violence. The explosion of gunpowder magazines was a frequent hazard to ships in combat. The presence of shot or projectiles not associated with the embarked battery or that are damaged by impact in a shipwreck, or the presence of wood splinters or otherwise unexplained penetrations, indicate exposure to violence. The remains of watercraft deliberately expended as weapons or to impede movement, such as fireships or blockships, are other clear examples in this category (e.g. Bound et al. 1998:97–102; Crumlin-Pedersen 2002:331–338; Delgado 2019:71; Kahanov et al. 2012:1994, 1996–1998; Ravn 2016:112–113; Switzer 1998:188).

n. *Remains of watercraft in readiness for action*: Watercraft prepared for defence or violence but not necessarily the victim of it are identifiable in archaeological contexts. The state of the guns and their lashings and accoutrements, the presence of shot in proximity to guns, the state of magazines and the distribution of ammunition throughout a shipwreck may indicate readiness for violence. Wrecks of vessels carrying quantities of weapons or military stores significantly beyond the normal requirements of passage may indicate involvement in organised violence (e.g. Bound 1998:81; Hanselmann 2019:111–120; Lusardi 2006:202–203, 216–217; Wilde-Ramsing 2006:183–185, 193–195).

o. *Detritus of battle in submerged sites*: Submerged battlefields with scattered weapons and ammunition, helmets, armour, ballast or non-cargo elements with temporal and spatial proximity to known conflicts are all potential indicators of violence, even if there are no watercraft present. Vessels are valuable and 'potent expressions of power and status' (Delgado 2019:65), hence the objective was to capture rather than destroy. Discarded or damaged weapons, such as burst guns, may also indicate a conflict site (e.g. Batchvarov 2016; Delgado 2019:48).

p. *Damaged coastal settlements or fortifications*. Damaged or destroyed coastal sites and defences, such as the UNESCO World Heritage site of al-Zubārah in Qatar, abandoned in 1811 after repeated assaults (Leisten 2014:3), can indicate seaborne raiding and maritime violence (e.g. Skowronek and Ewen 2006:255).

3.3.6 Resultative correlates of organised maritime violence

Although all of Wileman's (2009:54) original resultative correlates remain relevant to this study, those listed below are relevant specifically to maritime societies operating watercraft.

q. *Changes in watercraft population*. Changes in the number, variety and types of watercraft in a society may be indicators of the pressure of violence. Losses in combat or raids, the abandonment of more complex or resource intensive forms, or the loss of building knowledge of specific types of craft through death or dislocation of shipwrights can change the way the watercraft population appears. The introduction of new or foreign types, possibly through captured examples or shipwrights, may also represent the results of violence (e.g. Ferreiro 2007:22–24).

r. *Changes in watercraft quality*. Effects of violence, such as timber embargoes and changes in trading patterns, could induce stress in boatbuilding traditions, forcing reuse, use of marginal resources, continuation beyond practical use life, increased risk and use of alternative craft like bundle boats, dugouts or skin boats. Changes in the types and quality of materials used for boatbuilding may be evident (e.g. Bound and Bado 1998:255–256).

s. *Changes in resource exploitation*. Resultative correlates may include fluctuations in pressure on resources such as pearl beds, as some polities lose the ability to access them through loss or diversion of watercraft, or increased catches in other settlements. Archaeological signatures may include middens ashore or growth stratum in pearl beds aligned with known periods of intense dislocation or watercraft destruction. The Persian Gulf was probably too small a market for fluctuations in demand for timber to be noticed in India, but local resources may show signs of stress or over exploitation as a result of increased demand for shipbuilding material.

t. *Dislocation of maritime social elements*. Migration is a common response to violence, but particularly so among the mobile maritime societies of the Persian Gulf (Nadjmabadi 2009:132–133). The movement of shipwrights or other skilled maritime labourers may also be induced by violence. Morphological changes in maritime settlements, such as moves away from the coast, are potential responses to violence, as are the onset of illicit or disrupted trading patterns (e.g. Skowronek and Ewen 2006:255–265).

3.4 Summary

Having considered vernacular watercraft as technology subject to differentiation, through which behaviour may be inferred and shown how organised violence may influence watercraft form, this discussion of method now turns to the analytical techniques required to identify organised maritime violence in visual sources. This relies on explicit statements of assumptions about how societies change their technologies, how the functions of vernacular watercraft affect the ways they appear, how images of these watercraft are formed and can be interpreted, and how archaeological inferences can be drawn from them.

4 USING VISUAL SOURCES IN MARITIME ARCHAEOLOGY

Using visual sources as primary evidence in maritime archaeology requires explicit techniques of analysis. This chapter describes the methods used in this thesis to both analyse and interpret visual sources and to incorporate this evidence with other intertextual sources. Section 4.1 explains the analytical techniques applied to visual sources while section 4.2 describes how inferences can be drawn from evidence produced by such methods.

4.1 Analytical techniques

Wedde (2000:16), in his study of 370 representations of watercraft from the Bronze Age Aegean, suggests an approach to 'decoding' a 'representational record' that involves explicit statements of the methods followed, developing an understanding of the iconographic 'signals' in images and of the processes employed in their creation, and 'translating the resulting typology into historically relevant terms'. The analytical approach to the corpus of images collected for this study follows a three-step process that involves finding, coding and analysing images that broadly replicates Wedde's approach, although remaining wary of Wachsmann's subsequent advice to avoid typologies that over-interpret visual evidence (2019:23–24). The section below on discourse analysis (4.1.1) shows how the population of visual artefacts and assemblages was defined, sampled and selected, while the section on content analysis (4.1.2) details how they were coded. The third section (4.1.3) discusses analysis techniques applied to individual images of watercraft.

The production of this discourse on warfare, piracy and vernacular watercraft has influenced the way evidence can be found in surviving records and it matters a great deal who created each element and with what bias, and what now might be missing. This is interpretation, which in turn affects the validity of the inferences, narratives and explanations created on the basis of such evidence. The interpretation of diverse sources, such as those used here, demands frameworks upon which to scaffold, and from which to derive, meaning. Two main characteristics of this study have influenced the selection of conceptual frameworks: the overwhelming reliance on visual sources, whether images, models or artefacts, and the use of these sources as evidence of technological change.

Of studies that may be used as examples of similar approaches, Flatman (2007) and Wedde (2000) most usefully and explicitly detail their methods of analysing nautical iconography, providing some of the tools and methods used in this study. Just as the interpretation of evidence for specific practices and technology within a discourse requires a framework and method, so does the identification and interpretation of technological change or differentiation, an inherently comparative approach. Even seemingly 'simple' comparative tasks require explicit statements of the

analytical techniques used to critically interpret them. Loren and Baram (2007:1) juxtapose the 'simple and naïve' approach that seeks merely to compare an image with an artefact with a 'critical and informed' use of images that is 'mindful of origin, intent, dissemination, and audience'. Images have an artistic context, which includes 'the types and associations of behaviours and material culture as well as the social and cultural circumstances of an image's production' (Loren and Baram 2007:2–3). Some images are therefore more useful for gaining a sense of what a thing or place, or watercraft in this case, looked like, while others are more useful in interpreting social relations and challenging assumptions made on the basis of textual data (Loren and Baram 2007:2). The inclusion of critically interpreted imagery diversifies the archival sources that can be used for historical archaeology (Loren and Baram 2007:2). The techniques discussed in this section are intended to achieve a corpus of critically interpreted visual sources able to supplement other forms of evidence used to enquire into organised maritime violence and vernacular watercraft technology in the early modern Persian Gulf.

4.1.1 Discourse analysis

Decisions about what to include within the bounds of relevant discourse, and what materials to leave out, can be troublesome, particularly for ethnography and archaeology. Ethnographic examples of maritime practices may still be relevant as analogy despite a considerable temporal, spatial or even cultural distance from the subject matter (Blue 2003:334–335). Similarly, the paucity of relevant archaeological material means that sites of unspecified cultural origin, or removed by centuries from the study period, like the ninth century Belitung shipwreck (Flecker 2000, 2008) or the medieval al-Balīd ship timbers from Oman (Belfioretti and Vosmer 2010), remain valid elements of the discourse. The effect of such scope and paucity is to bound the discourse more by interpretation than identity, requiring both 'intertextuality' in a broad sense and further moves to focus inferences and explanations.

4.1.1.1 Discourses and intertextuality

Rose (2016:187) considers discourse simply as 'groups of statements that structure the way a thing is thought, and the way we act on the basis of that thinking' and as a type of 'particular knowledge about the world'. Paraphrasing Rose further, it is possible to identify a discourse on dhows with its own specialised forms of knowledge and language, as 'articulated through all sorts of visual and verbal images and texts, specialised or not, and also through the practices that those languages permit' (Rose 2016:187). The diversity of these forms and the way that meaning of any particular image within that discourse relies on the meanings of contextual sources is referred to as 'intertextuality' (Rose 2016:187–188). This notion of intertextuality is significant in the understanding and interpretation of visual sources, as none of the images in this study are

interpreted on the basis of information and meaning within that image alone. The intertextual nature of visual sources should be clear, as they all rely on contextual information—location, date, artist, cultural affiliation, scene—a fundamental concept of archaeology. Indeed, the form of discourse analysis followed here relies on intertextuality for its 'interpretive power' (Rose 2016:204). The variety of iconographic source material on fighting dhows, and the absence of significant archaeological remains for comparison, makes iconographic analysis potentially troublesome if relied on alone (McGrail 2004:2). Indeed, Wachsmann (2019:9) insists that textual, archaeological and ethnographic evidence *must* be 'considered critically whenever available and relevant'. In the explanation of methods used in this research the employment and the assumption of intertextuality is explicit.

In that 'it is possible to think of visuality as a form of discourse' (Rose 2016:188), it is fair to assume that the corpus of visual sources that relate to pre-modern watercraft of the Persian Gulf has its own language and meanings, and that some things will be 'visible in particular ways, and other things unseeable' (Rose 2016:188). The implication so far in this study is that the vernacular watercraft created, acquired and adapted for organised violence in the Persian Gulf have been rendered practically 'unseen' by the form of historical discourse that has rendered other dhows 'visible in particular ways'. The methods employed in this study must therefore be designed to expose the unseen, not just the visual images themselves, but also the meanings and implications derived from an intertextual examination of the discourse of which they form a part. By interrogating this discourse with the notions of observable technological change in vernacular watercraft explained above, and further by using the methods described below, this study will expose results from which behavioural inferences will be made. In so saying, it is important to be clear that there are many potential discourses on pre-modern fighting dhows. The methodology of this study is more aligned with Rose's 'discourse analysis I' that is most concerned with various forms of visual images and texts themselves, rather than her 'discourse analysis II' that considers the 'material practices of institutions' and issues of power and truth (2016:192). While the latter approach would no doubt make an important study, the former is more productive of data for analysis of technological change and can show 'how images construct accounts of the social world' (Rose 2016:192).

Contemporary observers of early modern maritime violence in the Persian Gulf, both Indigenous and foreign, recorded their experiences in a variety of primary sources that together form a corpus of intertextual data relating to the themes this research. The verbal sources within this discourse on organised maritime violence provide context for iconographic sources in the way of Fairclough's (2003:2–7) 'textually oriented discourse analysis' model. Forms of textual and lexicographical

analysis of historical documentary sources that often accompany images are familiar methods in maritime archaeological and ethnographic studies of dhow culture (Agius 2008:15–30; Hornell 1942, Moreland 1939a, 1939b; Nance 1914, 1920). The following themes were used to enquire into the contextual verbal elements of the intertextual discourse on maritime violence (Fairclough 2003:7):

a) nomenclature and lexicographical/linguistic associations of vessel names, including other vessels they are compared to, collected with or differentiated from;

b) temporal, spatial and cultural associations of terms relating to fighting craft and maritime violence;

c) descriptions of vessels, armaments, fortifications or other material elements of organised maritime violence;

d) human agency in acts of maritime violence, including references to ethnic or cultural origin, social status, division of labour, ownership, gender or organisation, and

e) other contextual information, such as related indications of social, political, ideological or economic change or causation.

4.1.1.2 Formation processes of discourse

A particular concern of discourse analysis is the way the discourse itself is structured, how it produces a 'particular kind of knowledge' (Rose 2016:205). Elements of this have already been considered in Chapter 2, but as the production and formation of the discourse affects the ways that images themselves are analysed, this concern must be explicitly considered here. The limitations of the principal types of visual sources, including the materials used to create them, are considered in further detail in Chapter 5. These are the technological aspects of image production that relate not only to how an image was created but also to how it can be transmitted, viewed or displayed (Loren and Baram 2007:2–3; Rose 2016:25). Consider here the obvious distinction between petroglyphs and easily reproducible and transportable lithographs.

The acknowledgement of 'generic conventions'—those that relate to the particular genre into which an image fits (Rose 2016:28)—enable a closer reading of production and formation effects. Images of fighting dhows will fall into a range of visual genres, like portraiture, landscape, 'battlescape' and combat art, Orientalism, ethnography, military intelligence, cartography and coastal views, and only rarely those concerned with naval architecture. Most images may be ascribed to more than one genre, each of which has conventions for how they should depict technology like watercraft and the activities associated with them. Discourse analysis must therefore take into account not only the

materials and technology of the image creation, but also the genres or codes (Wedde 2000:15–18) used consciously or not by the artist.

A third consideration of the production and formation of visual discourse is to consider why or for whom the image was created in the first place (Rose 2016:5). This may be impossible for many examples, and the intentions of the artist may not even be helpful in later meaning making of images (Rose 2016:32), but an image created as a military intelligence product will have different characteristics to one produced for a children's book. In an exegesis of an historical discourse comprised of a variety of visual sources such as this, considerations of the technology, genre and intent of the images included must be an element of the techniques used to analyse them. Together, these considerations are effectively the formation processes of the discourse, equivalent to those of the archaeological record (Schiffer 1987:8–11).

4.1.1.3 Sampling the discourse

Smith and Peregrine (2011:9–10) adopt nine 'dimensions of comparison' to describe the variety of comparative approaches used in archaeology: sample size, sample selection, contextualisation, scale, primary vs secondary data, archaeological vs historical data, synchronic vs diachronic, stage in research trajectory, and spatial and temporal domain. The comparative approach adopted in this study employs these same dimensions. The sample size in this study principally refers to the number of primary historical visual sources collected for comparison. The early modern visual sources of watercraft of the Persian Gulf form the population sampled by this study, but there is no clear idea of the original size of this population. The vagaries of preservation, deterioration and loss, trade and exchange, private art collecting, copying and forgery, such as that on the right in Figure 4.1, and modern interpretation blur any attempt to consider its exact dimensions.

This sample was selected by taking all the cases of 'sufficient richness of data and contextual control' (Smith and Peregrine 2010:11), that could be assembled within the scope and limitations of the study. Visual sources were included in the sample as cases of vernacular watercraft of the Persian Gulf if they apparently represented planked wooden watercraft not flying European flags or otherwise associated with European or extra-regional cultures, shown or described as being within the bounds of the Persian Gulf cultural area described above in section 1.2.1, or shown or described as being from a culture or society from within the Persian Gulf. Reed boats, skin boats or rafts were excluded as they were not immediately relevant to the development of vernacular fighting craft. The sample is not exhaustive as there are numerous cases of visual sources indicated by metadata as potentially meeting the conditions for inclusion, but that were inaccessible to the study. The sample may also include watercraft from other cultures, particularly from western India, that traded within the Gulf but that display no obvious pictorial identifying features by which to exclude them. The

very similar *baghla*, *ghanja* and *kotia* are a case in point (Burningham 2007). The results of this sampling process are discussed in Chapter 6, the entire corpus of cases is included at Appendix B and individual cases are examined in detail in Chapters 6 and 7.

Figure 4.1 Population estimates of relevant visual sources may be affected by copies or forgeries, such as that on the right, a high-quality, early twentieth-century copy of the *Maqāmāt* ship on the left, passed off originally as a page from a thirteenth-century manuscript (left BnF Arabe 5847:f.119v [B2.32]; right Hoare 2017: No.207).

Smith and Peregrine (2010:11–12) consider contextualisation to be 'the extent to which social, cultural and historical details are provided to support and illuminate specific comparisons', which 'tends to vary inversely with the sample size'. With a large sample size in this study, a low or general level of contextualisation should therefore be acceptable, but each type of visual source used entails specific contextual elements and individual cases come from a variety of contexts. For example, the level of contextualisation available for petroglyphs is significantly lower than for paintings from manuscripts that are accompanied by text and, in many cases, dated attributions. The scale of comparison of this study can be considered 'middle range' (Smith and Peregrine 2010:12), in that it seeks to compare specific features of a vernacular shipbuilding tradition both temporally and spatially with similar vernacular and imported European and western Indian Ocean traditions. While the overall study is systematic in that it employs a large number of cases for general comparison, it is also intensive in the way individual vessels or classes of watercraft are considered.

Other studies follow a similar method by explicitly comparing a corpus of visual sources of watercraft (Flatman 2007; Martin 2001; Unger 1991b, 2010; Wedde 2000). Flatman (2007:19) catalogued 2,335 individual folios depicting watercraft in medieval European manuscripts; Martin (2001:25–140) used over 120 visual sources of Venetian watercraft depicted in a variety of media, many showing multiple vessels; Unger (1991b:figs.1–77) demonstrated change in shipbuilding technology in Europe by reference to 75 images of Noah's Ark; and Wedde (2000:13) collected 370 iconographic depictions of watercraft of the ancient Eastern Mediterranean. Nicolle's shorter survey of shipping in Islamic art, including from the Mediterranean, used over 130 depictions of individual watercraft (1989). Given the regional scope of the present research and the limits on the population size mentioned above, a sample size of 405 sources with 1,252 individual depictions of watercraft compares well to these earlier studies of maritime iconography.

4.1.2 Content analysis: frequency and coding

The method of content analysis espoused by Rose (2016:88) involves 'counting the frequency of certain visual elements in a clearly defined population of images, then analysing those images'. Her four-step process involves finding the images, deciding how to code them, coding them and analysing them (Rose 2016:88–99). Section 4.1.1 on discourse analysis showed how the population of images was defined and sampled, while this section details how they were coded, the second and third of Rose's steps. The following section (4.1.3) discusses the techniques of analysis that comprise the last of Rose's four steps.

Earlier examples of iconographic exegesis in nautical archaeology have used descriptive statistical techniques in a content analysis both implicitly and explicitly. Flatman (2007, 2009) used counts and basic measures of frequency in his survey of shipping in medieval European manuscript paintings. Martin (2001: figs.133, 147, 154–158, 178–179) explicitly used measures of frequency and distribution of types, as well as features of Venetian watercraft to identify trends in iconographic representation and to compare textual and iconographic sources. Wedde (2000:fig.5) made limited use of frequency, proportion and distribution to investigate Bronze Age Aegean nautical imagery. All three adopted a set of standard statistical approaches that allowed them to classify, explore and describe patterns in their sources to provide the basis for analyses of primarily nominal variables like images. This study has relied on similar count-based techniques that describe classification, proportions, frequency and distribution, all common in archaeological studies (Drennan 2008:2093). Coding this corpus of images requires attaching labels to categories that are both exhaustive, in that they include all possible aspects within that category, and that are exclusive and do not overlap (Rose 2016:92).

4.1.2.1 Interpreting watercraft motifs

In order to select watercraft motifs for further investigation they must be intuitively recognisable as watercraft in the first place, which relies to an extent on the observer's bias and cultural perspective (Wedde 2000:12–13). While the images selected for this study almost certainly all represent watercraft, intuitive deductions are insufficient to identify the type and function with any degree of certainty when the artist does not explicitly record them. Identifying watercraft of similar form in two-dimensional or low-relief motifs of vastly differing styles requires a systematic approach that takes into account all of the details depicted and assumes that they are all purposefully illustrated.

Most generic systems for describing the form or shape of watercraft are directly applicable to full sized three-dimensional craft (e.g. McKee 1983:69–105; Steffy 1994:266–298). Two-dimensional artistic representations or scaled three-dimensional interpretations of vessels are liable to incorporate distortions, however minor, and lack the detail of the original. Iconographic interpretation of watercraft involves, in part, the identification of the full-sized craft that the artist attempted to represent, assuming that was the original intention, which it may well not have been. It is therefore appropriate to use systems for describing watercraft shapes in two-dimensional representations while remaining conscious of the potential for distortion and loss of detail. Naval ship recognition methods are designed for a similar scenario—the identification of a ship type from a brief or distant view that potentially suffers from atmospheric distortion and inadequate detail (Talbot-Booth 1944:x–xiii). A classic work of this type—the Vietnam War-era *Junk Blue Book* (Dalby and Thede 1962)—combined ethnographic observation with the operational requirements of military forces to produce an extraordinary identification guide to vernacular watercraft. Images and descriptions of dhows were included in accounts of UK Royal Navy anti-slavery patrols in the nineteenth century (Colomb 1873:35–41; Sullivan 1968 [1873]:102), and more recently Hawkins used profile silhouettes of dhows as an identification guide in his 1977 work (138–141), examples of which are shown at Figure 4.2.

While training methods in ship recognition have advanced, the classic approach uses two-dimensional waterline silhouettes of ships from which it was only possible to discern shape, configuration and basic detail. This method aimed to achieve swift and accurate identification of vessels at sea and depended on the observer recognising the whole form rather than discrete elements, although such competence is built though lengthy instruction on the shape and configuration of different types of ship (Renshaw 1945:227–230; Talbot-Booth 1944:xi). This lengthy apprenticeship aimed to develop what Rose (2016:57) calls 'the good eye' or visual connoisseurship, although she is more concerned with assessing artistic quality than technical identification. Jordanova (2012:211) considers connoisseurship to be a form of expertise 'based on

the ability to make fine visual discriminations', employing 'comparative visual skills'. A system of ship identification based on comparative visual skills has much to recommend it when seeking to identify watercraft in two-dimensional artistic representations of very similar form but varying detail. Familiarity with the shapes and configurations of historical watercraft aids identification, but the articulation of that identification in sufficient detail to allow replication and review requires the application of an explicit method.

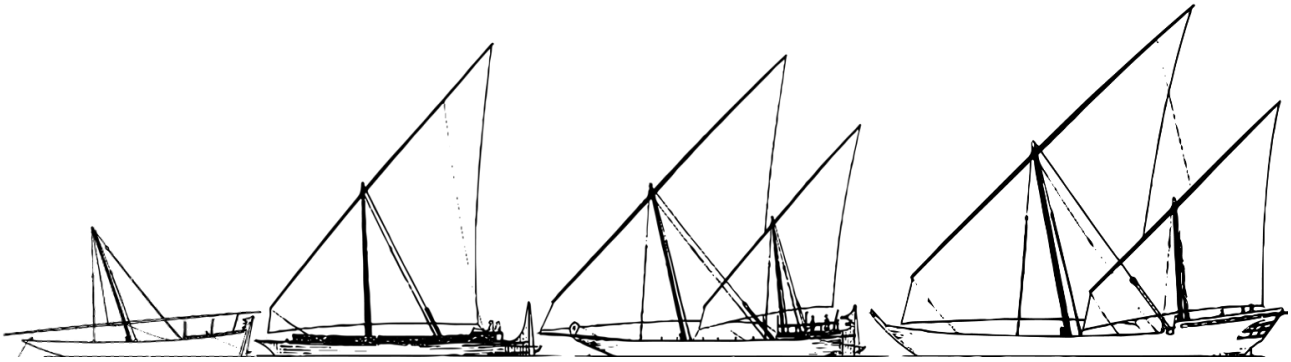


Figure 4.2 Profile silhouettes of dhows used for identification, from left: *baqqāra*, *badan*, *battīl*, *baghla* (redrawn after Hawkins 1977:138, 141).

A modification of the naval ship recognition system offers a way to articulate an identification of a watercraft by describing the shape, proportions, configuration and detail—the basic elements of recognition. Watercraft in images have defined shapes, elements are arranged spatially within the image giving proportions to the shape, propulsion and superstructure are arranged in specific configurations and the details of these elements and others, such as people, colour and flags, can offer further clues to identity. Moreover, these four elements offer categories for repeatable comparison. Within these elements, watercraft depictions will display morphological characteristics that can be clustered—the foundation of a classificatory system.

4.1.2.2 Clustering by shape, proportions, configuration and detail

In order to make inferences about technological change in watercraft engaged in organised violence, their representations need to be categorised in a way that enables analysis of significant features, such as type, weapons, structural characteristics, frequency of appearance and temporal scope. The differences and similarities in the forms of watercraft depicted in visual sources allow their classification into clusters on the basis of type (Wedde 2000:18–20). Each cluster contains visual sources that show watercraft with morphological characteristics similar to all the others in the same cluster, yet illustrated on different materials across the entire temporal range. The morphological characteristics can be further classified 'according to their structural significance and their frequency into primary, secondary, and incidental' (Wedde 2000:18). Wedde (2000:18) considers primary features to be those of the overall form of the watercraft depicted, 'without which it could not be depicted'. The primary features of the classification in this study relate to shape and

proportion—the form of the bow and stern of the vessel and the comparative heights of the ends, but particularly to the shape of the stern, the principal distinguishing feature of dhows. Four main clusters are created on the basis of stern shape: double-ended, square-ended, counter-sterned and undetermined. The types of shapes used to identify the first three categories are shown in Figure 4.3, while the last category must be included, as many watercraft are depicted in ways that mean the form of the stern in not clear. Some craft in this latter category may be assigned to other clusters on the basis of additional primary characteristics, such as the shape of the stem finial, which is distinctive in some classes of dhow, or by contextual documentary information. The use of size as a primary feature, as in the classification of a dhow as either a ship (*safīna*) or boat (*qārib*), has been avoided, as relative proportions may be distorted in visual sources.

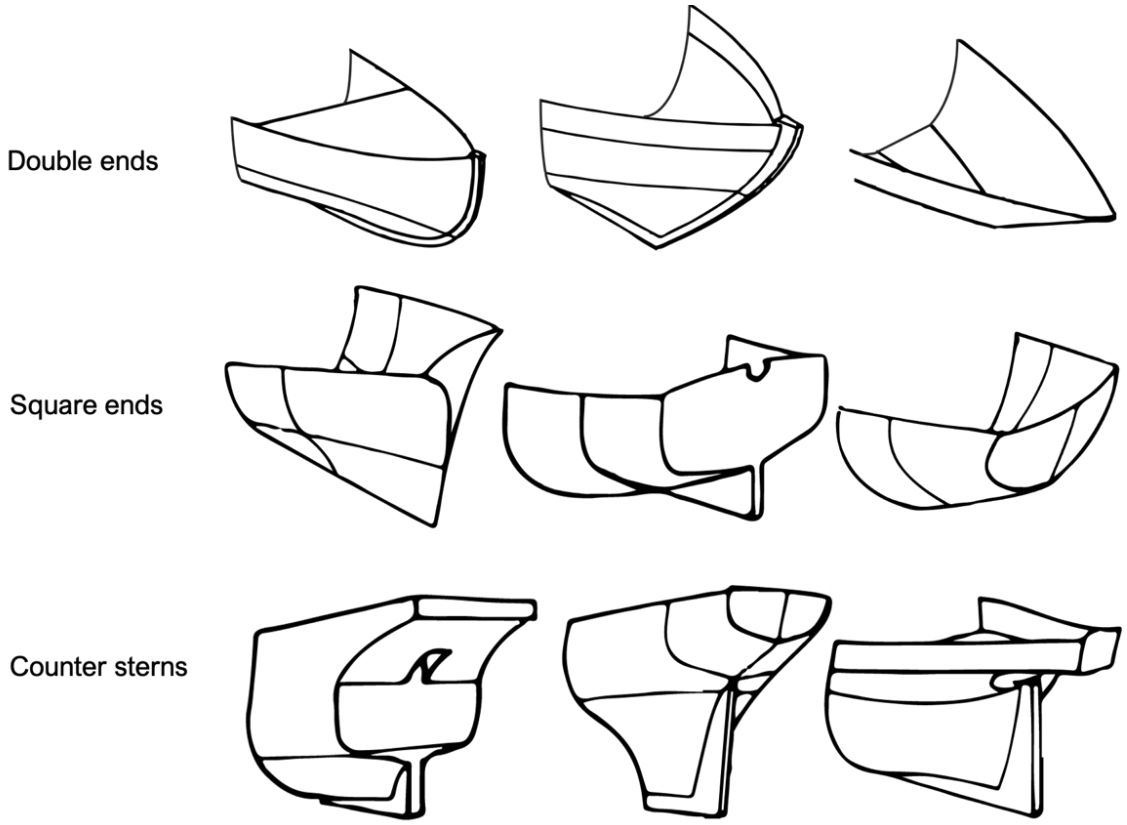


Figure 4.3 Types of stern shapes used in clustering visual sources (redrawn after McKee 1983:79, 84, 91).

Secondary characteristics relate to configuration and include forms of propulsion—mainly combinations of oars, masts and sails—and steering, decks, superstructures and major appendages. The incidental characteristics are all those others that form the non-diagnostic detail of the vessel, such as colours, flags, motifs, washstrakes, stanchions, deck matting and other miscellaneous features that may help to categorise use. Weapons and the structural modifications made to facilitate them—primarily gunports and stanchions—are included in this latter category as incidental features that might enable the identification of watercraft as fighting vessels of an established type. The primary and secondary features are used to establish the type of vessel while the incidental features

can indicate its use. A categorisation on the basis of use may also be made from contextual information in documents or other images describing violent events, such as when the watercraft involved are described elsewhere or if violence is not immediately apparent in the image.

In keeping with Wedde's approach (2000:19), the features and characteristics that enable identification must be explicitly stated. While each cluster will contain images of watercraft of several types exhibiting common traits, there will be considerable variation on the basis of secondary and incidental features and also by temporal proximity. The validity of identifications depends on Occam's razor—the simplest possible explanation. The number of craft similarly identified gives an indication of credibility and contextuality, while outliers must be explained rather than rejected. The identification of a unique individual without contextual evidence may therefore be invalid or an example of a dramatic change in technology, and 'a type receives greater validity if confirmed by further representations from several material categories' (Wedde 2000:20). Indeed, any identification requires the use of several visual, archaeological or textual documents and should only be made on the basis of primary features—secondary and incidental features account for variations of the type (Wedde 2000:20). Those craft that remain in the undetermined cluster after consideration of other evidence may provide contextual data, but by definition they cannot be identified by type. The aim of clustering watercraft images on this basis is to identify vessels engaged in organised violence on the basis of primary, secondary and incidental characteristics, thereby providing data for the analysis of technological change. The methods of analysis that follow rely on valid identifications and statements derived from this typological clustering process.

4.1.3 Comparative analysis

4.1.3.1 Comparative naval architecture analysis

Anderson used the term 'comparative naval architecture' as the title for a three-part paper in 1921, although he did not explicitly define it beyond 'a detailed examination of the difference between ships' (1921a:38). This form of comparative approach reflects standard archaeological practice that relies on a basic 'comparison of material traits to explore variation over time and space' (Smith and Peregrine 2011:4). As in Anderson's papers (1921a, 1921b, 1921c), comparison is usually an intertextual practice combining other forms of evidence with iconography and it is this form of comparison that underlies approaches to naval ship recognition discussed in section 4.1.2.1 above. Unger hints at the risk in relying on iconography alone for such comparisons: 'evaluating the accuracy of an artist's illustration of a ship is difficult, not only because of the medium but also because of the basis of such evaluation: the measure of accuracy must often be consistency with the work of another artist' (Unger 1991a:76–77). All forms of imagery can have some value in a study

of technology, as the things represented must at least form ‘a reasonable facsimile of the object’ (Unger 1991a:75). Analogies from archaeology and ethnography can provide checks on accuracy when comparing images to each other, rather than to the actual referent itself.

Constraints on the design of watercraft come from a range of interrelated social and environmental factors (Adams 2013:22–28). In the absence of more direct evidence behind the choice of various forms of vessel or their use for particular purposes, comparison with other, better-recorded types may offer insight. The use to which the projecting counter stern of the *dāw* was put is a case in point. There were contemporary, extra-regional analogues of the principal features of the fighting dhow that are worthy of comparison. Ottoman vessels (Güleryüz 2004), Mediterranean fighting craft such as the *xebec* (Boudriot and Berti 1991) and some East Asian watercraft exhibited similar characteristics of form that may help identify reasons behind their adoption in the *dāw*. Some contemporary European observers compared features of Indo-Arabian warships with more familiar vessels in their home waters (e.g. Lodewijcksz 1617:55; Parsons 1808:169; Witsen 1671:222, 223), comparisons that invite further analysis. The reuse of stock imagery from other cultural regions must also be investigated when considering depictions of Indigenous vessels, such as Witsen’s Malabar fighting vessel (1671:220, pl.87), directly copied from an image of a Bandanese vessel (Lodewijcksz 1617:56) that was itself adapted from an architecturally different Malabar vessel in van Linschoten’s earlier work (1955 [1596]:pl.12). As shown in Figure 4.4, Witsen’s later interpretation of the Malabar vessel includes a fighting platform not shown in Linschoten’s image, highlighting the need for contextual information in any comparative naval architecture analysis. Building methods and materials may also be illuminated by comparison of naval architecture through similarities with contemporary and vernacular watercraft of the western Indian Ocean. The process of comparative naval architecture analysis will be further facilitated by reconstructions of the main types of vessel under consideration, discussed below in section 4.2.

Figure 4.4 Reused stock imagery: from left, Linschoten’s Malabar fighting vessel (Van Linschoten 1600:46–47, f.9), a Bandanese vessel (Lodewijcksz 1617:56), and Witsen’s Malabar fighting vessel, including the fighting platform of the Bandanese craft (1671:220, pl.87).

4.1.3.2 Morphometric Analysis

Divergence among Indo-Arabian-Persian warship designs is quantifiable by analysis of the relative proportions of form taken from suitably detailed images. De Winter and Burningham (2001) have applied this method successfully to the analysis of seventeenth century Dutch vessels, overcoming the limitations of absolute measurement from images of varying size depicting vessels of unknown dimensions. The application of this method will rely on the identification of suitable images of vernacular watercraft in or near profile, which reduces the distortions of perspective (de Winter and Burningham 2001:58). This method makes possible the identification of temporal and spatial variation, as well as potential antecedents of similar morphological characteristics.

Coefficients of form derived from these measurements allow comparison of performance regardless of size (Chartered Institute for Archaeologists 2014:21–23; Steffy 1994:253–255). Where dimensions can be identified or scaled from images or descriptions, coefficients of form can be used to describe the characteristics and hydrodynamic performance of watercraft. In this way the potential speed, draught, load capacity and seaworthiness of vessels may be compared as Palmer (2003) was able to do for four types of Indian vernacular craft. In turn, and again where sufficient data are available, this can aid in comparing the representative performance characteristics of fighting vessels by type. Several elements of nautical morphology or form are potential correlates of violence. For example, the available deck area in relation to the waterplane area enables comparison of the fighting platform available on square-ended and counter-sterned vessels to that available on double-ended vessels of similar waterplane proportions. The dimensions of the useable areas of the fighting platform are important for the operation of carriage guns as they require room to recoil athwartships and also a minimum distance between them to accommodate the crew (Chapman 1820:90–104). This in turn describes the effective broadside length and the number of guns of particular calibres that may be arranged in a vessel of a certain length, such that a square-ended vessel would have a longer effective broadside than a double-ended vessel of the same waterline plane. Through these considerations, types of vessels may be compared for their efficiency at hosting ordnance, although this is only one element of consideration for evaluating the fighting power of a wooden sailing craft (Nowacki 2006:4–5). Through this method also, the thresholds imposed by stability and strength may be identified, where a vessel below a certain size could not support the operation of carriage mounted ordnance. The principal relative dimensions used for analyses and description in this research are shown in Figure 4.5.

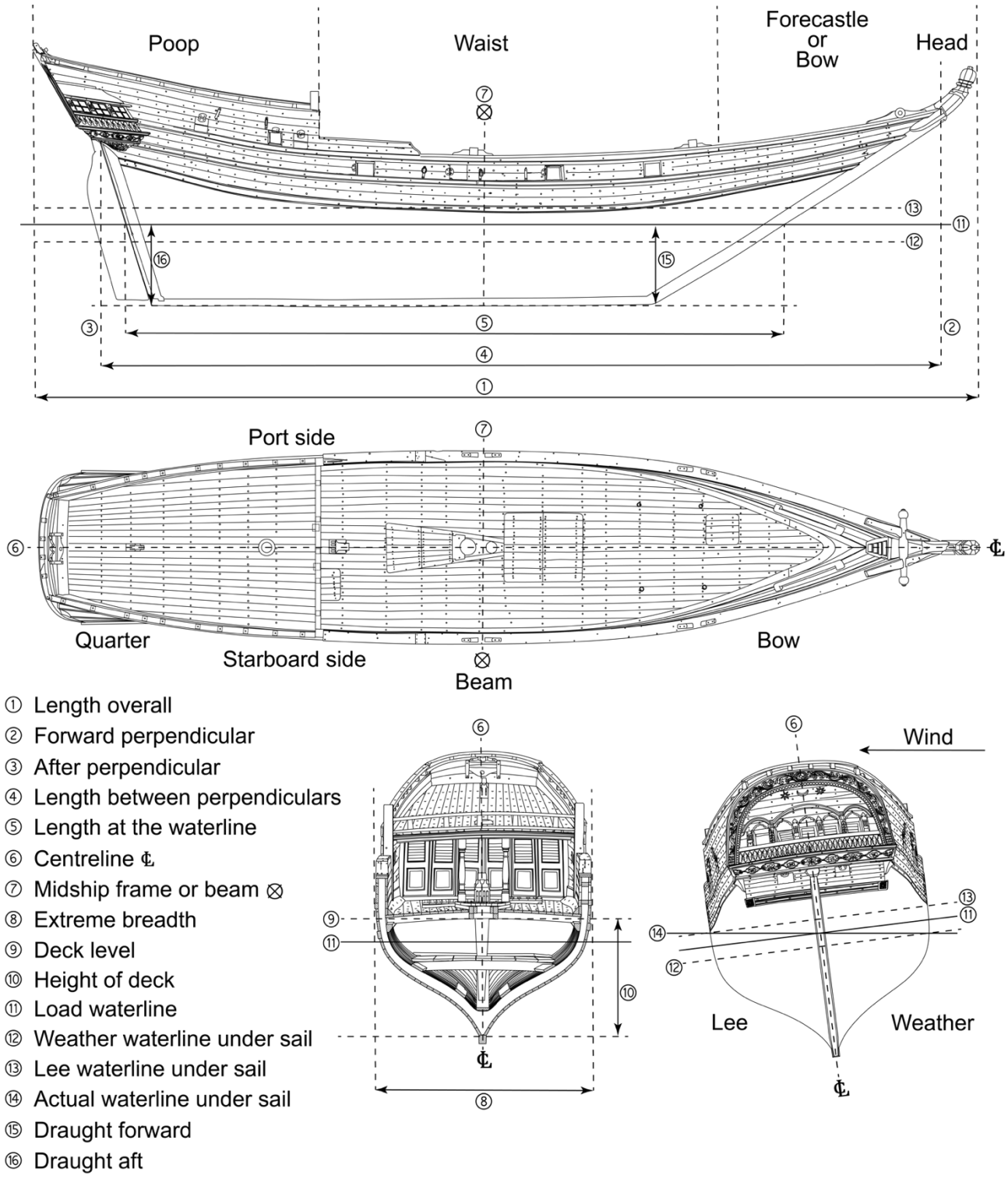


Figure 4.5 The principal dimension used for coefficients of form and description (Image: M. de Ruyter 2020; *baghla* drawing after N. Weismann 2014, used with permission; original concept after Mondfeld 1985:65).

The comparison of coefficients of form for each type of craft can suggest which types were more useful for particular roles. While stability thresholds are important for vessels loaded with ordnance, 'long ships' like Ottoman galleys are better suited to hosting forward-firing weapons, while 'round ships' commonly preferred for transport are better suited to hosting broadside weapons. These characteristics are compared over time where possible, as change in the length to breadth ratio of similar types of vessel may indicate changes in preference for particular ways of fighting. The

principal dimensions used for such comparisons are length overall (LOA) and breadth, but images rarely enable the identification of both. Some dimensions, such as length of keel or moulded breadth (measured internally), are also rarely observable in two-dimensional visual sources. Only relative proportions are used in these analyses, as absolute proportions are impossible to derive from visual sources of different sizes rendered in varying types of media (de Winter and Burningham 2001:58). An *estimate* of absolute measurements may be derived from comparison with figures in images or from known dimensions, but even then, all forms of visual representation used in this research, including photography, incorporate intentional or unintentional distortions (de Winter and Burningham 2001:58).

4.2 Archaeological inference from iconographic sources

4.2.1 Inferences from formation processes

When studying human behaviour through visual representations of past material culture one must consider the formation processes that gave rise to the archaeological and historical, including visual, record (Schiffer 1996:5). In this case the visual record is considered as subset of both archaeological and historical records as it contains both texts and sites, such as of petroglyphs, graffiti and carvings, as well as three-dimensional models. The corpus of visual sources may be equated with an assemblage of artefacts that is affected by a range of common formation processes, but then each type of artefact, or visual source in this case, is affected more or less by cultural and environmental formation processes, and then each artefact is individually affected by its context. For example, artistic and aesthetic conventions may have influenced the way elements of visual sources were depicted (Loren and Baram 2007:3), and the formation processes of visual sources are not as reliant on literacy or copying or archiving as are texts. As most visual sources were accessed digitally in this study, much of the context and formation processes affecting their preservation are unknown or lost, like individual artefacts in private collections, kept and traded for artistic value rather than archaeological inference. In some cases, the relevant context and formation processes can be partially reconstructed by reconnecting these artefacts to others of the same type or origin.

Formation processes are effectively agents of bias within a sampling framework. Of the ‘three basic populations of interest to archaeologists’, the ‘events in a past behavioral system’ relate to the use, adaptation or invention of vernacular fighting craft, ‘the artefacts created and deposited by that system’ are the material and documentary, including iconographic, records made of them, and the ‘artefacts that remain and are found’ population refers to what is now known in records and archaeological sites (Schiffer 1996:9). As with archaeological artefacts, some visual subjects are rarely depicted or missing altogether, ‘and these omissions from the visual record often result in historical silences about these subjects, silences that often extend into assumptions about the

trajectories to the present day' (Trouillot 1995, cited in Loren and Baram 2007:3). These discontinuities can explain why some types of visual source are more prevalent than others. In some cases, there were simply more made, so the initial population was higher. Therefore, the visual record alone cannot be said to be representative of the watercraft population due to inherent formation processes. Research questions pertaining to technological and social change may still be answered by the visual record despite these potential biases, although their assumed existence must be taken into account 'when using the evidence to infer past behaviors' (Schiffer 1996:6).

Rose (2016:24–27) uses a 'critical visual methodology' that takes into account many of the potential biases and formation processes to interpret images. Her method involves consideration of four sites 'at which the meanings of an image are made'—production, the image itself, circulation and audience—and technological, compositional and social aspects of each, referred to as 'modalities' (Rose 2016:24). These sites and modalities are shown in Figure 4.6. Interpreting images in this manner takes into account formation processes more commonly associated with the material archaeological record, but that are particularly relevant for visual sources. Schiffer considers 'conservatory functions' that change an artefact's use in an attempt to preserve it (Schiffer 1996:32), such as may be applied to manuscripts that become collector's items subsequent to their initial use. Recycling or remanufacturing (Schiffer 1996:29–30) can affect manuscript images that are retouched or defaced, or manuscripts in which images are later added. Secondary use, when 'objects take on a new use without needing extensive modification' (Schiffer 1996:30), can affect petroglyphs that may have been reused as gameboards, or in the case of the al-Balīd ship timbers (Belfioretti and Vosmer 2010). Copying is a special form of recycling or secondary use, potentially resulting in forgeries like that shown in Figure 4.3. Individual pieces are much less likely to survive than ones that have been copied, such as masterful images in Islamic manuscript painting, or lithographs or woodcut prints rather than oil paintings. The role of child's play as a formation process also cannot be discounted (Schiffer 1996:75), particularly with regard to models, graffiti and shadow puppets. Discards of visual sources are rarely encountered because of the degradation of the support material, such as paper, canvas, wood and ceramics, or of the pigments and inks that created the image. Often the support material itself rather than the visual representation may have been the subject of reuse. Weathering of petroglyphs and graffiti must be considered, as well as intentional destruction or defacement like iconoclasm (Grabar 2005). By combining Rose's critical visual methodology with archaeological approaches to formation processes, the visual sources used in this research are interpreted in ways that remain conscious of inherent biases in order to produce valid inferences.

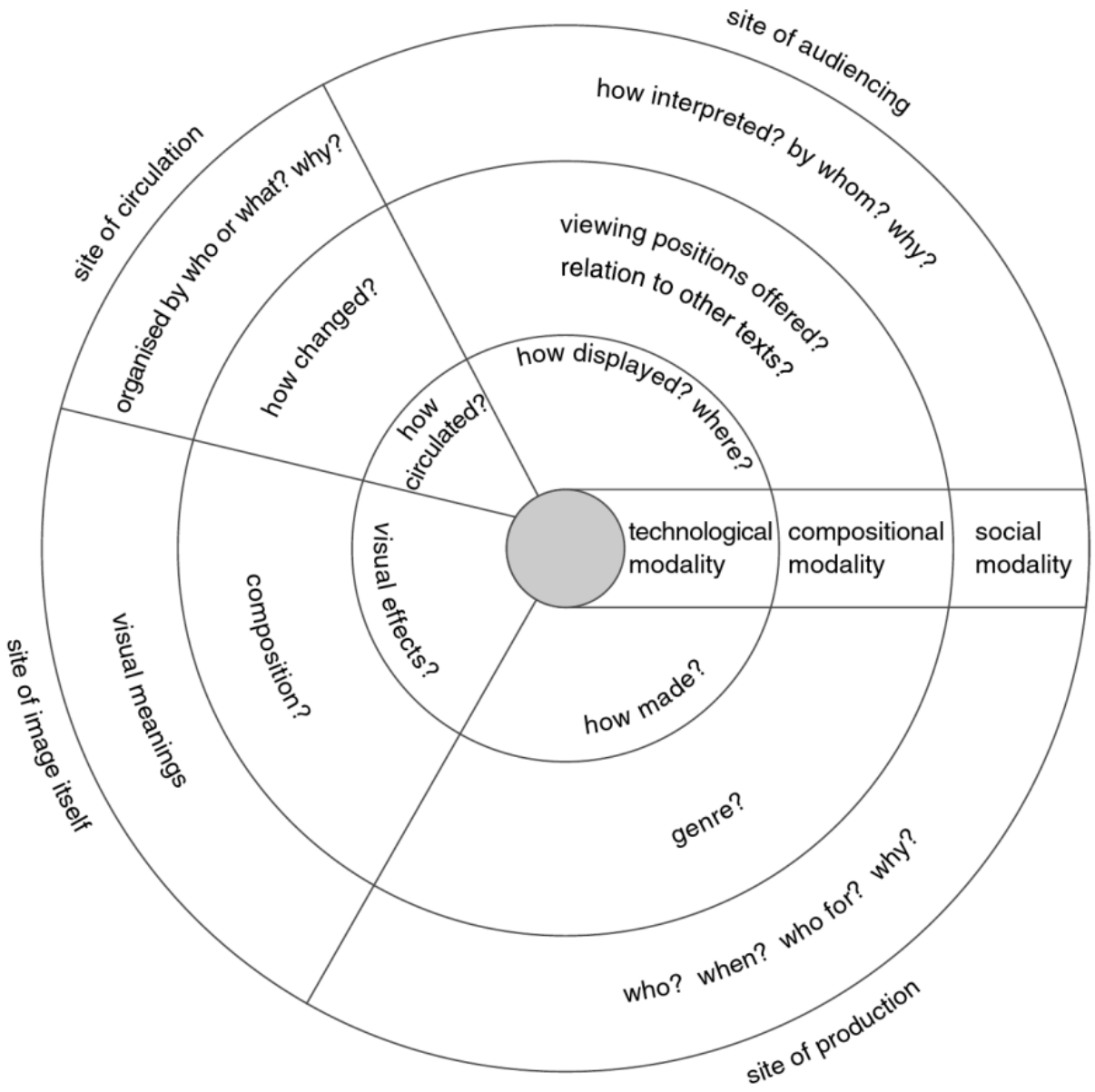


Figure 4.6 The sites and modalities for interpreting visual materials used in Rose's 'critical visual methodology' (redrawn after Rose 2016:25, fig.2.1).

4.2.2 Behavioural inferences

Watercraft used for organised violence may have initially been multi-function vessels or intended for another use entirely, such as many of the craft taken up from trade to oppose the initial Portuguese assault on Hormuz in 1507 (Birch 1875:105–106). As Van Keuren notes, 'our customary analysis of […] form, function, typology and design can obscure the multiplicity of ways that people use [watercraft] in the past' (2017:51). Skibo's (2013) study aimed at inferring the function of pottery from archaeological remains offers insights that may equally be applied to vernacular watercraft. While acknowledging that analysis of intended function is important, he demonstrated several reasons for differences in actual function and how understanding this variation makes for better inferences (Skibo 2013:4–5). He posits that analysis of the actual function of an artefact allows for 'more precise' inferences, that the intended function is not always how the

artefact was used, and that actual function is important as many artefacts are multi-functional and inference from design may be inadequate (Skibo 2013:4). Artefacts can also be reused and recycled and otherwise utilitarian artefacts may be deposited in ritual contexts (Skibo 2013:5). To paraphrase Skibo's (2013:4) approach: 'knowing actual function, therefore, provides a more accurate guide to [watercraft] use when inferences drawn from the [builder's] technical choices may be unclear'. Visual sources provide a way of understanding how actual function corresponds with intended function, at least as far as the limitations of using historical images allow. This approach is strengthened by aggregating observations from a corpus of visual sources.

Schiffer and Reid (2017:4) advocate a 'strong case' approach when inferring behaviour from evidence, where a strong case 'is an analytic unit […] defined on the basis of formation processes, that has been argued relevant for solving a specific research problem'. The corpus of visual sources representing watercraft from the thirteenth to the nineteenth centuries is the 'analytic unit' in this case. Inferences generated from analysis of visual sources are often weak cases, as they use small samples removed from context without sufficient attention to the formation processes that created the artefact (see Schiffer and Reid 2017:4). As Wachsmann (2019:6) exhorts: 'a representation of a ship is not the ship itself', and direct correlations of an image with an object from the archaeological record avoids 'critical issues of origin and intent, such as who is depicted and why, what ideologies are represented, who was the artist, who had access to such images, and how are such images used in the present' (Loren and Baram 2007:1). Visual sources, interpreted and corrected for the biases discussed above, can support a strong case when archaeological sources provide an insufficiently large sample and when historical sources lack the resolution necessary to investigate technological change in detail. These other, albeit limited, sources of evidence are still required to validate and establish a strong case based primarily on visual sources, along with data from experimental and ethnographic archaeologies. Together, these sources allow for the evidence-based reconstruction of watercraft to support inferences of how societies changed these complex socio-technical systems over time and space.

4.2.3 Drawing inferences through reconstructions

Reconstruction images of past lifeways and technologies are common in archaeology, used for public interpretation, research and teaching (James 1997:22; Perry and Johnson 2014:323–324). While the technique may subtly differ for public and academic audiences, the principal aim is communication of ideas and information (James 1997:22–23). Illustrations are sometimes viewed as 'auxiliaries to written text' in scholarly publications, yet reconstruction images are used in archaeology to express and shape arguments and interpretations of the human past (James 1997:24). It is in this sense that reconstructions of watercraft are used in this thesis—as interpretative tools, to

demonstrate evidence of technological change in such a manner that diverse intertextual sources may be rendered comparable.

Steffy's (1994:214) view that 'ship and boat reconstruction, in the archaeological sense, is the partial recreation of the remains of sunken or abandoned vessels and the people and processes that influenced them', supports the use of reconstructions of watercraft to infer past behaviour. The cases presented in this thesis are recreated without the benefit of physical remains, as they are yet to be excavated, although 'the success of a reconstruction is largely restricted by the ingenuity of its investigator, not the extent of hull survival' (Steffy 1994:6). While there can never be a complete reconstruction based purely on historical evidence (Steffy 1994:8–9), and physical reconstructions are beyond the scope and budget of this study, reconstructions in graphic form can show the interpretations developed in this research and can become 'an invaluable research tool' (James 1997:24–25, 27). Perry and Johnson claim that using reconstruction images in archaeological practice in this way has a 'productive quality' that encourages the reformulation of 'interpretative approaches' (2014:324).

4.2.3.1 Three-dimensional reconstructions

Full-sized and scaled three-dimensional reconstructions have been used, particularly in the study of dhows, to generate data for comparison and inferences of past behaviour (Staples 2019). Examples of these reconstructions were discussed briefly in section 2.4.2.3. Principal among these is the *Jewel of Muscat* (Fig. 4.7), a sewn-plank vessel reconstructed to show a ninth-century ship on the basis of the Belitung wreck and iconography (Staples 2019:315–319). This vessel was used for interpretation of construction techniques and ultimately display, but also for the experimental value of operating the craft on a voyage from Oman to Singapore (Vosmer et al. 2011). Such a project required a significant budget and an entire project team and crew to manage it, and Crumlin-Pedersen and McGrail (2006:53) have insisted that such projects be 'undertaken by independent, inter-disciplinary group of experienced maritime archaeologists, naval architects, craftsmen and sailors'. While a full reconstruction along the lines of the *Jewel of Muscat* project is clearly beyond the scope of a thesis, the principles employed by the project team and the lessons learned from the experience reinforce the value of using reconstructions as interpretative tools in archaeology.

Figure 4.7 The full-sized sailing reconstruction ninth-century vessel *Jewel of Muscat,* shown here on sea trials in Oman, is an example of an experimental archaeology project conducted by an inter-disciplinary team (Image: Alessandro Ghidoni, 2010).

Digital two- and three-dimensional reconstructions of watercraft are used widely in maritime archaeology as interpretative models in ways similar to, but cheaper than, full-sized reconstruction projects. Studies of dhows have included conjectural reconstruction drawings, such as that used by Facey and Martin (2001:51), which purports to show a watercraft 'probably used by [medieval] Omani seafarers' shown on the left in Figure 4.8. This image is clearly based on ethnographic analogies with watercraft of the early modern era and exhibits more than a passing resemblance to the *baqqāra* [A2.3] and the smaller *battīl qarib* [A2.5]. Another reconstruction image of a late-medieval Arabian Sea ship was drawn by Burningham, a prolific reconstruction artist, principally using iconographic evidence but also features of the Belitung wreck (Fig. 4.8 right) (2019:145–147, fig.6.1). These two images represent extremes of interpretation based on evidence, the *baqqāra*-like vessel on left offering a conservative approach, while Burningham's reconstruction on the right looks unlike any vessel observed by ethnographers in the nineteenth or twentieth centuries. Nevertheless, the second reconstruction is equally valid and serves to encourage interpretations unconstrained by modern examples. Even though the watercraft examined in this thesis are in some cases substantially unlike those observed by ethnographers and photographers in the nineteenth century and later, each element of their reconstructions must still be based on valid evidence.

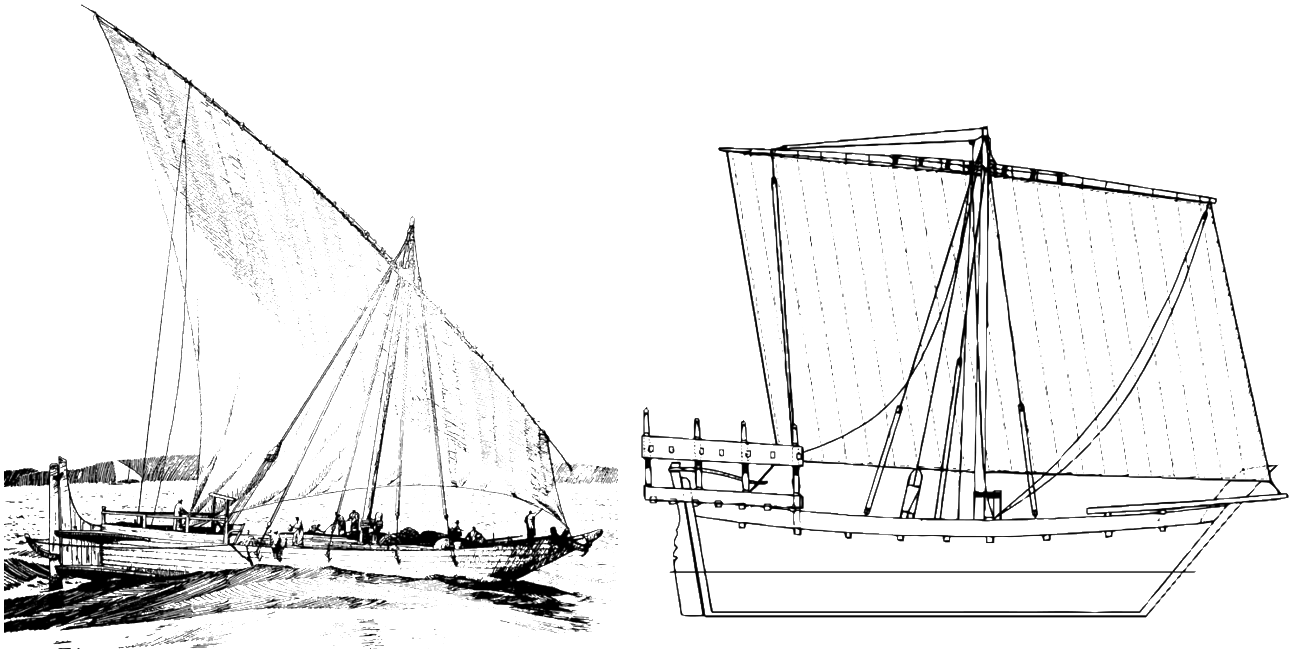


Figure 4.8 Reconstruction drawings of late-medieval dhows based to varying degrees on ethnographic analogy, iconography and archaeology (left after Facey and Martin 2001:51; right after Burningham 2019b:146, fig.6.1c).

4.2.3.2 Evidence-based reconstruction images

Archaeological reconstructions should be based on all of the 'rigorously obtained' evidence available, on the building styles and conventions of the time, on 'architectural and engineering considerations' (Adkins and Adkins 1989:132), on the 'physical properties of the materials and structures depicted' (James 1997:25), and on ethnographic analogies of similar craft, although those parts based on evidence and those on analogy need to be distinguished (Adkins and Adkins 1989:132–133; James 1997:25). A reconstruction so formed 'must not contradict the evidence and should aim to account for as much of it as possible' (James 1997:25). James (1997:25) claims that the only real certainty of a reconstruction drawing is that it is wrong, the question being to what degree. He also cautions that 'demonstratable accuracy is inversely proportional to the complexity of the scene' (James 1997:25), implying, for example, that reconstruction of a 14-gun *dāw* should rely on more evidence than the smaller and simpler *baqqāra*. Perversely, the smaller vessel has been captured regularly by photographers, been measured in life and examples preserved in museums, consequently becoming far easier to recreate based on such evidence. Yet, as 'a good understanding of the functional aspects [...] is essential to the creation of good reconstructions' (James 1997:27), close observation and interpretation of smaller, more common types of vessel and of extant large craft like the *ghanja* (Dzianski and Weismann 2010), can improve the quality of the interpretation of the now extinct *dāw*.

The reconstructions attempted in this thesis are evidence-based conjectural drawings. Each specific feature included in the reconstruction is reasoned on evidence, a research approach that aligns the process of drawing with observation and measurement. The validity of each feature included in the

reconstruction is improved by an increase in the number of supporting cases observed. Reconstructions based principally on iconographic evidence benefit from using as many cases as possible to avoid what Wedde (2000:21–22) calls the 'single item solution fallacy', in which a temporally or spatially unsupported document acts as a solution to a particular problem. While some features like sails and rigging are supported by significant ethnographic evidence, elements like counter sterns that have not survived in either the archaeological or ethnographic record are based primarily on iconographic evidence. The reliance on iconographic evidence is in proportion to the rate of change or senescence of the reconstructed craft, so that craft that were extinct by the mid-nineteenth century, like the *kalbā* and *dāw*, draw more heavily on historical visual sources than do the *baqqāra* or *baghla* that survived into the modern age. Having reconstruction as a method will in turn aid interpretation and reinterpretation during the research process (James 1997:46), encouraging further enquiry into the technical choices and social processes of those who made and operated vernacular fighting craft.

4.2.3.3 Techniques of reconstruction

Although they were concerned with physical reconstructions of ancient watercraft, the principles advanced by Crumlin-Pedersen and McGrail (2006) can be adapted to inform techniques of reconstruction drawing and modelling. They offer five principles that act as guides: the effects of deformation on hull shape, consideration of 'modern naval architectural standards', the use of 'alien' or foreign features to complete the reconstructed hull, a concern with 'propulsion, steering and seaworthiness', and the notion of 'minimum reconstruction' (Crumlin-Pedersen and McGrail 2006:53).

a. *The effects of deformation on hull shape*: The original principle considered problems of 'deterioration, deformation and shrinkage' in the physical remains of watercraft (Crumlin-Pedersen and McGrail 2006:54). Deformation also occurs in iconographic representations as the artist interprets the actual shape and attempts to represent it within the limitations of the medium and support used for the artwork (Fig. 4.9), so that even realistic portraits and photographs are, to an extent, distortions (Burke 2001:21–33). This is an example of considering the technical modality of image production, as shown in Rose's diagram in Figure 4.6 above. The effects of perspective must also be considered, while the limitations of particular types of iconography are considered in the next chapter. The exhortation to 'keep an open mind about possible alternative solutions' when reconstructing hull shapes and details of watercraft defines this principle (Crumlin-Pedersen and McGrail 2006:54).

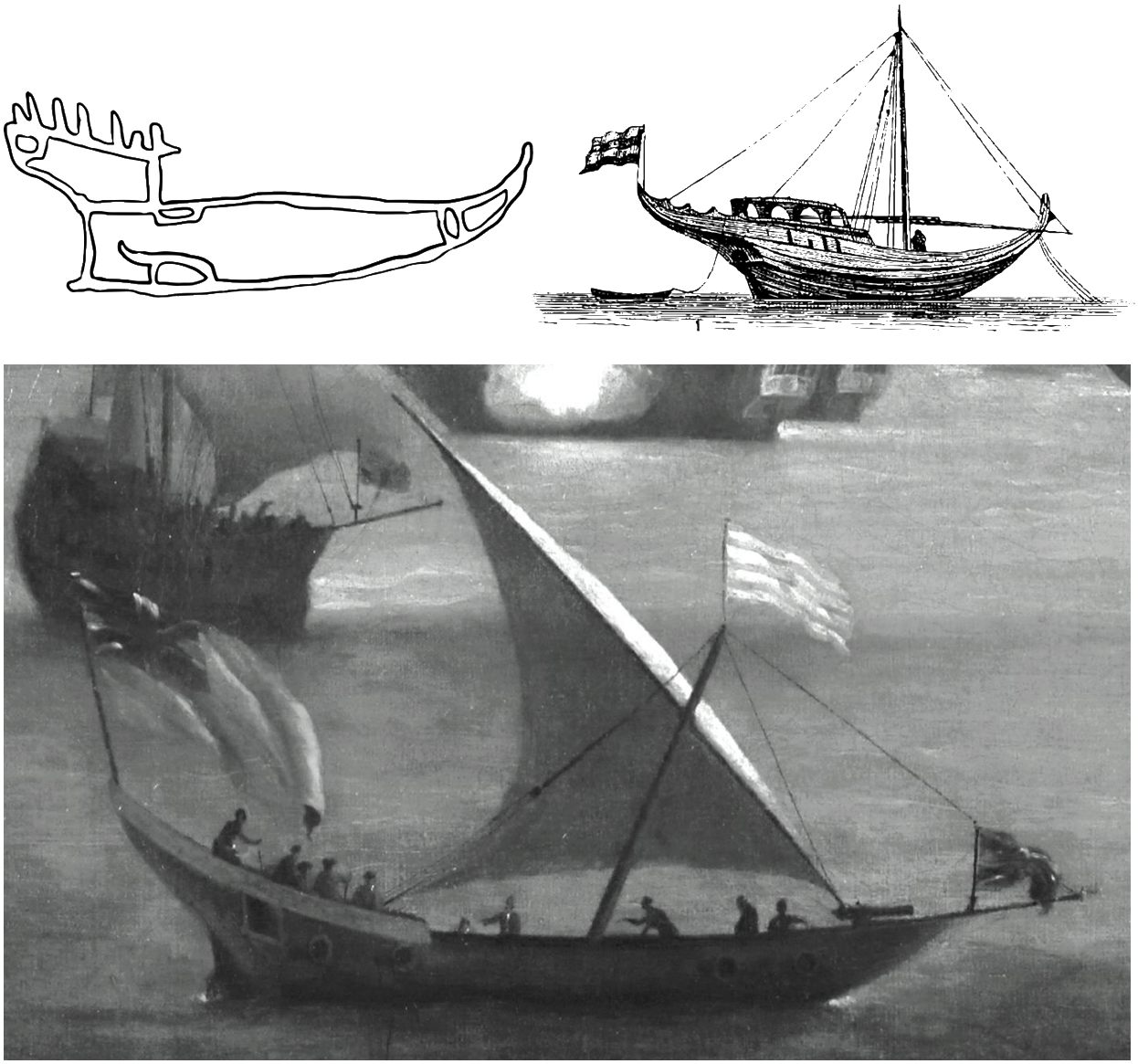


Figure 4.9 Three essentially similar counter-sterned hull shapes demonstrating distortions of form inherent in artistic media: top left, petroglyph from al-Jusāsiyyah, Qatar (after Kapel 1983:fig.3); top right, Red Sea 'dow' observed in 1795, engraving based on pen drawing (reversed, after Conant 1806:200); and bottom, a gallivat in Bombay, 1674, oil on canvas (detail from Lambert and Scott c.1731, The British Library Board, F48).

b. *Modern standards of naval architecture*: Crumlin-Pedersen and McGrail (2006:54–55) warn against the assumption of straight or parallel lines when reconstructing watercraft built by craftsmen with simple tools using rules of thumb. Modern standards of fastening are also questionable, especially when organic fastenings—ligatures and wooden treenails—are used. The loads that such a hull might bear will be difficult to calculate without 'calibration data from full-scale trials' (Crumlin-Pedersen and McGrail 2006:55). The application of this principle therefore limits assumptions, for example about the weight of ordnance that a dhow hull could bear, without access to details of internal structure and fastenings.

c. *Introduction of foreign elements*: Except for models and measured drawings, most forms of iconographic representation only show a single perspective of a vessel leaving missing features to

be mirrored or extrapolated. In these cases, supplementary evidence is required, but this will usually come from different vessels, such that ‘solutions based on evidence from other vessels built within the same tradition, and used under similar conditions, but of a somewhat [different] date, must be presented in detail and their relevance clearly argued’ (Crumlin-Pedersen and McGrail 2006:55). Rose’s ‘site of audiencing’ (2016:24–27) is important here, as foreign elements may have been included to make the resulting image more pleasing or intelligible to the intended, usually European, audience (Fig. 4.6). This is shown clearly in a painting of a dhow in the Strait of Hormuz that includes a bluff bow, a bowsprit and a short foremast, an arrangement familiar to Europeans but unknown in Khaliji dhows (Fig. 4.10). In this thesis, it is assumed that any watercraft depicted afloat was able to maintain buoyancy, function and move, but ‘circular arguments’ based on imported or foreign elements are avoided (Crumlin-Pedersen and McGrail 2006:55).

Figure 4.10 Painting of a dhow with ‘foreign elements’—a bluff bow, a bowsprit and a short foremast (Daniell, W. c.1790–1837 [artwork]).

d. *Propulsion, steering and seaworthiness*: Prevailing environmental conditions, particularly the effects of tide and wind, must be taken into account when reconstructing watercraft, as these influence the types and magnitude of propulsion fitted. Craft should be reconstructed for the environment in which they were operated, such that shallow-draft inshore vessels should not be depicted under a press of sail so large that it would induce instability (Crumlin-Pedersen and McGrail 2006:55–56).

e. *Minimum reconstruction*: The term ‘minimum reconstruction’, when applied to watercraft, means reconstruction ‘without recourse to naval architectural conjectures, alien elements, or anachronistic intrusions’, therefore combining the notions discussed above with reliance on ‘valid comparative evidence’ (Crumlin-Pedersen and McGrail 2006:57). In reconstruction illustrations those parts

based on conjecture, or for which there is no direct evidence, should be so indicated (Adkins and Adkins 1989:132–133; James 1997:25).

Together, these five principles inform the reconstruction of watercraft in this thesis. The resulting reconstructions, and the evidence upon which they are based, of the main types of vernacular fighting craft used in the early modern Persian Gulf are discussed in Chapter 7.

4.3 Summary

The methodological foci of this study aim to elicit inferences of behaviour by observing changes in the technology of vernacular watercraft in the visual elements of historical discourse. This relies on explicit statements of assumptions about how images of these watercraft are formed and can be interpreted, and how archaeological inferences can be drawn from them. This chapter has explained the assumptions behind this study and has described the methods and techniques used to generate the data from which to make inferences. The next chapter discusses the disparate sources of significantly varying resolution, detail, faithfulness to form and technical merit that may potentially be compared to offer evidence of technological and social change.

5 THE VISUAL RECORD OF KHALIJI SEAFARING

The written record of dhows is predominantly European, so much so that rare non-European sources are rendered unimportant by failing to offer any technical detail of consequence (Agius 2008:221). The archaeological record is similarly insignificant, and only a few sites can be counted as contributors in this regard. The ethnographic record is only relatively recent and is focussed almost entirely on activities other than fighting, including fishing, pearling, transport, transhipment, water carrying, even specialised stone carrying dhows, but few warships. Until recently, little of this ethnography has been conducted by scholars indigenous to the cultures or societies they examine. That leaves visual sources, oral histories and linguistics as the only other major sources of evidence available and of which visual sources are the most appropriate for the study of technology. This chapter presents the available types of visual sources that represent seafaring with vernacular watercraft in the early modern Persian Gulf.

5.1 Graphic representations from Khaliji sources

5.1.1 Islamic manuscript painting

When applied to art, the problematic and increasingly anachronistic term ‘Islamic’ refers to secular and religious works by and for people of a variety of faiths made in regions controlled by regimes that profess Islam (Michelsen 2014:4075). Despite the presence of outsiders, Khaliji societies and those of the Persian Gulf hinterlands certainly met this definition during the early modern period so their works may be considered Islamic (Potter 2009:2). ‘Islamic art’ maintains a particular style and uniformity throughout the period under review, when artists ‘remained attached to the model whose merit had been sanctioned by time and convention, seeking to renew its appeal, rejuvenate its character, by subtle variations in character’ (Rice 1975:7). Nevertheless, there is no single monolithic style and a multitude of ways have been used to distinguish the elements that broadly comprise Islamic art (Grabar 2006:247–248). The range of art covers calligraphy, costume, jewellery, arms and armour, metal ware, book binding, carpets, ceramics, carvings and more (e.g. Rice 1975), but this study focusses predominantly on manuscript paintings due to their capacity to show detail and their almost exclusive association with written text (Grabar 2006:249). This contextuality and materiality of Islamic visual culture beyond mere ‘aesthetics and connoisseurship’ emphasises the functional and social elements of its creation and use (Michelsen 2014:4074), and it is from this aspect that manuscript paintings inform this study.

Islamic manuscript paintings can be ascribed to certain periods or schools, and lately geographic regions, on the basis of stylistic variations (Michelsen 2014:4075). The general categories of

Islamic manuscript painting of relevance to the Persian Gulf are Mesopotamian from the tenth to the thirteenth century, Persian from the fourteenth to the nineteenth century, Ottoman from the fifteenth to the nineteenth century and Moghul or Indian from the fifteenth to the nineteenth centuries. These general categories can be further refined by dynastic period or the location of the particular court that commissioned the art, which in the cases of Mesopotamian and Persian manuscript painting in particular can suggest the degree of familiarity with watercraft that the artist was likely to have. The 'stereotyped, stylized, [and] archaic' illustrations of 'land-lubbers' and the 'untutored' can still be useful representations from which to study watercraft (Nicolle 1989:168), particularly when used in aggregate to show practices and functions. Once a class or type of watercraft is identified or established, further works by the same artist or by others may be assessed against the archetype, such that even otherwise unreliable imagery may hold information of technical value (Unger 1991a:77). This is clearly the case with Islamic manuscript paintings that are highly stylised or caricatured, yet that can still be used to show the functional employment of watercraft, particularly in relation to violence, and the trends of architectural form rather than detail.

5.1.2 Persian manuscript illustrations

Persian manuscript illustrations, known as miniatures or illuminations, are some of the most distinctive pieces of art created by the cultures that occupy the Persian Gulf (Agius 2008:31). The limited interpretation of this form of art as evidence of nautical material culture is dismissive (Nicolle 1989:183–187) or restricted (Agius 2008:382), for a number of good reasons. These artworks were generally created in Persian centres far from the sea, where artists had precious little opportunity for exposure to the actual watercraft they were commissioned to depict (Eastman 1950:162–163). Much Persian art was commissioned under the patronage of the ruling dynasty to illustrate great narratives about the golden age of Persian power or contemporary patrons, none of which had much to do with the sea. The Portuguese assault in the start of the sixteenth century was of no immediate consequence to the ruling Persian dynasty to whom the Hormuzis nominally deferred, and the Islamic-era Persian state did not face a major military challenge from the sea until the middle of the eighteenth century (Floor 1987:31–33). Battle was a persistent theme in Persian miniature painting, but there were few incidents at sea of sufficient importance to be represented in art patronised by rulers far inland. Where there were, the appearance of sea monsters often portends grief or evil (Simpson 1997:56–57). Resulting images are often stylised and lack detail, but nevertheless depict the forms of watercraft, their activities and social structures onboard (Fig. 5.1).

Figure 5.1 A 1533 painting from the *Ẓafarnāmah*, a biography of Timur, showing structural features of watercraft and clear differentiation between courtiers and passengers, soldiers and crew (BL IO Islamic 137:f.50r, courtesy of the British Library) [B2.20].

Foreign influence is particularly apparent in Persian miniature painting of nautical subjects, and Persian art in general was widely adoptive of styles and detail from foreign sources (Eastman

1950:162–163). Turkish and Mughal art of similar styles was well represented in Persian libraries, along with European illuminated manuscripts. Watercraft were relatively competently and reliably depicted in European and Turkish Ottoman manuscripts (Nicolle 1989:183), providing stock imagery for reuse in Persian illuminations. Persian nautical illustrations from this period may then lack credibility as Indigenous witness statements, but they still have value as interpretations of maritime culture (Nicolle 1989:163). Even as medieval European illuminations and maps often depict ships and boats ambiguously, they have been shown to have great representative and symbolic value (Flatman 2007, 2009; Unger 1991b, 2010). The presence of details that are not explicitly described in the documentary record, or that do not make it into the archaeological record, has demonstrated the value of European illuminations of ships and boats. The same values are not readily associated with Persian nautical art (Nicolle 1989). The aggregate value of Persian miniatures depicting watercraft is, though, much lower than that of equivalent European illuminations. With far fewer relevant images, little direct maritime experience, a demonstrated propensity to adopt foreign styles and ambivalent patronage, Persian miniatures appear an unpromising subject upon which to base an analysis of nautical material culture (Nicolle 1989:168). As with European illuminations though, there is still representative and symbolic value to be found in the corpus of Persian maritime illuminations. The value of Islamic depictions of watercraft may lie in the ways they illustrate social aspects of seafaring rather in their technical merit or consistency. The perils of relying on the latter are demonstrated by the *Maqāmāt* ships, Mesopotamian manuscript paintings that are perhaps the most famous Islamic depictions of watercraft from the Indian Ocean.

5.1.3 Mesopotamian manuscript paintings

Mesopotamian or Arab manuscript painting enjoyed only a brief florescence from the eleventh to the thirteenth centuries (Grabar 2007:21), but nevertheless produced perhaps the most recognisable pre-modern image of an Indian Ocean watercraft—the illustration in the Paris Schefer *Maqāmāt* from 1237, shown on the left in Figure 5.2. The *Maqāmāt*, which translates roughly to ‘the Assemblies’, is a collection of 50 stories, or *maqāmah*, written by Al-Hariri in the eleventh century that remained popular for several centuries. The appeal of the work lay primarily in ‘verbal pyrotechnics’ rather than the imagery created by the stories, which are really only props for the literary and linguistic wonder of the text (Grabar 2005:188–189). ‘Of Oman’, the thirty-ninth *maqāmah*, describes a voyage in the Persian Gulf to Suhar in Oman during which the ship is forced to shelter at an exotic island (Steingass 1898:93–94), a story illustrated with sea-going vessels such as those in Figure 5.2. The twenty-second *maqāmah*, ‘Of the Euphrates’ takes place on a riverine craft (Chenery 1867:229) and is illustrated with open boats. While there are other representations of

watercraft in Arab manuscript paintings, and relatively few that can be ascribed to Indian Ocean traditions rather than those of the Eastern Mediterranean, the images in several copies of Al Hariri's *Maqāmāt* are the most prominent. Of more than 200 extant copies of this manuscript, only 13 are illustrated and four of these accord with the Baghdad school (Grabar 1984:7–19), meaning that they most likely represent Indian Ocean watercraft.

Figure 5.2 Two representations of an Indian Ocean ship from Al Hariri's *Maqāmāt,* (left) from *maqāmah* 39 of the Paris manuscript, 1237 (BnF Arabe 5847:f.119v) [B2.32], and (right) from the St Petersburg manuscript dated 1225–1235 (IOS St Petersburg Ms. S23:260) [B2.104].

This familiar image came to prominence in nautical archaeology with Hourani's interpretation of it as a sewn-plank ship in his book *Arab Seafaring* in 1951, when there were few other pictorial or material sources known to researchers. The detail, state of preservation and free availability of the Paris *Maqāmāt* ship illustration nearly 800 years after it was painted has made it a modern success and it is frequently cited in works on Indian Ocean seafaring (e.g. Agius 2005:139, 2010:70, 2012:51; Facey 1987:201; Facey and Martin 1979:108; Hourani 1995 [1951]:92; Howarth 1977:19; Lambourn 2018:190–192; Mott 1997:122–123; Sheriff 2010:84). As a result it has been the basis of interpretations of the Belitung shipwreck in Indonesia (Flecker 2000:213–214), the Punom Surin shipwreck in Thailand (Guy 2019:126), and the nautical petroglyphs at al-Jusāsiyyah in Qatar (Facey 1987:201). It has also been used in part as the basis for the reproduction sewn-plank ships *Sohar* in 1980 (Staples 2019:316) and *Jewel of Muscat* in 2008 (Staples 2019:318–319).

The illustration on the right in 5.2 is from the more obscure St Petersburg copy of the *Maqāmāt* dated to 1225–1235. These two ship images are used to illustrate different parts of the story: the Paris manuscript image (left in Fig. 5.2) shows the passage to Oman, while the St Petersburg image (right in Fig. 5.2) shows the moment when the principal character of the story is negotiating his passage onboard in Basra in exchange for a charm to 'shield against anxiety, when the wave of the deep rages' (Steingass 1898:96). In the earlier St Petersburg image, the only illustration in that *maqāmah* in the manuscript, the mast is broken, the oars are out, and the crew is bailing. In the later Paris version these artistic elements are copied in the first of three illustrations showing the ship at sea before arriving at the magical island. The damaged ship is hidden behind the island in the second illustration and not shown at all in the third. This sequence of illustrations has convinced some that the Paris manuscript is truer to the text of the story and that the mast shown in the St Petersburg manuscript is not broken (Burningham 2019b:157). Nevertheless, such an interpretation ignores the intent of the charm offered for passage as a 'shield against anxiety' (Steingass 1898:96). To illustrate the concept, the artist has shown the ship in obvious distress and the single image therefore appears to diverge from the narrative sequence of the text.

The two representations shown in Figure 5.2 are similar in many aspects, which may indicate that the artists used the same or similar referents. The referents could of course have been actual ships, several of which would have been available in riverine ports in Iraq where these works were illustrated, the common assumption in interpretations of these images (Burningham 2019b:147–150, 157). George (2011) has shown convincingly that many of the *Maqāmāt* illustrations were actually based on shadow puppets, as indicated by figures shown in profile and structures shown in silhouette. The 'flat outline' of ships, the 'disproportionally large human figures' and devices for framing used in other structural puppets indicate the 'imperatives of visibility in the shadow theatre' (George 2011:11). Indeed, it may never have been the artist's intention to create a realistic representation of a contemporary watercraft, but rather to offer a metaphorical caricature. Drawing conclusions about structural arrangements, the number and configuration of masts for instance, from single illustrations created in such a way is fraught. Interpretation of watercraft in iconographic depictions, and in Islamic art in particular, benefits from contextual information when available and, when not, from comparison with other spatially, temporally or culturally related depictions (Wachsmann 2019:9). The pervasiveness of this image and interpretations of it in regional maritime archaeology studies demands that it be reviewed in this research, even though it is from an earlier epoch than the period under consideration here.

5.2 Graphic representations from extra-regional sources

5.2.1 European graphic sources

European artists, travellers, mariners, merchants, cartographers and diplomats sought with varying effect to represent watercraft from the western Indian Ocean throughout the entire period of this study, as well as for centuries earlier. Dhows could be easily distinguished from European vessels by their sails, the lateen or settee rig that was almost universal among watercraft indigenous to the western Indian Ocean, but among dhows themselves it was hull shape that distinguished one type from another (Gilbert 2014:104). The aims, practices and assumptions of artists changed over the period so representations from one century are not necessarily of equal value in the study of nautical technology as those from another. Studying technology like ships through the work of artists means 'evaluating artists' reliability rather than their skill' (Unger 1991a:75). Unger claims that in this regard 'the worth of the work, its documentation value, depends on the type of ship or boat illustrated and how precisely that job is done—nothing more' (1991a:75). This may be the case for studying the way particular technological artefacts appeared, but even visual sources incompetent by this measure have value in showing how the artefacts were used, or what Molyneaux calls the 'social landscape' of the image (1997:111). The trend towards realism in European art over the period of this study leans towards technological particularism but there is value also in the understated social landscapes represented.

Dutch artists in the seventeenth century treated ships with such accuracy that their work has since been considered the earliest completely reliable European art on the subject (Unger 1991a:75). Unfortunately for this study, representations of Persian Gulf watercraft are rare in Dutch marine art, although there were some potentially useful works showing shipping on the western Indian seaboard, such as the view of Surat in Figure 5.3. Indeed, urban views of all types became increasingly popular during the sixteenth and seventeenth centuries and harbour views are now an important source of information on ship types (Unger 1991a:76). The British school of marine art grew from the Dutch, particularly with the influence of the van de Veldes, from which the accurate depiction of 'sea fights' draws its origin (Quarm 2011:182). British patrons regularly contracted artists to illustrate incidents of naval warfare from the seventeenth century (Quarm 2011:182–182), and by the nineteenth century the genre of combat art in marine painting had been established among British artists as a commemorative and patriotic form in which accuracy was valued (Quarm 2011:180).

Figure 5.3 Indigenous shipping shown in a Dutch harbour view of Surat, including a gallivat or small *ghurāb*, centre with yellow flags, and a *ghurāb*, top right centre with red flags (detail from Anon. c.1670 [artwork]).

Some artists may have had little direct experience of watercraft or the processes of building or operating them, others may not have valued technical precision in representations of them – a symbolic rather than a functional interest (Unger 1991a:78). Artists may never have seen the vessels they were depicting and could have been working from sketches or drawings provided by mariners or travellers, or other referents, such as various forms of art returned from the East. Artists depicting sea battles often based their work on the sketches of those who were at the event (Quarm 2011:180). Serres became Britain's 'leading marine painter' in the latter half of the eighteenth century (Quarm 2011:190), and his representations of gallivats and *aghriba* (plural of *ghurāb*) at Geriah on India's west coast in 1756 are particularly useful, although likely based on sketches of those who were there and not completed until years after the battle in 1771 and 1773. For example, the gallivats in Figure 5.4, a painting commissioned by Commodore William James who commanded some of the fleet at Geriah, are detailed representations, but not as detailed as the more familiar western ships shown in the same image. The hull shape, position of the masts, rigging and balustrades shown in the East India Company gallivats in Figure 5.4, are all awkwardly rendered, as if sketched from memory rather than life by an inexpert artist. While the gallivats themselves appear inaccurate, the general size, arrangement and armament remain useful and may be compared with other depictions by other artists or on other media. In European shipbuilding, archaeology and art tend to confirm that many technical changes were introduced earlier than is evident from written sources (Unger 1991a:86-91).

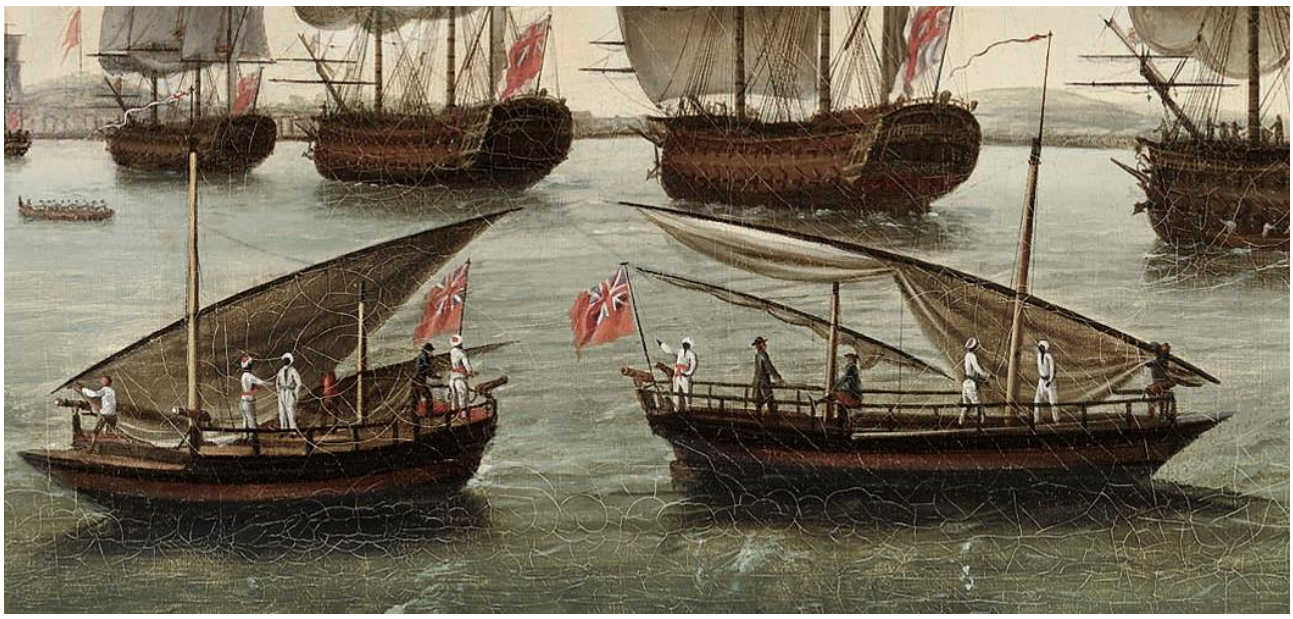


Figure 5.4 East India Company gallivats at Geriah in 1756, as depicted by Britain's leading marine painter of the time, Dominic Serres, in 1773, with inaccurate hull shapes, mast placement and rigging (detail from Serres c.1773 [artwork]).

Gilbert has detected a change in European representations of western Indian Ocean watercraft in the latter half of the nineteenth century that corresponds with British and French anti-slavery patrols, from which time dhows became 'symbols of inferior culture' (2014:108). Gilbert argues that 'representations of the ships of the Indian Ocean, both visual and written' were responsible for creating the view of the dhow as a generic class of ship from the 'timeless and archaic Orient' that contrasted with progressive western technology (2014:102). By the nineteenth century, European observers 'tended to see the region through the lens of science and a sense of the progressive nature of their own society in contrast to the unchanging east' (Gilbert 2014:104). Gilbert (2014:107) posits that this view of dhows changed in the latter half of the nineteenth century, from seeing them as merely ships to an unsympathetic view of them as 'floating metaphors' for 'inferior culture'. When dhow models were displayed at the Great Exhibition in London in 1851, one observer commented that 'the models of the vessels employed by the natives conveyed the idea that they were constructed rather for piratical expeditions than to carry on commerce with the neighbouring states' (Nash et al. 1854: plate 'India II'). By the time of this exhibition in the mid-nineteenth century, the European view of vernacular watercraft of the western Indian Ocean as fighting vessels was being superseded by one that saw them as 'primitive, unsafe, inefficient, outside the law and an obstacle to progress and modernity' (Gilbert 2011:66). From the mid-nineteenth century, European observers no longer sought to represent the visual detail of Indigenous watercraft, their images becoming 'increasingly cartoonish and inexact' (Gilbert 2014:108). With the slave trade largely suppressed by the twentieth century, the dhow lost its illegal connotations but was still represented as archaic and primitive (Gilbert 2014:101), (Fig. 5.5).

Figure 5.5 The dhow as 'primitive, unsafe, inefficient' (Gilbert 2011:66), in Wyllie's painting *Boarding a dhow in the Persian Gulf about 1912* (Wyllie c.1912 [artwork]).

While Gilbert's view clearly has merit, it is based on his studies of East African dhows rather than Arabian, Indian or Persian craft. Of Guillain's 1856 representation of dhow types in East Africa (1856a, 1856b [artworks]), Gilbert claims they are 'images of ships that emphasize the exotic and alien first and careful detailed representation second (2014:111). This may be contrasted with Pâris' (1841) collection of superbly drawn dhows of a similar vintage from the Arabian Peninsula, the Red Sea and western India that are unequalled in their accuracy and that have been widely used in later studies of the type (Agius 2002:101, n69), including this one. The 'cartoonish and inexact' nature of other representations of dhows may therefore reflect the skills of the artist, where those mariners with personal experience of western Indian Ocean watercraft—otherwise reliable observers—lacked the capacity to render them with the exactitude of professionals. Pâris' drawings are revered precisely because he combined reliability with skill.

5.2.2 Photography

Behdad claims that photography and Orientalism shared an intertwined history, and that 'the Orient' was crucial 'in the development of photography both as a new technology deployed in the service of empire and as a commercialized, mass medium that perpetuated the Euro-imperial desire for adventure and the exotic in the region' (Behdad 2016:1). Indeed, since the invention of photography in 1839 it was at the service of 'scientific' Orientalism 'that claimed to offer definitive and comprehensive understanding' (Behdad 2016:2). The earliest clear photograph of dhows at Suez in 1857 (Fig. 5.6), displays detail unmatched by forms of art that preceded it. Early photographers were only able to capture subjects that remained relatively still during the exposure, so images of

dhows underway were rare before the twentieth century. Yet photography was not the medium of historical objectivity that early photographers proclaimed, as ‘these images were generally designed to appeal to the sympathies of the viewers’ (Burke 2001:22). Photographs of dhows continued to emphasise the ‘primitive, unsafe [and] inefficient’ view that so concerned Gilbert (2011:66). Dhow photographers prior to the 1950s—Villiers (Facey et al. 2006; Villiers 1940), Thesiger (1994 [1959], and Codrai (2003), for example—rarely captured vessels outside of major ports or sea-routes and sought images that conformed to the exotic romanticism of the Arabian ‘Orient’. Their works and those of other photographers are nevertheless immensely important documents in the study of western Indian Ocean watercraft, effectively extending the scope of ethnographic analogy back to the late nineteenth century. Photography like this can provide a view of the social landscape that texts and other visual sources cannot but should be treated much like other types of art in which realism is distorted by the intentions of the artist (Burke 2001:30).

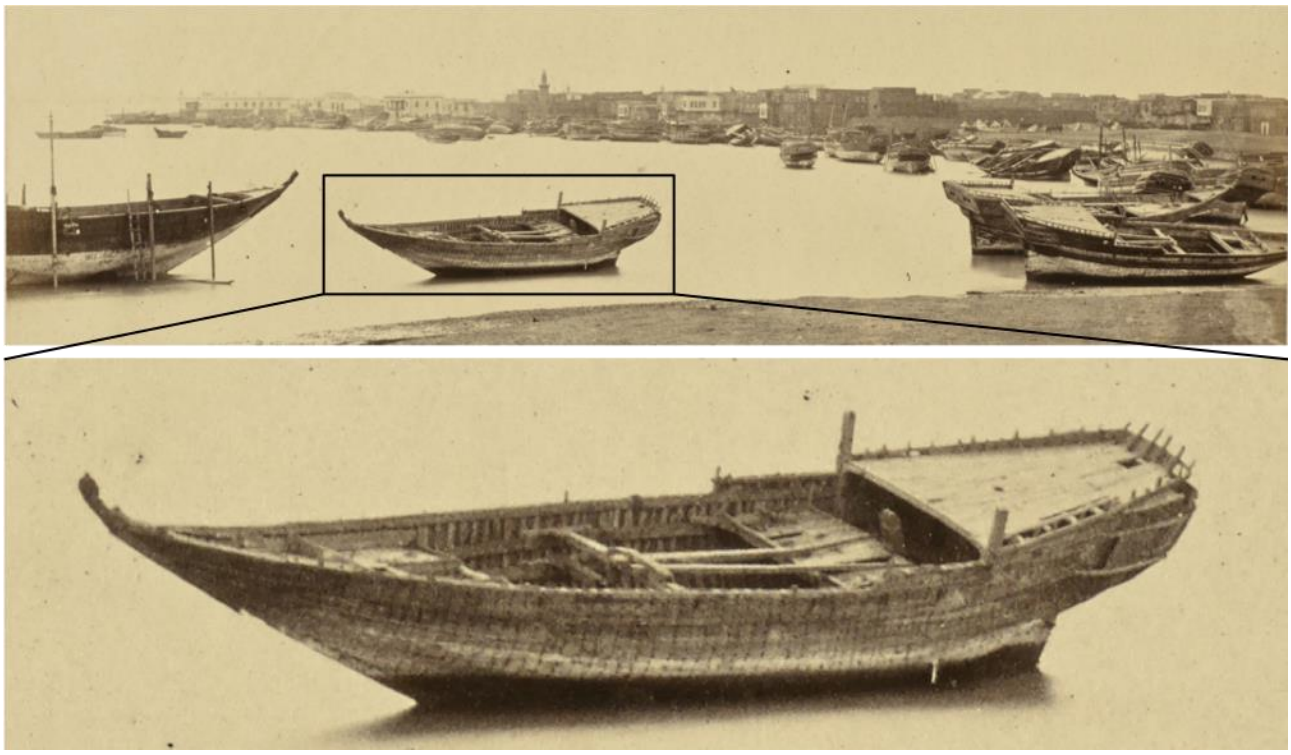


Figure 5.6 The earliest known clear photograph of dhows, taken at Suez in 1857. The inset shows a small *baghla* that is obviously metal fastened with removable decks supported without hanging knees, important construction details that are rare in earlier graphic representations (detail from Frith 1857 [artwork]).

5.2.3 Indian and Ottoman graphic sources

Graphic sources relating to the watercraft of the early modern Persian Gulf may also be found in Ottoman and Indian art traditions, and manuscript paintings and illustrated navigational charts are sources of particular interest here. A significant example from an Indian source is the image of a *dāw* that appears on a Marathi identification chart of watercraft from the late eighteenth century. Apte’s (1973) *A History of the Maratha Navy and Merchantships* presents a catalogue of watercraft

made and used by the seventeenth- and eighteenth-century Indigenous occupants of the mid-west coast of India, as depicted in their artworks. Apte used numerous Indigenous artworks, including three Maratha 'charts' now in the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (CSMVS) of Mumbai, but does not specifically identify which artworks he used for each illustration. In Figure 20 of his work, Apte shows an 'Arabic Dow' redrawn from an unidentified source and describes it as 'an Arabic war *Dow* (or *Daw*) of the Angre period' crewed by 40 sailors and 50 soldiers (Apte 1973:191). This drawing appears at odds with other depictions of the *dāw* from eighteenth and nineteenth century records that clearly show the projecting stern gallery that is a distinctive feature of the type (e.g. Cooper et al. 2015:43–45). The complete image and continuous waterline of Apte's *dāw* gives the impression that the entire drawing is faithfully copied. The original chart, CSMVS 15.425 (Anon. c.1750–1799 [artwork]), consists of two panels joined long ago, where the left edge is torn off, possibly indicating a missing third panel, and both remaining panels together have several damaged patches that obscure parts of the illustrated watercraft. There are at least 11 different types of vessels depicted, and the craft in the top left corner is captioned in Modi script 'Arabi daw'. An assistant curator at the CSMVS, Mrinalini Pathak, independently confirmed Apte's original translation of this caption.

The vessel identified as an Arab *dāw,* shown on the right in Figure 5.7, and used as the source for Apte's figure 20, shown on the left in Figure 5.7, is incomplete in the original depiction in CSMVS 15.425. The left side of the panel is torn away, so the aft-most portions of the sail, awning and hull are missing. There are only seven guns depicted here, rather than the nine in Apte's rendering, and the remains of a striped ensign appear above the awning. All details of this original, from the stemhead to the seventh gun aft, appear to be rendered faithfully by Apte. Yet the damage to the original has obliterated the topmost part of the sail, the aft-most parts of the ensign and awning, including the ensign staff and the awning stanchion, and presumably a portion of the vessel's structure. The original does, however, show the sternpost at the end of the lower hull as a thick black line. A very small portion of the original parchment is left aft of the sternpost to show that the grey of the lower hull does indeed stop at this point. The lowest wale, shown in red, also appears to terminate at the sternpost. Nevertheless, there must be some structure aft of this point on which to support the awning stanchion and ensign staff. The internal evidence of this painting supports the conclusion that the missing part of this vessel's structure is most probably the distinctive projecting stern gallery of the *dāw*.

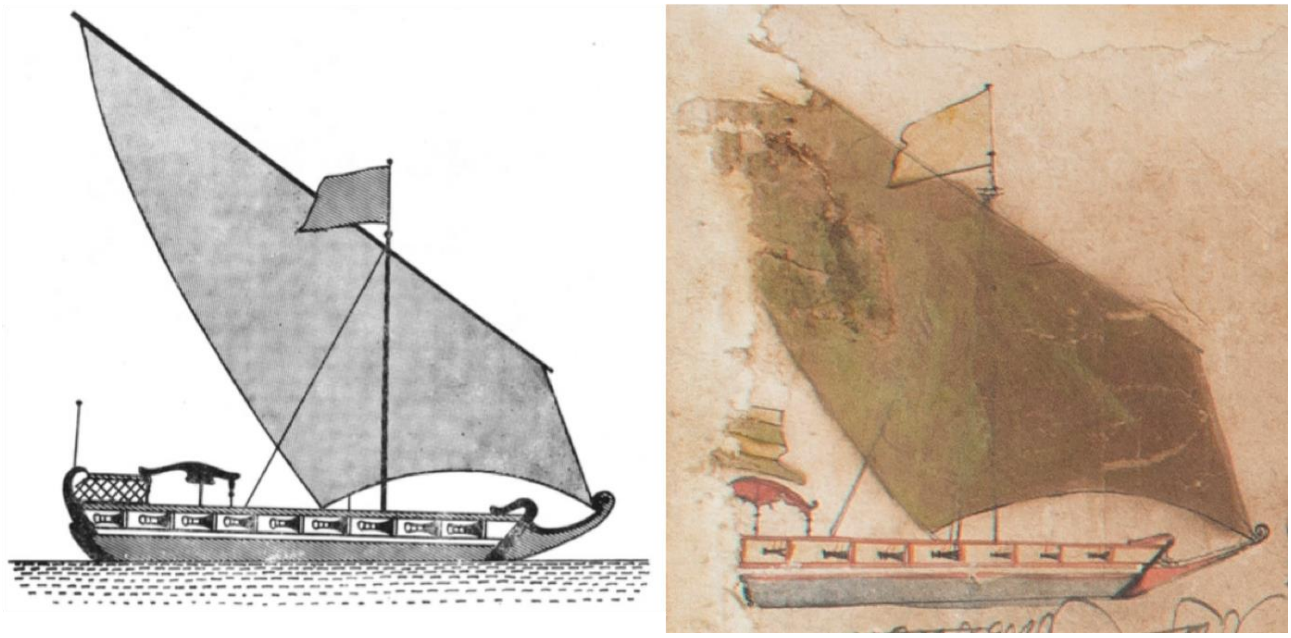


Figure 5.7 (Left) an Arab *dāw* depicted in *A History of the Maratha Navy and Merchantships* (Apte 1973:fig.20); and (right) the original 'Arabi Daw', detail from an eighteenth century painting of Maratha period watercraft (Anon. c.1750–1799 [artwork]).

Watercraft are also represented on some extant examples of Gujarati and Marathi cartography of the west coast of India from the seventeenth to the nineteenth centuries (Gole 1989:153–165). Indigenous navigational charts were used in the Indian Ocean before the arrival of the Portuguese (Tibbets 1992:256), and while extant examples are rare, many European and Ottoman charts were based on Indigenous sources (Tibbets 1992:256-257). The most important of these cartographic sources for the present study is a Gujarati chart of the Red Sea and Gulf of Aden 'procured' and published by the Royal Geographical Society in 1835 (Weismann 2012), part of which is shown at Figure 5.8. This chart is nearly two metres long and shows 26 different watercraft all apparently drawn by the same artist, an invaluable aid for comparison (Weismann 2012:421–422). Most of the craft depicted have been identified as 'Indo-Arabic' (Weismann 2012), some of which were common in the Persian Gulf.

Graphic sources showing western Indian Ocean watercraft during the early modern period are rare (Gilbert 2014:106; Nicolle 1989; Weismann 2012:422), especially when compared to similar sources showing European watercraft (e.g. Flatman 2007:19). However, there is a wide variety of potential visual sources yet to be fully investigated or published and the incorporation of such an underutilised corpus lends significance to this study. While graphic sources provide the bulk of available material on vernacular fighting craft of the early modern Persian Gulf, glyptic sources and models are extremely important visual artefacts in the absence of any other significant archaeological remains.

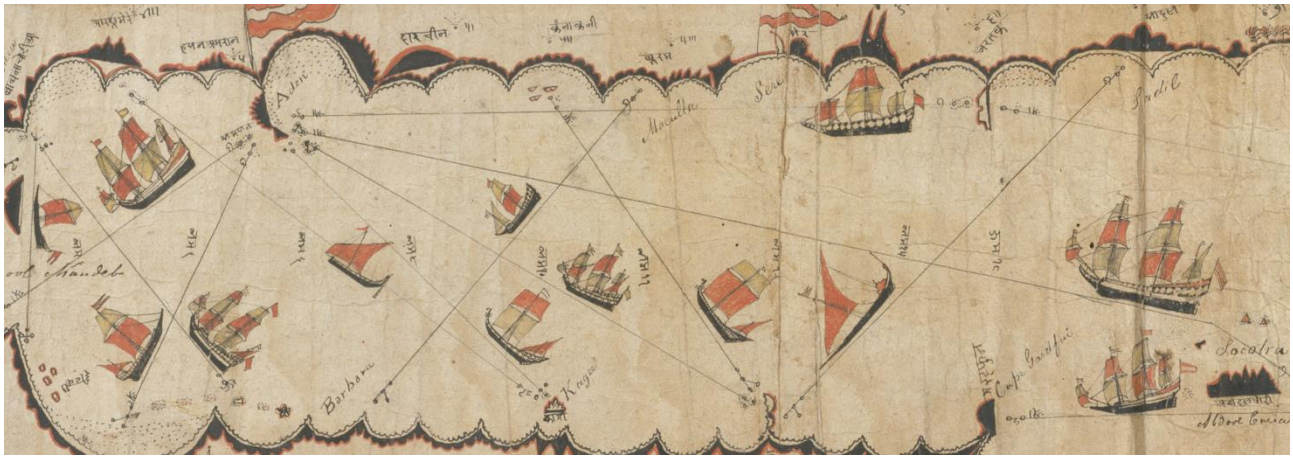


Figure 5.8 Part of a Gujarati chart from 1835 showing western Indian Ocean watercraft in the Gulf of Aden, with the entrance to the Red Sea on the left (Anon. 1835 [artwork]).

5.3 Glyptic sources

5.3.1 Petroglyphs

Petroglyphs—carvings or incisions that are formed by removing material from stone (Taçon and Chippindale 1998:6)—are common throughout Egypt, Mesopotamia and Iran but are relatively less so on the Arabian Peninsula, where they appear ‘characteristically linear, two-dimensional and schematic’ (Charloux et al. 2018:165–166). Common themes of petroglyphs on the Arabian Peninsula include scenes of organised violence and hunting, animals, ‘enigmatic symbols and geometric, zoomorphic and anthropomorphic figures’ engraved on a variety of sites throughout the region (Charloux et al. 2018:166). There are also a number of sites containing petroglyphs of watercraft on the shores of the Persian Gulf, the most prominent and remarkable of which is at al-Jusāsiyyah in Qatar, a site that contained 141 nautical representations when surveyed in 1974 (Kapel 2017:121), but considerably fewer now as a result of erosion and damage. These petroglyphs of al-Jusāsiyyah are the subject of considerable scholarly attention and some controversy (Facey 1987; Hassiba et al. 2012; Hawkins 1987; Kapel 1983, 2017; Isitt 2007; Pelling et al. 2015; Taylor 2014), but they represent a corpus of presumably Indigenous representations of watercraft carved from unusual perspectives with a high degree of detail.

The boat shapes depicted in plan view at al-Jusāsiyyah are almost entirely unique. A single boat petroglyph amongst a number of cupmark designs and water catchers has been identified at Jebel Fuwairit, as site 9 km north of al-Jusāsiyyah in Qatar. This c.40 cm glyph is a boat in plan with plan with four banks of oars, each end terminating in a circular cupmark (Eddisford 2012:13–14). A similar lozenge shaped figure nearby may represent an unfinished boat design (Eddisford 2012:17). Two sites in the Hawar Islands of Bahrain include more than 23 ‘lozenge-shaped’ petroglyphs that have been interpreted as watercraft, despite the absence of oars, on the basis that one appears to trail a common type of stone anchor (Aspinall et al. 2003:30; Crombe et al. 2001:149).

The possibility of using informed methods, meaning ‘those that depend on some source of insight passed on directly or indirectly from those who made and used the rock-art’ (Taçon and Chippindale 1998:6), at the al-Jusāsiyyah site is constrained by the apparent discontinuation of the carving practices in the coastal areas of the Persian Gulf. There is as yet no oral history reference to the al-Jusāsiyyah petroglyphs, which suggests that they may have been created by a group no longer present in Qatar. Formal methods have been applied to the analysis of nautical glyphs in the Gulf, including ‘inference by location in landscape’ and deciphering geometry of shape (Taçon and Chippindale 1998:8). By far the most common method used to analyse these works has been archaeological reasoning by analogy. Attempts have been made to date them by reference to historical knowledge (Facey 1987:204–207; Pelling et al. 2015:221–222), including rebutted claims relating to Vikings (Isitt 2007; Taylor 2014). Some stratigraphic sequences have been observed or inferred (Facey 1987:207) and direct dating methods and weathering have been used (Hassiba et al. 2012; Pelling et al. 2015:227–228). Radiocarbon dating of oxalate layers formed on some of these petroglyphs suggests a minimum age in the eighteenth century, although they could be older (Hassiba et al. 2012:13).

Figure 5.9 Petroglyphs at al-Jusāsiyyah, Qatar: (left) redrawn image of site 487 showing proximity of blast quarrying to a glyph in profile; (right) site 175 showing two larger plan view glyphs each with a ‘stern appendage’ and approximately 90 cm long (Images: M. de Ruyter 2019).

The survey of the al-Jusāsiyyah site in 1974 identified 124 glyphs of watercraft in plan view and 17 in elevation, although some of these glyphs have since been destroyed by erosion or quarrying, as shown on the left in Figure 5.9. At least six of the vessels in plan show what was described as an appendage at the stern indicated by lower relief (Kapel 1983:120), shown on the right in Figure 5.9, and appear from this perspective to be similar in form to the archetypal *dāw*. The petroglyphs appear to be free of representations of weapons or violence so the most nuanced interpretation is

that they represent the artwork of members of a pearling fleet (Facey 1987:204–207). The detail and consistency inherent in the major sites indicate that most petroglyphs were the work of informed and experienced mariners, possibly of several epochs. The glyphs of early modern watercraft therefore form an idiosyncratic genre for which there is currently no strong basis of informed knowledge.

5.3.2 Graffiti

As used in this study, graffiti includes visual sources carved or engraved into plaster or stone in buildings, and their pictographic analogues made by applying paint or charcoal or similar substances to walls (Kenderdine and Vosmer 1994:35; Taçon and Chippindale 1998:6). These forms of visual sources are notoriously difficult to interpret and range from crude representations barely recognisable as watercraft to ‘exquisite renderings’ (Kenderdine and Vosmer 1994:35). Given their prominence in built structures, many are damaged, obscured, redrawn or superimposed, or have been resurfaced. Still, maritime graffiti is an important source, particularly as those that appear in buildings may be broadly dated.

In the 1990s researchers surveyed maritime graffiti on the walls of fortresses, including those well inland, in merchants’ houses and on cliff faces in Oman (Kenderdine and Vosmer 1994:34), producing one of the most extensive catalogues of watercraft yet published. All of the 35 examples published from this survey all are in elevation or seen from the side (Kenderdine and Vosmer 1994:35, also Facey and Martin 1991:66), in direct contrast to the majority of petroglyphs from al-Jusāsiyyah, and date from the mid-seventeenth century to the early twentieth century (1994:34). There are a number of others mentioned in the text but not illustrated and yet others unpublished (Tom Vosmer pers. comm. 2019). This corpus includes Khaliji, Indian, European and hybrid types of watercraft, including a *baghla* and a *dāw* that appear armed (e.g. Kenderdine and Vosmer 1994:figs.3a, 4d). The *dāw* graffito from Fulaij in Oman is particularly detailed (Kenderdine and Vosmer 1994:fig.4d), showing a seven-gun broadside, and is redrawn on the left in Figure 3.10.

Eleven similar examples of maritime graffiti were uncovered in excavations of the walled town of al-Zubārah in Qatar that was permanently occupied from 1760 until destroyed in 1811 and periodically after that date until the end of the nineteenth century (Cooper et al. 201535–36). These representations of Khaliji or European watercraft from the Arabian seas are engraved into plaster in the interiors of rooms and are executed to a varying degree of competence and detail (Cooper et al. 2015:35). The vessels depicted are mostly *baghāla* or *sanabīq*, as shown on the right in Figure 5.10, but the one unmistakably European vessel shows unusual patterning that may indicate an attempt to represent the internal structure of the ship (Cooper et al. 2015:39–40, fig.4). These engravings show

some stylistic similarities with the elevations at al-Jusāsiyyah, but not with those in plan (Cooper et al. 2015:45–46).

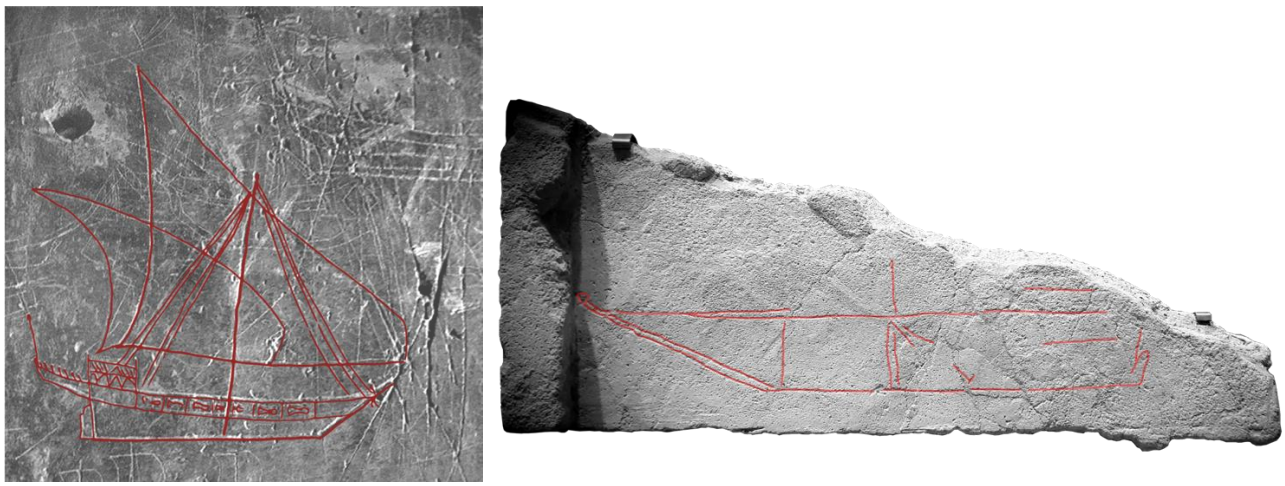


Figure 5.10 (left) Redrawn image of a graffito of an armed *dāw* from Fulaij Fort, Oman (Image: M. de Ruyter 2019 redrawn after T. Vosmer 1994); (right) redrawn image of a *baghla* or *sanbūq* in graffito D1 of site ZUEP04, al-Zubārah, Qatar, now in the Qatar National Museum, Doha (Image: M. de Ruyter 2019).

Other littoral sites within the Persian Gulf include maritime graffiti and depictions of watercraft. 'Numerous different types of ships' that look 'quite modern' are known from caves in the mountains of southern Oman, some showing 'a row of small circles' along the side and oars (Al-Shahri 1991:183). Although a full survey of these depictions is yet to be published, some are illustrated in various sources (e.g. Al-Shahri 1991:pl.VIa, Agius 2005:211, figs.76, 77, 2008:55, fig.3; Fossati 2017:78, fig.3). Undated maritime graffiti is also known in the UAE (Lancaster and Lancaster 2011a:176–177, fig.8; Ziolkowski 2007:fig.38) and Oman (Fossati 2017:figs.7, 17; Weismann 2012:426). Stucco motifs of ships are also known from Oman, predominantly on the exterior of merchant's houses as a symbol of their status or voyages past (Agius 2005:210, fig.75, 2010:59, fig.13). The ethnographers Lancaster and Lancaster were told that many stone carvings they observed in the Hajar mountains in the UAE, including boats, were executed by ignorant or foolish 'boys with nothing better to do' and that adult men only carved wood and metals with geometric shapes, although this may have been related to recent cultural practice (Lancaster and Lancaster 2011a:191–193). Certainly, many of the historical watercraft represented in other areas are 'exquisite renderings' that demonstrate considerable knowledge of nautical technology, including internal arrangements (Kenderdine and Vosmer 1994:35). They are on this basis useful to the present study.

5.3.3 Other glyptic sources

While 'the tradition of the decorative carving of boats and ships was a distinctive feature' of Khaliji art (Agius 2005:206), carvings of ships or boats are rare, and only one example of a door carved with watercraft has been published (Reeler and Al Shaikh 44:fig.3.1). The lack of watercraft

carvings on wood may be related to the preference for carving only geometric patterns in some communities (Lancaster and Lancaster 2011a:191). The single published door is from Qatif on the Gulf coast of Saudi Arabia and is held in the Dammam Regional Museum, Saudi Arabia (inventory number 09.06.20; Nabiel Al Shaikh pers. comm. 2018). The door (Fig. 5.11) was measured and described in an unpublished thesis in 2017 (Al-Hasinah 2017:106–111, 192) and made from Ziziphus wood (Al-Hasinah 2017:192), which is common in the region and occasionally used for shipbuilding. It displays six carvings of watercraft, five of which are Khaliji craft and the sixth possibly a European square-rigged type.

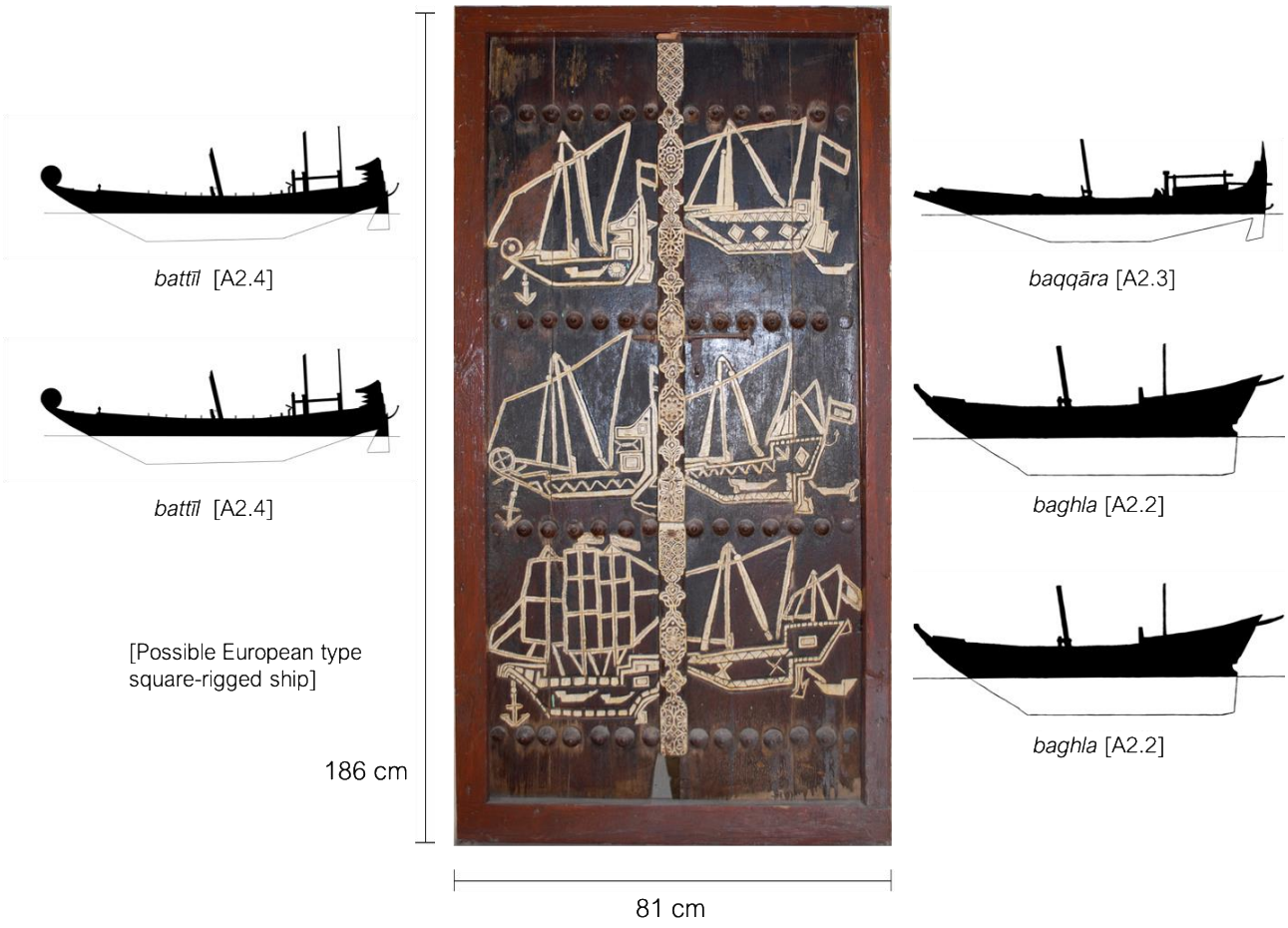


Figure 5.11 An undated carved door from Qatif in Saudi Arabia, Dammam Regional Museum no.09.06.20, with interpretations of the watercraft types represented (Image: M. de Ruyter 2020, photograph courtesy N. Al Shaikh 2018).

While the Dammam door has not yet been dated, there are some indications of its age. Surveys of the watercraft in harbours of Bahrain in the first decade of the twentieth century show that *batātīl* were still relatively common and that there were at least several *baghāla* still operating (Agius 2005:100–104). A series of photographs of the Dammam shore near Qatif in the 1930s show at least 14 separate craft on the shore and not one of them is a *battīl* or a *baghla* and are instead almost all *jālabīt* [A2.10], which are not represented on the door (NASM.1991.0079 Images 103, 105, 129, 131, 135, 145, 149, Joseph D. Mountain Collection, National Air and Space Museum Archives,

Washington DC). If the door was carved when the craft represented were common, then it was probably made before the twentieth century.

5.4 Models

5.4.1 Using models as evidence

Scale models of watercraft have been produced in the Persian Gulf since at least the sixth millennium BCE (Carter 2006:53–55). This review considers the scale models produced to represent early modern watercraft from the Persian Gulf by both Khaliji and foreign craftspeople. Modern 'museum quality' ship models are examples that accord with a 'standard level of accuracy, scope, and workmanship' that has its origin in technical models built to demonstrate the design of real ships (Wegner 1994:44). While modern standards were designed to 'direct the construction of new models' rather than critique historical works (Wegner 1994:46), notions of historical accuracy remain useful guides to the reliability of aspects of form inherent in pre-modern ship models. Historical accuracy, a term preferred in some instances to 'museum quality', refers to technical accuracy in scale fidelity, hull shape, rigging, fittings, finish and colour (Napier 1993:255). Models that do not conform to historical accuracy standards are considered 'folk' models, 'identified by some distortions of scale or symmetry, or lack of uniformity in detail', that may nevertheless retain considerable historical and artistic value (Wegner 1994:44). This category of 'folk' models conforms to the definition of 'vernacular' as a kind of work produced by craftsmen using simple tools and rules of thumb. Models of both types are still considered valuable sources for this research as, regardless of the use to which they were put, they were likely to have been made by people familiar with the referents (Dixon 2019b:297–299; Roach 2007:331). Watercraft models are unique visual sources that can enable comparisons and provide evidence of types and their details that are now extinct or otherwise insufficiently represented in historical records (Dixon 2019b:297–298).

Contemporary three-dimensional models of watercraft offer distinct advantages over two-dimensional images or those in low relief like the al-Jusāsiyyah carvings, particularly as sources of information about the shape of the hull and of potential performance characteristics (Roach 2008:313). Still, models cannot replace the ships themselves in a study of watercraft and should be subjected to informed criticism when used as sources of information about actual full-scale vessels. Models of watercraft were created for a number of reasons, most of which cannot be made clear from observation of the model in isolation, and employ a diversity of materials with varying capacities for preservation. Individual models may also have had life histories complicated by different uses, modifications, reconstructions and restorations. The importance of contemporary watercraft models as vehicles of technical information is highlighted by the potential for boat constructors to create full-scale vessels on the basis of the shapes and proportions of the models

(Roach 2008:314–315). Indeed, this process of transmission using three-dimensional scale models is ideal for societies of limited literacy and few drawn plans, such as existed in the Persian Gulf in the early modern period. Identifying and studying contemporary watercraft models, as opposed to the modern scale replicas created on the basis of historical information, offers an opportunity to study the shape and form of vessels as observed, experienced and interpreted by their users.

5.4.2 Museum models

5.4.2.1 Pre-modern museum quality models

Pre-modern or contemporary models of western Indian Ocean watercraft have only recently been studied as a corpus (Dixon 2018, 2019a, 2019b). They can be roughly segregated into Arabian/Persian, Indian and African types, similarly to the full-scale vessels they represent, and the practice of model making and use by Khalijis is attested in documentary sources. Francis Loch had at least two models built in Bushehr in Iran in 1819 that were subsequently presented to 'the Museum of the College of Edinburgh' (NRS GD1/633/1:f.172). Unfortunately, these important models cannot be located and have possibly been discarded or sold (Davies 1997:229; Pers. comm. Danielle Spittle, Edinburgh Research Library, 2018; pers. comm. Meredith Greiling, National Museums of Scotland, 2019). Models commissioned by a collector, whether intended for museum display or not, are more likely to approach or accord to the museum standard of historical accuracy than models found in archaeological contexts (Dixon 2019a:111–114). The models commissioned for display at the Great Exhibition in London in 1851 (Ellis 1851:909–911), several of which are now in the Science Museum, London, are excellent examples of this standard. Nevertheless, the *dāw* model in that collection offers a tale of caution regarding the historiography of such artefacts.

The Science Museum *dāw* model, shown at Figure 1.2, was constructed at the Bombay Dockyard by an unrecorded artisan and originally described as a 'Model of a Dow—One of the boats used by the *Joasmee* Pirates of the Persian Gulf, built in Bombay Dock Yard for the Exhibition of 1851' (Science Museum 1926a). Before the Shipping Galleries at the Science Museum were closed and the models dismantled and placed in long-term storage in 2012, Weismann measured and drew the model (Norbert Weismann, pers. comm. 2019), as shown in Figure 1.3. In his 1979 work *Die arabische Dau*, until recently the most extensive published survey of dhow models, Mondfeld calls this model a *ghanja*, even a 'Piratenghanja' (1979: 31–33). Mondfeld (1979: 31) cites Landström (1961: 213, fig.516) as the source of this identification and Landström in turn based his image on another 'mentioned in a book and in a drawing by an Arab' (1961: 213). Landström's is clearly based on the frontispiece of Moore's 1925 *Last Days of Mast and Sail*, itself an image of a *ghanja* drawn 'by an Arab' (Moore 1925: pl. I, 122). The small drawing used in the earlier works is reproduced at around three times the size in Mondfeld (1979: fig. 21), who introduces

characteristics taken from Moore's descriptions (1925: 122, 124), such as the curved stem and placement of the mizzen, as shown in Figure 5.12, although Moore himself identifies that the stern of the ghanja was 'quite different from that of the picture' (1925:124). Nevertheless, these interpretive drawings of the Science Museum model included in Mondfeld's book are widely used by ship modellers (see Mondfeld 1979: plan II), yet Weismann's unpublished measured drawings of the model are far more faithful to the original.

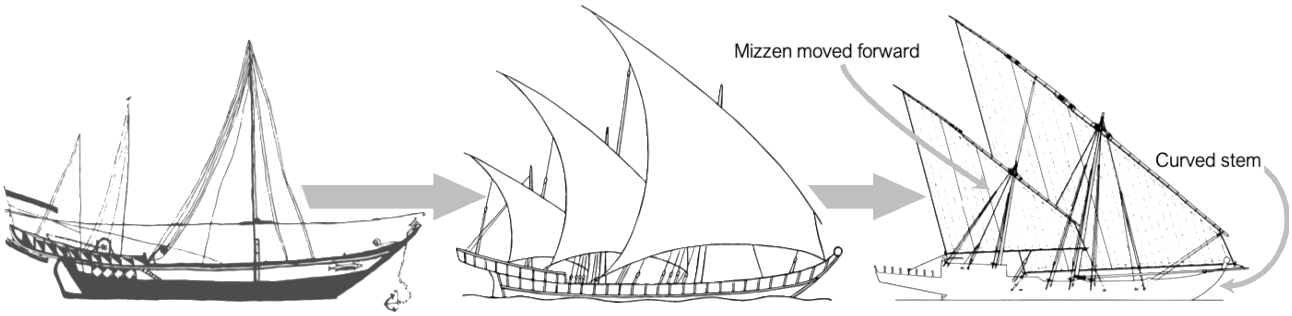


Figure 5.12 The evolution of a flawed interpretation: Moore's original drawing of a *ghanja* 'by an Arab' (after 1925:pl.I, 122) leads to Landström's interpretation (after 1961:213, fig.516) that in turn influences Mondfeld's erroneous reconstruction of a 'pirate *ghanja*' (after 1979:plan III) based on the Science Museum *dāw* model.

The original label accompanying the *dāw* model clearly differentiates the dhow from the *baghla* and *battīl* (Science Museum 1926a). The label developed by the Science Museum on transfer of the model in 1926 is titled 'Arab Pirate "Dhow" (1850)' and follows the earlier description with some additions (Science Museum 1926b). There are, however, some handwritten notes in the file accompanying the models acquired by the Museum in 1926, just after the publication of Moore's book in 1925, that include the estimated scale and dimensions of this particular vessel. The initial term 'dhow' is crossed out and replaced with 'ghanja', which is repeated later in the same document (Science Museum 1926b). When Mondfeld studied the Science Museum models for *Die arabische Dau* (1979), he may have also viewed the associated files, thereby reaffirming Moore's and Landström's earlier identification of this type of vessel as a *ghanja*. Mondfeld does not refer to this vessel specifically as a dhow and only uses the term in its later generic sense for all western Indian Ocean watercraft. These identifications of a *dāw* with a counter stern or 'projecting gallery' as a *ghanja* are, however, anomalous and the appellation *ghanja* (and its homonyms) is usually applied to a vessel more akin to the *baghla* and *kotia*; indeed, the three are often confused and are only readily distinguished by detail and origin (Burningham 2007: 107–110, table 1).

The source of this misidentification appears to lie with the original drawing 'by an Arab' in Moore's book. Yet this drawing should be considered in the context of the other images and descriptions supplied by the original informant, which make a clear distinction between those vessels with the rudder under the stern 'like ships', such as the 'Baghla' and 'Kutia', and those with the rudder on or over the stern like boats (Moore 1925: pls I and II, 122–124). One of each type is

illustrated by the original artist, the *ghanja* (Moore 1925: pl. I) with the rudder under the stern and the ‘Sambuk’ (1925: pl. II) with the rudder on or over the stern. The Arab artist appears to have made this distinction by exaggerating the stern extension on the *ghanja* to show the rudder under it, as a boat hangs fore and aft below it, where it would usually hang athwartships across the stern as illustrated in numerous photographs of the type. This case demonstrates the necessity of considering the cultural context of production, and the historiography of individual pieces, when examining contemporary watercraft models (Dixon 2019a:114–116).

5.4.2.2 Modern museum models

The case of the Science Museum *dāw* also illustrates one of the potential limitations of modern museum models—they can only be as accurate as the sources upon which they are based. Modern museum standard dhow models built to represent pre-modern watercraft for which there are limited sources must by necessity involve a degree of conjecture. The superbly detailed sewn-plank *būm* model in the Mariner’s Museum in Virginia is an excellent example of this limitation. It was built in 1992 to replicate a vessel of the pre-European contact Islamic period and was based on the plans used for Severin’s reconstruction *Sohar* (Severin 1985; Wiseman 1995:5–6). Research since the model was built indicates that the *būm* is a relatively modern vessel from the nineteenth century and was probably never sewn, but rather metal fastened from its initial adaptation, and that any resemblance to more ‘ancient’ vessels was superficial (Agius 2002:70; Al-Hijji 2001:21; Staples 2019:316). Nevertheless, at the time of writing (2020), the otherwise excellent sewn-plank *būm* model remains on display at the Mariner’s Museum, ostensibly as a reconstruction of a ninth-century dhow.

Similarly, Marquardt’s model of a *baghla* in the Deutsches Museum, Munich, is based on Pâris’ drawing from 1841 (Marquardt 1997:70), which in turn was from Edye, showing a ‘midship section most unlike the mid-sections of large Arabian vessels […] that have been recorded photographically or measured more recently’ (Burningham 2007:98). Indeed, this line drawing is most unlike the lithographs in Pâris’ own work (1841:pl.2,3,9) that show the *baghla* with a more pronounced curve to the sheer, ‘the longitudinal sweep of a vessel’s sides or decks’ (Steffy 1994:279). This internal inconsistency has not stopped the line drawing being used by modellers, although Pâris’/Edye’s drawing may have been based on a unique vessel (Burningham 2007:98). The standard Arabian *baghla* rarely shows such a flat sheer, which is more reminiscent of European vessels of the time that may have influenced building styles in India. A comparison is shown in Figure 5.13. Marquardt’s otherwise excellent model and many others based on the same source can be immediately identified by the unusually flat sheer prominent in Edye’s example. The limitations of the model shipwright’s craft and the bias of conjecture are at once summed up by Marquardt

himself: ‘drawings were non-existent, and, without them and archaeological finds, reliance has to be placed on modern relics of that ancient past, in the knowledge that time stood still in those regions’ (Marquardt 1997:69–70). The latter assumption no longer stands the test of scholarship.

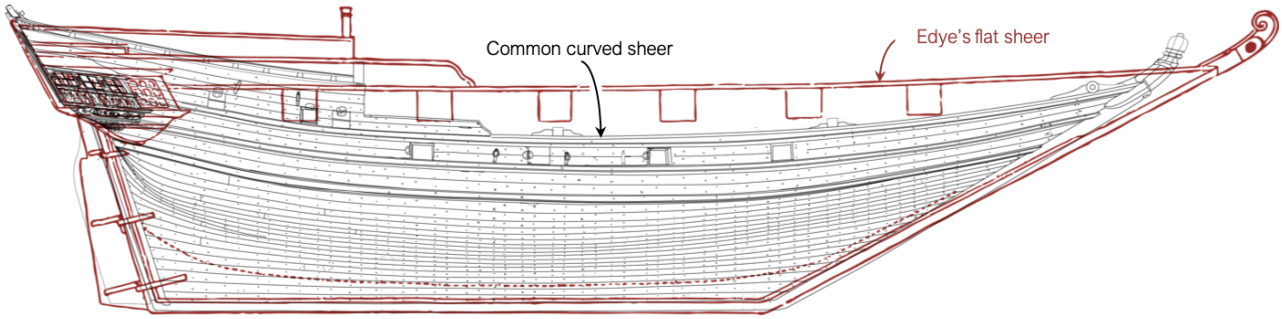


Figure 5.13 A comparison between Edye’s flat sheered *baghla* in red and the more common curved sheer in black (M. de Ruyter after Edye 1834:59, pl.9, and N. Weismann 2014, with permission).

5.4.3 Vernacular dhow models

5.4.3.1 Trade models

Modern vernacular dhow models are commonly made from shipbuilding materials by craftspeople who work in boatyards (e.g. Al-Hijji 2001:138, 140; Gueyle 2012:151), presumably using similar rules of thumb and mental templates, so that the shapes of these vernacular models are accurate, but the scale of the materials used is not. Al-Hijji (2001:140–141) experimented with the ‘half model technique used by western shipwrights’ in Kuwaiti dhow building late in the twentieth century and even elicited approval from a master dhow builder, implying that the use of models for building full-scale ships was not familiar in the region. The construction of models is, however, quite familiar and this can be seen from images of dhow model workshops and displays in the region, as in Figure 5.14, where only the shape of the model is properly to scale. Models like these are widely available in the region and are marketed to tourists and displayed in museums and heritage centres with little documentation for context. ‘Folk’ models of dhows are an important element in the seafaring visual culture of Khaliji society, where images of dhows are omnipresent—on currency, stamps, civic and private architecture and public murals (Agius 2005:214–219; Gilbert 2011:64)—and form rather than detail or historical accuracy is the desirable element. As a result, models in this category are less reliable sources than commissioned models made to a museum standard of accuracy and scale fidelity, and are probably less resilient, meaning that assertions of age based on crudity of manufacture should be treated with caution.

Figure 5.14 Dhow model workshops (left) Abu Dhabi, UAE (Image M. de Ruyter 2017), (right) Doha, Qatar (Image M. de Ruyter 2019).

5.4.3.2 Votive models

On safely entering the Persian Gulf through the Strait of Hormuz in a *baghla* named *Shat el Frat* in 1830, Wellsted observed the crew launching a sacrificial effigy of the ship.

> A miniature boat, fashioned from the shell of a cocoa-nut [sic], with a small sail, and fancifully decorated with ribbons, had previously been prepared, and was now laden with a few grains of rice, some dried flowers, and launched with loud cheers of "Salamat" into the waves. The same form is observed at the entrance to the Red Sea […] my companions told me that the present was addressed to the Evil Spirit. (Wellsted 1840:60–61)

Wellsted (1840:6–7) also observed that ship-launching ceremonies 'along the coasts of Arabia' on commencement of the sailing season towards the end of August were accompanied by ceremonies similar to coconut day on India's west coast, in which coconuts are cast on the sea as votive offerings. While ship models are sometimes described as votive offerings without documentary evidence (Roach 2007:319), it remains possible that historical dhow models may have been intended or used in this manner. Neither Agius (2010:42–43) nor Al-Hijji (2001:94–98), the foremost ethnographers of dhow building, mention the use of sacrificial effigies of ships or votive models in the twentieth century, so it is possible that the practice was shunned or discontinued. For this practice, the sacrificial models are likely to be crude shapes representative of watercraft rather than replicas, as the use of coconut shells indicates.

5.4.3.3 Models as toys

The use of models as children's toys must also be considered, especially where children form a major part of the society such as in settlements where dhows were built and operated. Indeed, Schiffer (1996:75) sees child's play as an underappreciated source of archaeological deposits where 'adult' artefacts or their fragments may be reworked for play, dedicated toys introduced, or artefacts misinterpreted as 'adult' pieces. In the 1950s Codrai (2003:152–153) observed and photographed boys in the Gulf playing with model boats 'enterprisingly shaped from discarded petrol tins, the masts from camel sticks and the sails from pieces of discarded *wazars* (loincloths)'. He also observed girls 'admiring' a model *būm* that had been made by a sailor during a return voyage from Africa, although the nature of the girls' play was not elaborated (Codrai 2003:152). Other photographs from earlier in the twentieth century show children playing with model boats in Gulf ports, as shown in Figure 5.15.

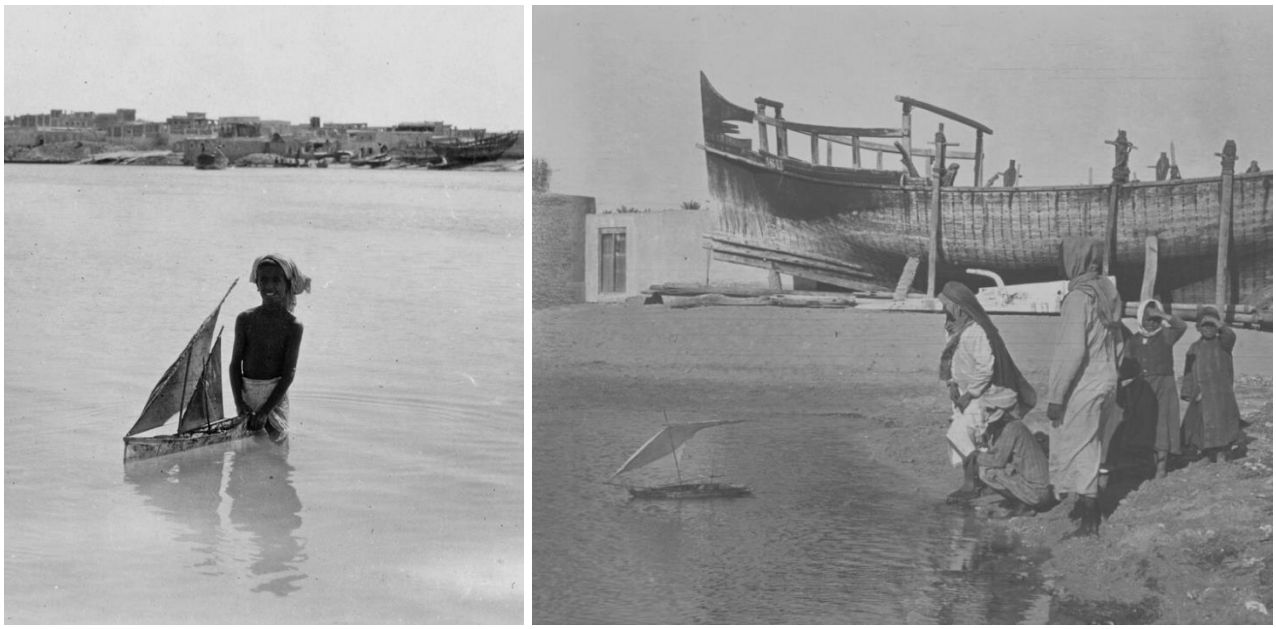


Figure 5.15 (left) A boy with a model boat in Sharjah, 1926 (detail, A.T. Wilson, Royal Geographical Society S00164840); (right) men and children with a model in Linga, 1918 (Storrs-Fox, A. 1918 *Linga* [Photograph] British Library: India Office Records and Private Papers, Photo 496/6/19, in Qatar Digital Library).

Curators at the UK National Maritime Museum, Greenwich, consider a *battīl* model in their collection to have been a toy based on the 'crude construction and evidence of water damage along the hull' (National Maritime Museum, Greenwich, AAE0058 [B4.15]). Twentieth century ethnographers have observed children making toy watercraft from reeds in the marshes of Iraq (Ochsenschlager 2004:80), and model boats used in celebrations in Bahrain in public gardens (BL IOR/L/PS/12/3769B:f.159r–160r). Boat models built as toys were unlikely to have been made of durable materials and the survival of these artefacts in archaeological contexts would be unusual (Roach 2007:314). Some models, perhaps like the Greenwich *battīl* model mentioned above, may have been repurposed as toys after their initial use was over. It is therefore difficult to determine if a

model boat was a toy and, if so, whether it represents the form of an actual craft or a caricature, the intention of which was to represent in the manner of vernacular models rather than replicate in the manner of museum models.

5.5 Summary

This chapter has reviewed the types of visual sources relevant to this study and has discussed the opportunities and limitations inherent in each. Graphic, glyptic and model forms of Persian Gulf watercraft made by Khalijis, intruders or passers-by are the principal data of this thesis. Each type of visual source requires particular critique and assumptions made for one will not necessarily hold for another. As demonstrated by the case of the *Maqāmāt* paintings, contextual information surrounding the visual artefact makes for the soundest interpretations and when this is unavailable or limited comparison with others of the same type will be required instead. When used together, there are sufficient visual sources available to indicate technological change in Persian Gulf watercraft and related social change in Khaliji society. The next chapter presents the results elicited from interrogating visual artefacts of the historical discourse on early modern Persian Gulf watercraft in this manner.

6 VISUAL ARTEFACTS AND MARITIME VIOLENCE

This chapter reports the results of the analysis of visual sources relating to early modern Persian Gulf seafaring, and of the identification of correlates of maritime violence within those sources and the potential archaeological signatures of such practice. Sections 6.1 describes the visual artefacts by type as listed in the catalogue at Appendix B. Appendix C contains the coded data used in this analysis. Section 6.2 demonstrates how the correlates of maritime violence are observable in the visual sources and how documentary sources give them context. Section 6.3 discusses the potential archaeological signature of this contextualised visual evidence. The implications of this evidence are then discussed in Chapters 7 and 8.

6.1 Picturing the dhowscape: the visual artefacts

6.1.1 Visual sources

The visual sources identified during this study are catalogued at Appendix B and classified by type as graphic images (B1), Islamic manuscript illustrations (B2), glyphs and graffiti (B3), models (B4) and photographs (B5). Section B6 catalogues known visual sources recognised as relevant but currently inaccessible in sufficient resolution for this research or identified too late for inclusion, although these are not reported in the results below. The definitions used for these classifications are developed in Chapter 5. The coded data associated with the individual cases catalogued in Appendix B are shown at Appendix C, listed by the same number but with the prefix C, such that the coded data for B1.4 is listed at C1.4.

Visual sources were included in the sample as cases of vernacular watercraft of the Persian Gulf where they meet the following criteria:

a) they apparently represented planked wooden watercraft and were not flying European flags or otherwise contextually associated with European or extra-regional cultures,
b) they are shown or described as being within the bounds of the Persian Gulf cultural area described in section 1.2.1, or
c) they are shown or described as being from a culture or society from within the Persian Gulf, and
d) date to the period of the thirteenth to the nineteenth centuries CE.

Visual sources were included if it can be assumed the artist had either experience of watercraft that fit the definition or access to referents that did, such as other illustrations or sketches, models or verbal descriptions. Obvious reprints have been omitted.

The catalogue sections B1 to B5 include 405 primary visual sources that meet the criteria above, which, combined, depict over 1,252 individual representations identifiable as watercraft. Section B6 includes an additional 34 known visual sources that are currently inaccessible or that were identified too late for inclusion in this research, although there are undoubtedly many more yet to be identified. Of the 405 primary visual sources, 85 (21%) date from before the Portuguese invasion of the Persian Gulf in 1507. The overall distribution of visual sources by year is shown in Figure 6.1. Many sources are imprecisely or approximately dated—some only to a particular century—so the utility of this distribution is in the general impression it gives. This demonstrates that most sources are drawn from two periods, the first of which spans the fifteenth to the early seventeenth centuries, and the second the nineteenth century.

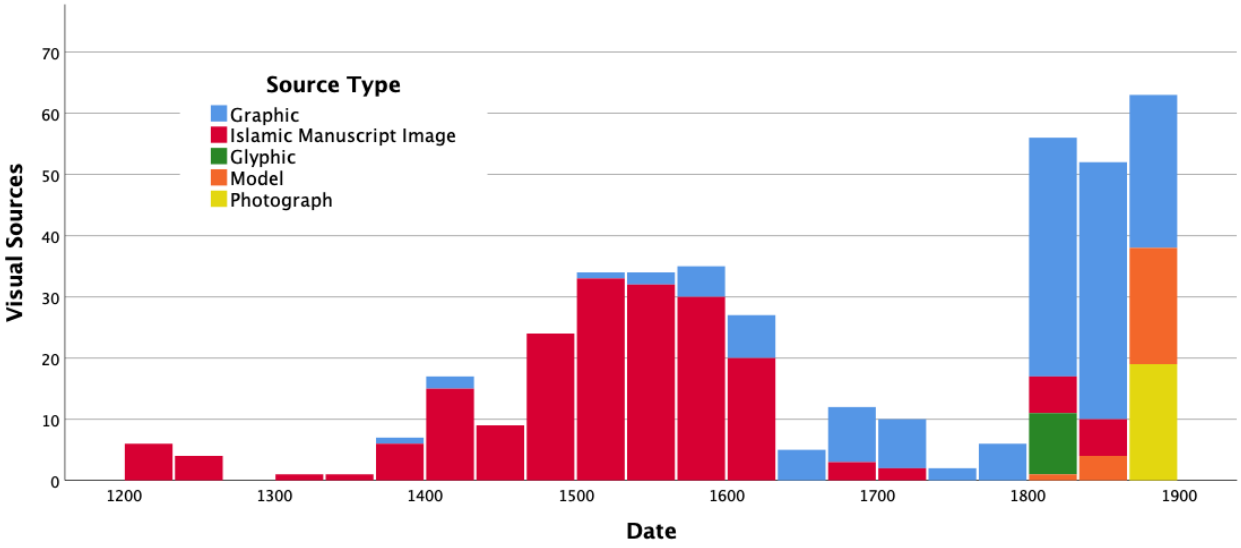


Figure 6.1 Distribution of visual sources by year, showing two significant eras from which sources have been preserved and identified, and the preponderance of Islamic manuscript images before the mid-seventeenth century and that of other source types after then (drawn from Appendix B sections B1 to B5).

Figure 6.1 also shows the distribution of visual sources by type and demonstrates that the preponderance of sources from before the mid-seventeenth century are Islamic manuscript images and the majority of those after are graphic or other types. Portuguese visual sources of the Gulf from their period of occupation during the sixteenth and seventeenth centuries are relatively rare, and many were presumably destroyed along with libraries and archives in the Lisbon earthquake and subsequent fires of 1755 (Rodrigues and Craig 2008). The collapse of central government in Persia during parts of the eighteenth century, the tenuous status of European trading stations during that period and the simultaneous rise of maritime powers among Arab states on the southern shore of the Gulf all probably affected the production and trade of manuscripts and visual artworks. The imposition of British protectorates from the early nineteenth century generated colonial interest in visual sources from the region that are included in many published works. Figure 6.1 shows that

visual sources of Persian Gulf seafaring are unevenly distributed by number and type over the late medieval and early modern period. Other potential reasons for these distributions are discussed by type in Sections 6.1.2–6.

In 47 percent of cases (*n*=190), the location depicted in the visual source may only be identified as the Persian Gulf in general, while nine sources show identifiably Persian Gulf watercraft within the Arabian seas more broadly (Fig. 6.2). In the remainder of cases, it was possible to identify a region where the depicted scene was located that corresponded to a modern Gulf state, the boundaries of which are shown in Figure 1.4. Of these latter cases, the majority are shown in Iran (86), Oman (83), Iraq (15) or the UAE (13), generally reflecting European concern with the major ports or battlefields in the Gulf—Muscat in Oman; Hormuz, Bandar Abbas and Bushehr in Iran, Basra in Iraq, and Ras al Khaimah in the UAE. More thinly populated and infrequently visited tribal areas outside of these ports are far less well served by visual sources, and in the cases of Kuwait and the Makran Coast, not at all. While this may be considered a limitation of the dataset, it reflects in part the bias in general documentary sources. Specific instances of this location bias are discussed by type in Sections 6.1.2–6.

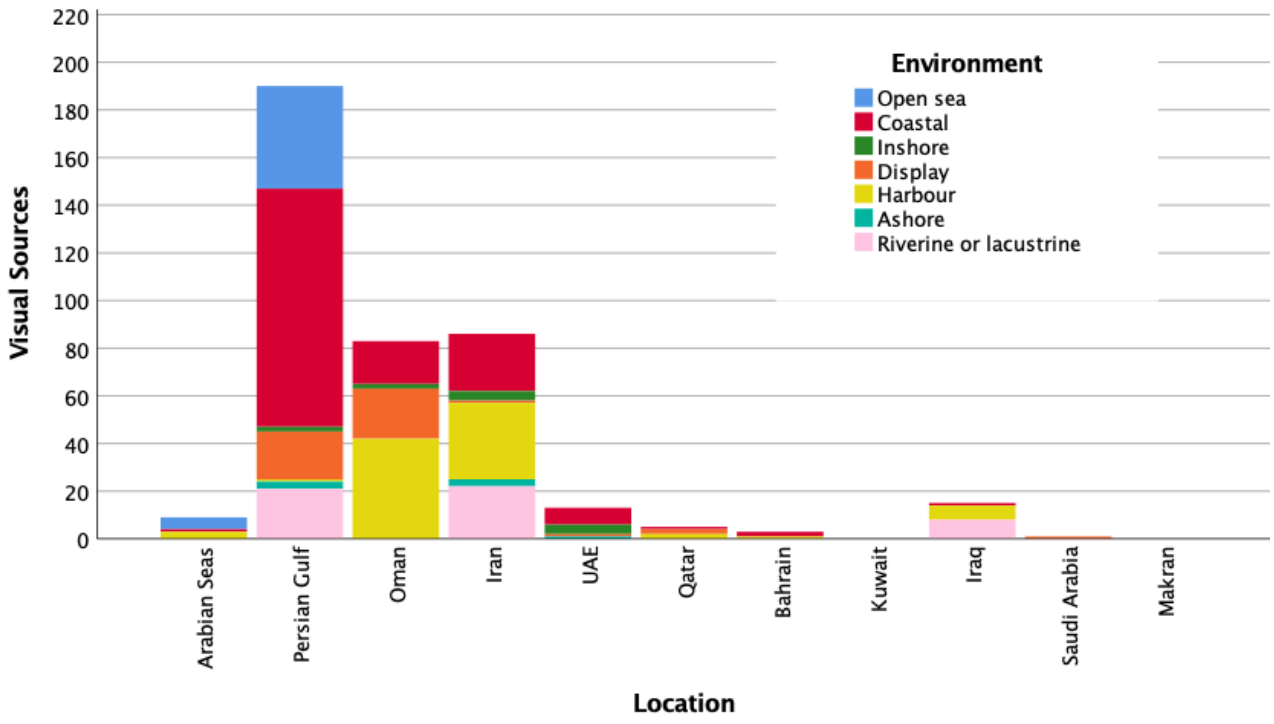


Figure 6.2 Distribution of visual sources by location depicted where identifiable, showing a bias towards those states with historically important harbours (in yellow), such as Muscat in Oman and Hormuz in Iran (drawn from Appendix B sections B1 to B5).

Violence is either shown or implied in just over a fifth (22%) of all visual sources of watercraft catalogued for this research. Organised maritime violence is clearly depicted in 35 cases (9%), implied in 52 cases (13%) and not indicated at all in the remaining 318 cases (78%). Violence was

classified as implied by contextual depictions or descriptions, associated historical texts or where watercraft or their occupants were armed or appeared armed (see Section 3.3). Organised maritime violence was identified in sources from the fifteenth century onwards, and thereafter in proportion to the number of sources identified (Fig. 6.3). There are relatively few visual sources of any type that depict watercraft before the fifteenth century. The period from the mid-seventeenth century to the late eighteenth century offers a discontinuous visual record of maritime violence, although the number of visual sources from this period is also correspondingly low.

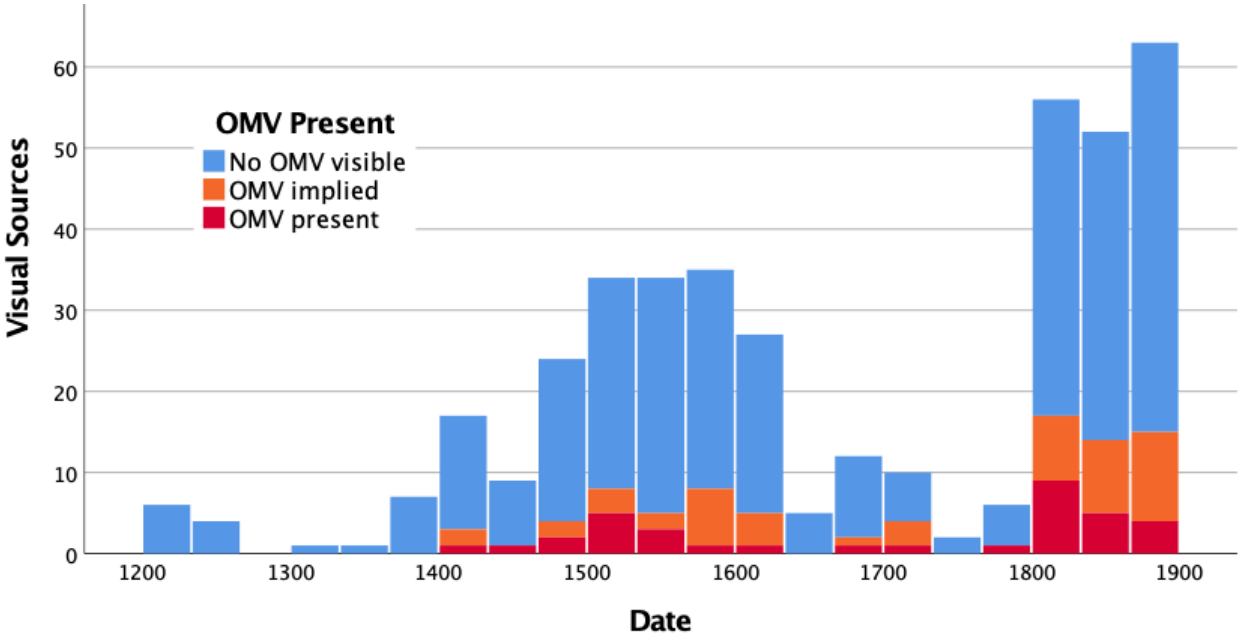


Figure 6.3 Distribution of identifiable cases of organised maritime violence (OMV) in the corpus by date, showing where violence was clearly present, where it could be implied and where there were no indications of violence (drawn from Appendix B sections B1 to B5).

Graphic sources displayed the greatest proportion of violence per number of cases (14%, n=22) and of implied violence per number of cases (15%, n=23). Organised violence was only clearly indicated in graphic (22 cases) and Islamic manuscript sources (13 cases). Only six models and one glyphic source depicted implied violence. There were no cases of clear or implied violence identified in photographs. Particular cases of violence depicted in the corpus are discussed below.

6.1.2 Graphic sources [B1]

Graphic sources are those in which an image is produced by applying a substance to a portable surface, such as paint to canvas or ink to paper. As painted or illustrated pages in Islamic manuscripts are a numerous and specific instance, they are considered separately from other graphic sources in this thesis. Appendix B1 catalogues 154 graphic sources, including European manuscript illustrations, oil and watercolour paintings, drawings, prints, lithographs, charts and plans. Plans are a special class of graphic source showing *measured* elements of watercraft, and only those by Pâris

show vernacular watercraft of the Persian Gulf [B1.111–115, B1.118], while Monleón includes sketches that may have been taken from plans [B1.100–102]. There are only three graphic sources that pre-date the Portuguese invasion in 1507 [B1.1, B1.2, B1.48], demonstrating a lack of preserved non-Indigenous or extra-regional sources. This reflects both the limited European engagement with the region before the sixteenth century and the perishability of the portable media of which graphic sources are comprised. Despite extensive Indian, Chinese and African engagement in the Persian Gulf, non-Indigenous graphic sources of Persian Gulf watercraft appear to be only European in origin. This probably reflects the languages used to enquire about sources, the lack of digitisation of sources from non-European cultures, the failure of preservation and the predominance of European colonial archives. The Maratha (Indian) image of a *dāw* (Fig. 5.7) described in section 5.2.3 was excluded from the catalogue of visual sources as the only cultural identifier used was 'Arab' and, while unlikely, this craft could therefore be from Southern Arabia or the Red Sea instead of the Persian Gulf.

The detail of watercraft in these graphic sources varies considerably, reflecting the choice of media, the expertise of the artist, the presence of exemplars and the intended audience or consumption of the image. Pâris' drawings [B1.111–122] are so revered because of their unrivalled detail and realism, but such precision is more difficult to achieve in woodcuts or watercolours, or when restricted by the small size of a page or other support. The anonymous pen and wash rendering of a *baghla* in B1.150 is spectacularly detailed considering the hull is only 3 cm long in the original. Yet less detailed or realistic graphic impressions of watercraft still offer valuable insight into seafaring in the Gulf. The craft drawn up on the shore in B1.7, B1.51, B1.56, B1.58, B1.59, B1.72, B1.85, B1.134 and B1.135, for example, are often crudely represented, but they amply demonstrate both the rudimentary nature of port facilities in the Gulf and visual evidence of more recently observed ethnographic practices of operating watercraft. The ways that visual sources provide evidence of this and other specific practices are discussed below.

The media used for graphic sources also provides opportunity for artists to annotate their work and in some cases, to include the names of the watercraft depicted [e.g. B1.3, B1.12, B1.19, B1.20, B1.49, B1.67, B1.68, B1.87]. In other cases, graphic sources represent specific historical events for which there are significant extant documentary sources for context—the British raids on Ras al Khaimah and other Qasimi ports in 1809–1810 are prominent examples. The Omani watercraft that accompanied the British on these raids are depicted in several images from multiple perspectives by four different artists [B1.17, B1.77, B1.139–140, B1.146], offering an invaluable opportunity for comparison. This also shows that the same watercraft may be depicted in several sources or, as in

those drawn by Pâris, in the same source from different perspectives. Such practice potentially renders a count of the actual number of individual watercraft shown in graphic sources ambiguous.

6.1.3 Islamic manuscript images [B2]

The corpus of Islamic manuscript images (section B2) includes 198 Mesopotamian (Iraqi), Persian (Iranian) and Ottoman (Turkish) sources of watercraft dating from the thirteenth to the nineteenth centuries. Ten Mesopotamian paintings are all in 'Arab' style and executed in Basra or Baghdad before the Portuguese intrusion in 1507 [B2.30–B2.33, B2.35, B2.76, B2.103, B2.104, B2.155, B2.169]. Three Ottoman images show watercraft built in the Arabian seas and operated by Ottoman and Arab mariners [B2.105–107], although they are represented in a distinctly Mediterranean style. Similar Ottoman and Arab operated watercraft are shown in Portuguese manuscript sources [B1.4, B1.5]. The remaining 185 Islamic manuscript images were executed in court workshops in inland cities of the Persianate world—Shiraz, Tabriz, Heart, Bukhara, Isfahan, Qazwin, Khurasan, Yazd—and are stylistically distinct from contemporary Arab, Ottoman and Indian manuscript paintings. The majority of these images come from copies of the *Shahnama* (Book of Kings), an epic Persian poem written in the eleventh century. The illustrators were not therefore witness to the events shown and appear to have used a mix of inspirations to supplement their limited real-life experience, including older Persian manuscripts, Arab and European art, rock reliefs and shadow puppets (see sections 5.1.2 and 5.1.3).

The images in the Islamic manuscript section depict a range of activities. Fully 73% of images show vessels underway on passage at sea or crossing inland water bodies, 10% show fighting or violence, 7% depict the Prophet Nūh (Noah) and his ark, and 7% represent vessels in crisis or people overboard. There are only two images of shipbuilding [B2.37, B2.91], both very similar and both depicting the building of the ark. It is clear that many scenes contain elements copied from earlier manuscripts or other models, as the figure of a single shirtless boatman appears copied or in similar guises in at least 11 of the Persian images [B2.2, B2.5, B2.11, B2.29, B2.72, B2.80, B2.127, B2.180, B2.183–185]. Crew members are commonly differentiated from passengers or soldiery by simpler clothing, often shirtless like this boatman figure, and also regularly by darker skin. A nakhoda (sailing master) is frequently shown in larger vessels positioned at the stern, usually distinguished by better clothing and headwear. Prophets, kings, women, soldiers, merchants and slaves are all variously shown as passengers in ships. Some 9% of images show women embarked, always as passengers and often in Nuh's ark. Horses are shown embarked in 6% of images.

There are several standard boat or ship types that appear throughout the corpus, usually shown in profile. Open boats represent 27% of vessels depicted, another 27% are open boats with a mast, 39% are seagoing vessels with mast and superstructure, and 6% are European type vessels (carracks

or galleons). ‘Banner’ sails similar to those in the ship from the Schefer *Maqāmāt* manuscript [B2.32], possibly depicting a Quranic metaphor (Beeston 1973:94), appear into the fifteenth century, while triangular and trapezoidal sails first appear in the early sixteenth century, and square sails are prevalent throughout. Only in later European style vessels, where nails or bolts appear, is it possible to conclusively determine the method of plank fastening. These implications of these observations are discussed in Chapter 7.

The images catalogued for this section show that seafaring for the Persian elite at least was an exceptional experience, much more so than fighting, hunting or feasting if the frequency of representation in manuscript paintings in general is a guide. This is demonstrated by the appearance of watercraft in only one per cent of the manuscript illustrations reviewed for this thesis, and the majority of these watercraft conform to one of several visual tropes repeated throughout. These images for the most part display the nautical technical naivety of the terrestrially bound court artists, yet provide rich insight into the social contexts of Persian seafaring. Indeed, it was not until Shah Abbas retook coastal and island territories from the Portuguese in the seventeenth century that the sea began to appear as a Persian battle theme [B2.13, B2.14] rather than one that related to Alexander the Great (Iskandar) or other foreign influences.

6.1.4 Glyptic sources [B3]

Section B3 includes sources made by carving or removing material from non-portable surfaces of stone or wood, as well as those made by applying material to similar surfaces, as in graffiti and stucco. This section catalogues ten sites in Oman, Qatar and Saudi Arabia at which there are 125 individual watercraft motifs, each numbered in section B3 by the site then motif number, such that B3.8.45 refers to the forty-fifth motif at al-Jusāsiyyah, Qatar. These sites are included as they have been estimated to date from the early modern era, although precise dating is rarely possible with such sources. In some sites in Oman [B3.9, B3.10], the construction records of the buildings in which the graffiti occurs indicate the earliest potential date as the eighteenth or nineteenth centuries (Kenderdine and Vosmer 1994). While some motifs are damaged, all watercraft are shown in elevation or from the side, with the single exception of those at al-Jusāsiyyah in Qatar [B3.8]. In this case the majority of motifs (45 of 61 included from this site) are shown in plan.

Given the limited size and detail of many of these motifs, and the lack of contextual data, it is possible that some represent extra-regional watercraft. Two plaster etchings from al-Zubārah in Qatar [B3.5.5, B3.5.6] are displayed in the Qatar National Museum with a label stating of the larger ship that unidentified ‘experts believe it may be a Chinese vessel’, although this claim is more provocative than evidence-based (Ferhan Sakhal, Qatar Museums, pers. comm. 2019). The larger ship in this case [B3.5.5] shows a square rig on multiple masts and this, along with similar examples

[B3.4.5, B3.9.6, B3.6.9, B3.6.10, B3.9.13, B3.9.20], may represent European or Indian craft, but they have nonetheless been included here, as Khaliji watercraft were also known to employ such rigs. The ethnic origins of the artists of any of these works are unknown, although given their locations, a Khaliji origin for at least the majority seems likely.

6.1.5 Models [B4]

Models are scaled, three-dimensional representations of watercraft built or sculpted from a variety of materials. Twenty-four historical models of Arabian or Indo-Arabian craft are listed in section B4, although there are undoubtedly more in private collections or that are misidentified or inadequately catalogued. Of those included, five [B4.5, B4.20–23] were created in France late in the nineteenth century on the basis of plans drawn by Admiral Pâris, so are effectively secondary sources. At least three models [B4.2, B4.3, B4.24], including the only model of a *dāw* [B4.3], were built at the Bombay Dockyard as display pieces for the Great Exhibition in London in 1851. A *battīl* model from this workshop [B4.24] is the only case, other than those from France, in which the name of the artist is known. A model of a *battīl* [B4.9] was built in the same workshop as the Great Exhibition models but remained in India and is now displayed with other models of Indian craft in the Dr Bhau Daji Lad Museum in Mumbai. This important collection is little known and apparently unpublished in English. The origins of the other models are unclear, so none are known for certain to have been built by Khaliji users of the craft themselves. Those for which no date is recorded, or for which only a twentieth century acquisition date is known [B4.10–19], may be from the early twentieth century and therefore outside the scope of this thesis, but have nevertheless been included here on the basis of stylistic and material similarities to the other models and the lack of a more precise date.

At least 11 of these models were expressly built for museum or exhibition display [B4.1–5, B4.9, B4.20–24], and of the remaining 13 models only one [B4.15] shows signs of use in water, indicating that it may have been used at one stage as a toy. The use(s) to which the others were put before acquisition by their current collections is uncertain. The models built for Francis Loch in Bushehr in the early nineteenth century and displayed in a museum in Edinburgh have not been identified (Davies 1997:229; NRS GD1/633/1:f.172; Danielle Spittle, Edinburgh Research Library, pers. comm. 2018; Meredith Greiling, National Museums of Scotland, pers. comm. 2019). Two images in Appendix B [B1.144, B2.86] potentially demonstrate the votive use of models as sacrificial effigies in the Strait of Hormuz (Fig. 6.4), a practice described by Wellsted (1840:60–61). Given that models used in such a way are intended to be disposable, it is unlikely that any of the 24 catalogued in Appendix B4 were built for this purpose.

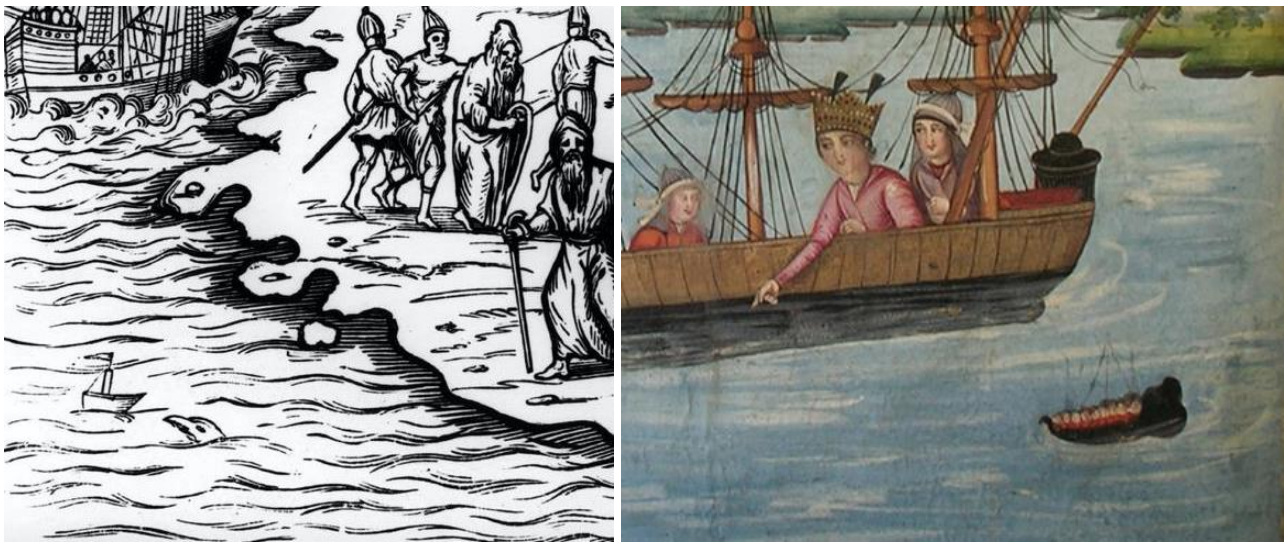


Figure 6.4 Graphic sources potentially showing the votive use of models as sacrificial effigies in the Strait of Hormuz (left Thevet 1575 [B1.144], and right FLP Lewis O.58: f.260r [B2.86]).

6.1.6 Photographs [B5]

Nineteen photographs of Persian Gulf vernacular watercraft taken between 1870 and 1900 were catalogued in Appendix B5. Three of the photos [B5.17–19] were taken in Zanzibar but specifically identify the vessels as being from Muscat. Many other photographs from Zanzibar and East Africa depict vessels from Oman, but as they are difficult to differentiate from East African vessels belonging to Omani colonies, no others are included here. The other catalogued photos were taken in Oman [B5.1–4, B5.7–11, B5.13], Iran [B5.6, B5.12, B5.14, B5.16], Iraq [B5.15] and Bahrain [B5.5]. There are undoubtedly more than those catalogued here; section B6 on missing sources includes five known photographs that are potentially useful records of vernacular watercraft, but that were unable to be obtained for this research. Counter-sterned watercraft are entirely absent from photographic sources, although 19 cases represent an inadequate survey. The exposure time of early photography means that some images of watercraft suffer from motion blur [B5.7, B5.9–11]. Nevertheless, several of these photos [B5.12, B5.14, B5.15] show details of internal construction—particularly framing, clamps and stringers, and the absence of knees—albeit in small craft only. Such sources allow modern ethnographic analogies to be linked to earlier shipbuilding practices, particularly those shown in Pâris' drawings [B1.111–122].

6.1.7 Contextual documentary sources [D]

The survey of documentary sources for incidents of organised maritime violence in the Persian Gulf between 1500 and 1900 was primarily a scoping exercise to understand the ways and means of fighting at sea in order to identify correlates in the visual record. As such, it is not a comprehensive survey of all documents and certainly does not identify all recorded incidents that meet the definition of organised maritime violence. The survey relies principally on secondary sources

except where specific incidents warranted more detailed research or were identified during review of archival visual sources. The lists in Appendix D are therefore indicative rather than comprehensive. The nature of the research program and the sources used to compile Appendix D1; and lacunae in reporting, loss or displacement of primary source material, the potential bias and exaggeration involved, and the frequent absence of corroborating sources or of the Indigenous view, render such a survey partial at best.

Documentary sources provide context for the visual sources identified in this thesis. Appendix D1 lists 158 incidents of violence that reportedly involved vernacular watercraft of the Persian Gulf between 1400 and 1900, as derived from primary and secondary historical sources. The vernacular watercraft listed in these incidents were the victims or perpetrators of the violence, or in many cases both. Several of these incidents took place in the Arabian seas outside the Persian Gulf and usually involved Qasimi fleets cruising on the west coast of India or the entrance to the Red Sea [D1.110, D1.111, D1.116, D1.117, D1.119, D1.121, D1.122, D1.125, D1.126, D1.127]. The list at Appendix D1 includes entries describing sites where watercraft were destroyed or lost at sea or ashore in violent circumstances, sites of maritime violence that probably resulted in archaeological deposition, and major related shore sites such as shipyards or arsenals. These entries are described in more detail in Section 6.3.

Appendix D2 shows the results of a concurrent watercraft population survey, listing occasions where significant actual numbers of watercraft were recorded. The cases in this list show the total number of watercraft mentioned and where they are differentiated by size or by role as fighting craft. The quality of the observation of numbers given is noted as either a count (1), an estimate (2) or a minimum (3). The list also includes the date and general location of the incident, and the sources. Many cases in D2 list the watercraft involved in the same incidents described in Appendix D1. Together, the two parts of Appendix D quantify a significant number of incidents of organised violence involving vernacular watercraft that lend context to the visual sources catalogued in Appendix B and coded in Appendix C.

6.2 Correlates of maritime violence

In his attempts to use visual sources as evidence of medieval Islamic seafaring in the Indian Ocean, Agius (2012:51) noted that ‘in spite of the detail we find in the *Maqāmāt* image, iconographic representation in general, compared to European medieval sources, is very sparse and what we are left with is scraps of data which can be more frustrating than no information’. The analysis reported in this section aligns the ‘scraps of data’ identified above, albeit mostly from a later era than that which concerned Agius, with the correlates of maritime violence outlined in Section 3.3. This process is intended to provide insight that sums to more than its parts by relating these visual

sources to the preconditional, preparatory, functional and resultative correlates of maritime violence. The documentary sources in Appendix D are used to support the alignment of visual sources with relevant correlates.

6.2.1 Preconditional correlates

Preconditional correlates 'indicate appropriate conditions for conflict' (Wileman 2009:6) and were described as access to navigable water, capacity to build or acquire watercraft, capacity to operate watercraft and performance preferences for fighting with watercraft. Preconditional correlates like these are often, but not always, self-evident in visual sources of watercraft.

6.2.1.1 Access to navigable water

This condition is relatively simply realised, as most watercraft in graphic, Islamic manuscript and photographic sources are shown in a maritime environment. In order to determine the sort of access to navigable water demonstrated by the corpus, images were coded on the basis of the environment in which they appeared—harbour, coastal, open sea, riverine, lacustrine or undetermined. Craft were considered in harbour if a settlement was depicted, coastal if the coast was depicted and open sea if no coast appeared in the image. Riverine and lacustrine codes were assigned on the basis of contextual evidence or where the shores of these water bodies are clearly shown. Those sources coded as undetermined showed no indication of environment, such as with petroglyphs or models. The corpus included only wooden craft, rather than skin boats like the circular *qufa* or bundle boats and rafts like the *shasha*. These latter 'non-rigid' small craft would appear in riverine and coastal environments, so the images of watercraft in these categories in this survey will not be representative of the entire watercraft population of those areas. Figure 6.2 shows the distribution of visual sources by environment.

Watercraft in Islamic manuscript images are depicted in a range of environments; at least a third of these images can be directly associated with rivers or lakes, while only 10% are explicitly depicted in the Persian Gulf or Indian Ocean. Images of watercraft in Islamic manuscripts sometimes show coastal and open sea craft in riverine or lacustrine environments, such as the European galleon represented in a river crossing scene in B2.78. Certainly not all lacustrine craft will be similar to seagoing craft, but this convention shows that lacustrine craft cannot reasonably be excluded from the corpus. Nevertheless, these artistic conventions have the potential to skew the results of this particular analysis, particularly given the large proportion of Islamic manuscript images in the corpus (49%, n=198). Given the deliberate exclusion of non-planked or non-rigid craft from the corpus and the limitation of contextual environments by artistic conventions and media, analysis of this criterion merely confirms access to navigable water.

6.2.1.2 Capacity to build or acquire watercraft

Images were coded on the basis of construction status, whether they were operating, beached in maintenance, had frames exposed or were represented by components. Vessels beached in maintenance were commonly supported by mangrove poles and had masts unstepped and were sometimes also sheltered from exposure by canvas or palm leaf covers, so comparison with more recent ethnographic studies helped identify the status of vessels in this case. A large counter-sterned vessel appears in this state in a 1793 depiction from Muscat [B1.56], and others are shown in Temple's coloured lithographs of the British Gulf expedition in 1809 [B1.136, B1.137, B1.138, B1.141] (Fig. 6.5). A photograph from Bahrain from around 1870 shows dismasted vessels drawn ashore and supported by poles and in some cases sheltered [B5.5], while another from Khark shows craft ashore and supported by poles [B5.16]. These scenes depict craft in maintenance rather than being built, indicating at least their home port for the season.

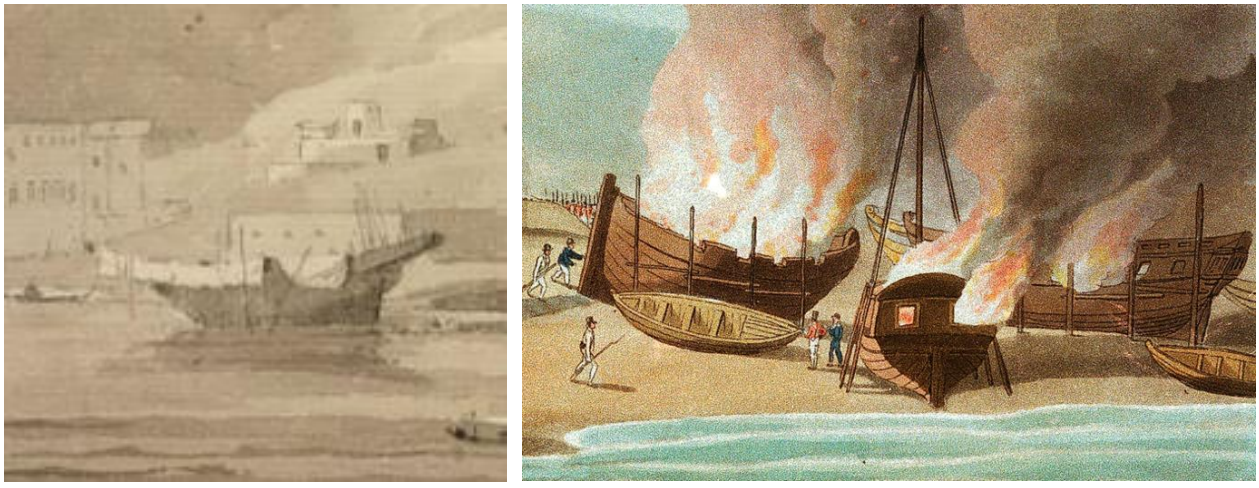


Figure 6.5 Khaliji watercraft drawn ashore in maintenance; left, a *dāw* sheltered from exposure in Muscat (detail from Daniell, W. 1793 [B1.56]); and right, a *battīl* (left) and square-sterned vessels drawn ashore and propped by poles in Ras al Khaimah (detail from Temple 1813h [B1.143]).

Unambiguous evidence of shipbuilding is represented in only two cases (0.05%) in the entire visual corpus [B2.37, B2.91], and these both represent the building of the prophet Nūh's ark as represented in Islamic manuscripts (Fig. 6.6). Both images were painted in the sixteenth century and clearly follow similar models and composition. Each depicts people boring planks with bow drills, a practice indicating sewn or laced fastening, as metal fastening requires the planks and frames to be aligned when bored. Other activities shown include sawing, shaping and planing planks and fashioning dowels or frames, while neither image depicts hammers or metal fastenings. The tools in use—adze, plane, hand saw, two-handed frame or pit saw and bow drill—are identical to those observed in modern dhow-building contexts (Agius 2002:139–144; Al-Hijji 2001:31–34).

Figure 6.6 Shipbuilding in two Persian images of the prophet Nūh building the ark, showing tools and methods indicating laced rather than metal-fastened construction (left BnF Pers.Supp. 54: f.19r [B2.37], right GPM Tehran Ms.2237 Vol1:44 [B2.91]).

The capacity to acquire watercraft through capture is demonstrated more by contextual information than the images themselves, although the country ship *Minerva* is shown during the raid on Ras al Khaimah in 1809 [B1.16], some six months after its well-documented capture (Al-Qasimi 1988:93–97). Hornbrook's painting of the East India Company cruiser *Nautilus* with approaching Khaliji fighting craft shows an unsuccessful attempt at capture [B2.79]. There are no obvious depictions of other modes of acquisition, such as through trade or purchase, although European or Indian square-rigged vessels shown in some images may have been transferred to Khaliji service in this manner.

6.2.1.3 Capacity to operate watercraft

The capacity to operate watercraft in this context requires that Khaliji societies directed the operation of the ships and boats engaged in maritime violence. Nevertheless, it cannot be assumed that all small or apparently vernacular watercraft represented in the Persian Gulf belonged to Khalijis or were operated by Khaliji crews, as many regional watercraft from elsewhere in the

Arabian Peninsula and the west coast of India operated in the Gulf. Attempts to identify ethnicity in the iconography of Gulf seafarers—particularly in the case of the *Maqāmāt* ship [B2.32]—have noted a range of skin hues and clothing that only indicates an 'ethnic mix' from the broader western Indian Ocean (Agius 2012:51). Therefore, there was no consistent way to further differentiate apparently Arab, Persian, South Asian or African figures in the images in the corpus. Skin colour, clothing and hairstyle are all variably represented by artist or genre. Persian artists of Islamic manuscript paintings frequently differentiate between higher ranked figures of the nobility or merchant classes and the presumably lower ranked members of watercraft crews by depicting the former with fine clothing and light skin and the latter with little clothing and dark skin [e.g. B2.4, B2.20, B2.32, B2.44, B2.60, B2.74, B2.75]. Even then, the shirtless boatman figure discussed in section 6.1.3 appears lighter skinned Turkic or Asian rather than dark-skinned, while nakhodas, or sailing masters, are often differentiated from the crew only by better clothing. These appearances might indicate different social status in the eyes of the artists and intended contemporary audiences, but they are not unequivocal ethnic markers of Khaliji identity.

The only other iconographic means to determine if an apparently vernacular watercraft is operated by a Khaliji society is by flag or location in a Khaliji port, and even these methods are fraught and uncertain. Colonial or European flags—Portuguese, English, British, Dutch, French and the Honourable East India Company—were identified and excluded. Arab societies of the Gulf commonly used a plain red flag—the 'blood-red Arab flag' of Davies' account (1997:109, 144)—but other red-based designs were introduced in the nineteenth century to differentiate tribes and emirates (Al-Qasimi 2015:pl.3; Davies 1997:363 n.36). The Persians used a variety of flags over the early modern period, generally of green, white or black with religious symbols or script (Shahbazi 2012), and not easily confused with European flags.

Ensigns and pennants are often flown in dhows from the stern or from staffs on either quarter of the superstructure. Flags and sails are confused in many Islamic manuscript renderings [e.g. B2.3, B2.27, B2.45], but red and green flags and pennants abound [e.g. B2.4, B2.15–18, B2.20, B2.49, B2.62, B2.70, B2.81, B2.86]. European style ships with blue or white ensigns or pennants may indicate a vessel operating under a European or colonial flag [e.g. B2.22, B2.23], although this is by no means certain. Given the inconsistency in these Islamic manuscript renderings, and the variety of colours used for sails, it is possible that artists simply used whatever pigments were at hand without meaning to indicate identity through the colour of the flag.

Red, green and white ensigns, pennants and awnings are shown in the earliest European depictions of watercraft in the Persian Gulf [B1.1, B1.3], although some are Ottoman operated craft, possibly with Khaliji crews [B1.4, B1.5]. A chart of Muscat from 1704 shows several vessels, each with

superficially similar red flags distinguished in detail, and annotated as English, Armenian and Arab [B1.12]. Plain red flags or later variants with white are common in the corpus of coloured graphic sources [e.g. B1.13, B1.16, B1.36, B1.52, B1.53, B1.76–79, B1.84, B1.94, B1.101, B1.124, B1.131, B1.150]. The model B4.11 flies a red pennant from the main mast, while the Science Museum dāw model [B4.3] was originally fixed with red flags [Norbert Weismann pers. comm. 2018]. Staples identifies the ships in B3.9.12 and B3.9.14 as Arab by the large size of their flags (2013:189). Nevertheless, there are many watercraft included in the corpus that do not fly discernible flags or pennants and many uncoloured images, rendering this method of identification only partially useful. Contextual information—captions, annotations or inscriptions—often identifies the origin of the craft depicted or places the rendering in a defined location. In such latter cases, where small craft neither fly European flags nor demonstrate association with ships that do, it has been assumed that they are craft local to the port depicted. For the purposes of this study, all watercraft depicted in the corpus are therefore presumed to be operated by Khalijis where there is no internal or contextual reason to consider otherwise, thus demonstrating the capacity to operate watercraft.

6.2.1.4 Performance preferences for fighting with watercraft

This relates more to later correlates but can be confirmed by offensive actions taken by Khalijis in modified or specialised fighting craft. There must have been an element of preconception involved in offensive actions, so this condition is clearly satisfied. If the only craft shown in a combat situation are Khaliji, such as in B1.3, B2.154 and B2.186, then one side at least must have been deliberately acting offensively and is therefore exhibiting a performance preference for fighting with watercraft. Many of the incidents listed in Appendix D1 show Khaliji actors as the aggressors with a variety of motivations. By using contextual evidence like this, many incidents depicted in visual sources can be shown to demonstrate performance preferences for fighting with watercraft. For instance, the several depictions of the British-led raid on Ras al Khaimah in 1809 show Omani *batātīl* operating as part of the raiding force [B1.17, B1.77, B1.139, B1.140, B1.146].

6.2.2 Preparatory correlates

Preparatory correlates of organised maritime violence are the ‘actions taken by societies to prepare for aggression or defence’ (Wileman 2009:11) and include those identified and discussed at length in Section 3.3.4 and used as headings in the section below.

6.2.2.1 Proliferation of embarked weapons

Images were coded for the presence of weapons, ranging from firearms and personal weapons like spears and swords, to swivel guns, forward firing mounted guns and guns mounted broadside. Ovington observed of the Omanis in 1689: ‘They are stout and manly, and expert at the bow and dart, and since their engagement in the war with the Portuguese, are excellent marksmen, and very

dexterous and ready in the exercise of firearms, in which they employ always some part of the day' (Rawlinson 1929:246). The employment of archery and firearms by Khalijis is amply attested in the corpus of visual sources. Indeed, as was clear from the first Portuguese attack on Hormuz in 1507, gunpowder weapons were employed in Khaliji vessels. The fighting vessels shown in Fig. 6.7, accord almost exactly with initial Portuguese observations:

> galleons, which are long ships with many oars, but not very large […] armed with two large mortars in the prow, and packed with cotton bales, so high that the rowers are hidden from sight. […] There were also many terradas […] full of small guns and men wearing sword-proof dresses and armed from head to foot, most of them being archers (Birch 1875:105).

Personal weapons may be divided into mélee weapons that require the user to remain in contact with the weapon as it strikes its target—swords, maces, clubs, stabbing spears—and ranged weapons that employ a projectile to strike the target, such as arrows, javelins and firearms. Documentary sources describe Khaliji watercraft 'full of men, brandishing their weapons in the air' (Buckingham 1829:496), a stance clearly evident in B1.53 and B2.130 (Fig. 6.7 right). Prominent examples of Khaliji mélee weapons embarked in watercraft are shown in B1.53, B1.60, B2.20, B2.124, B2.127, B2.130, B2.154 and ranged personal weapons are depicted in B1.3, B2.13, B2.20, B2.36, B2.46, B2.129, B2.130, B2.144, B2.154, B2.174, B2.186. Swords, spears and lances, bows and arrows, and firearms are shown in these images (Fig. 6.7). Helmets, body armour and shields are frequently depicted in Islamic manuscript paintings, although they are not shown in any European graphic sources in which Khaliji crews are depicted engaged in combat or in fighting vessels [B1.3, B1.53, B1.60, B1.73, B1.76, B1.78, B1.102, B1.138]. This apparent discrepancy may result from showing helmets and body armour in Islamic manuscript paintings to indicate the warrior status of the wearer, while perhaps in practice they were little used afloat due to their weight or expense.

Where colour allowed, a differentiation was made between guns that appeared to be of bronze and those that appeared to be of iron. Where images showed guns in sufficient detail and realism, an estimate of their size or calibre was made by scaling from other elements of the image, usually people, although such an approach can only produce coarse results, as discussed in Chapter 7. Khaliji-operated, crew-served gunpowder weapons are clearly observable in B1.3, B1.19, B1.69, B1.84, B1.102, B1.138, B1.139, B2.13, B2.16–18, B2.23, B2.93, B2.97 and B2.192, and there are many other examples where gunports may indicate the presence of such weapons. Guns or gunports do not necessarily signify a fighting vessel, as 'the trader is cramped and fettered by the necessity of arming every vessel, at an enormous charge, for her own defence, or submitting to the delays and vexations of convoy' (Buckingham 1829:511). The types of crew-served ordnance used in Khaliji fighting craft are discussed in Chapter 7.

Figure 6.7 Personal weapons embarked in Khaliji watercraft: (left) archery and firearms, but no helmets or body armour (Anon. c.1507–1599 [B1.3]); and (right), swords, archery, firearms, helmets and body armour (after Mondfeld 1979:15 [B2.130]).

6.2.2.2 Watercraft structures to facilitate employment of weapons or defence

The only watercraft structures obviously designed to facilitate the employment of weapons identifiable in the corpus are gunports or embrasures. A gunport is an opening in the side of a vessel enclosed on all sides by framing, with the lintel at the top (Steffy 1994:272, 275, fig.G–3). Gunports without lintels or timbers on top are referred to here as embrasures. Gunports and embrasures can have lids or doors and will usually have eyebolts or other strongpoints on the inboard side to secure the gun tackle (Harland 1984:209–210). While painted false gunports are discussed below in section 6.2.2.6, the purpose of a shape depicted on the vessel's side may be ambiguous, especially as vessels used ports for ventilation or loading access. Khaliji watercraft with unambiguous gunports can be seen in numerous sources [e.g. B1.19, B1.20, B1.28, B1.36, B1.79, B1.84, B1.91, B1.102, B1.104, B1.113, B2.192, B3.9.8, B4.2, B4.3], while gun embrasures are only shown in B1.138 (Fig. 6.8), B1.139, B1.141 and B1.143. All of the latter images with gun embrasures were created by the one artist (R. Temple) of the British expedition against the Qasimi in 1809. Other depictions of some of the same craft in the same expedition by other artists appear not to show embrasures [B1.17, B1.77 and B1.146], although the vessels are not depicted in as much detail.

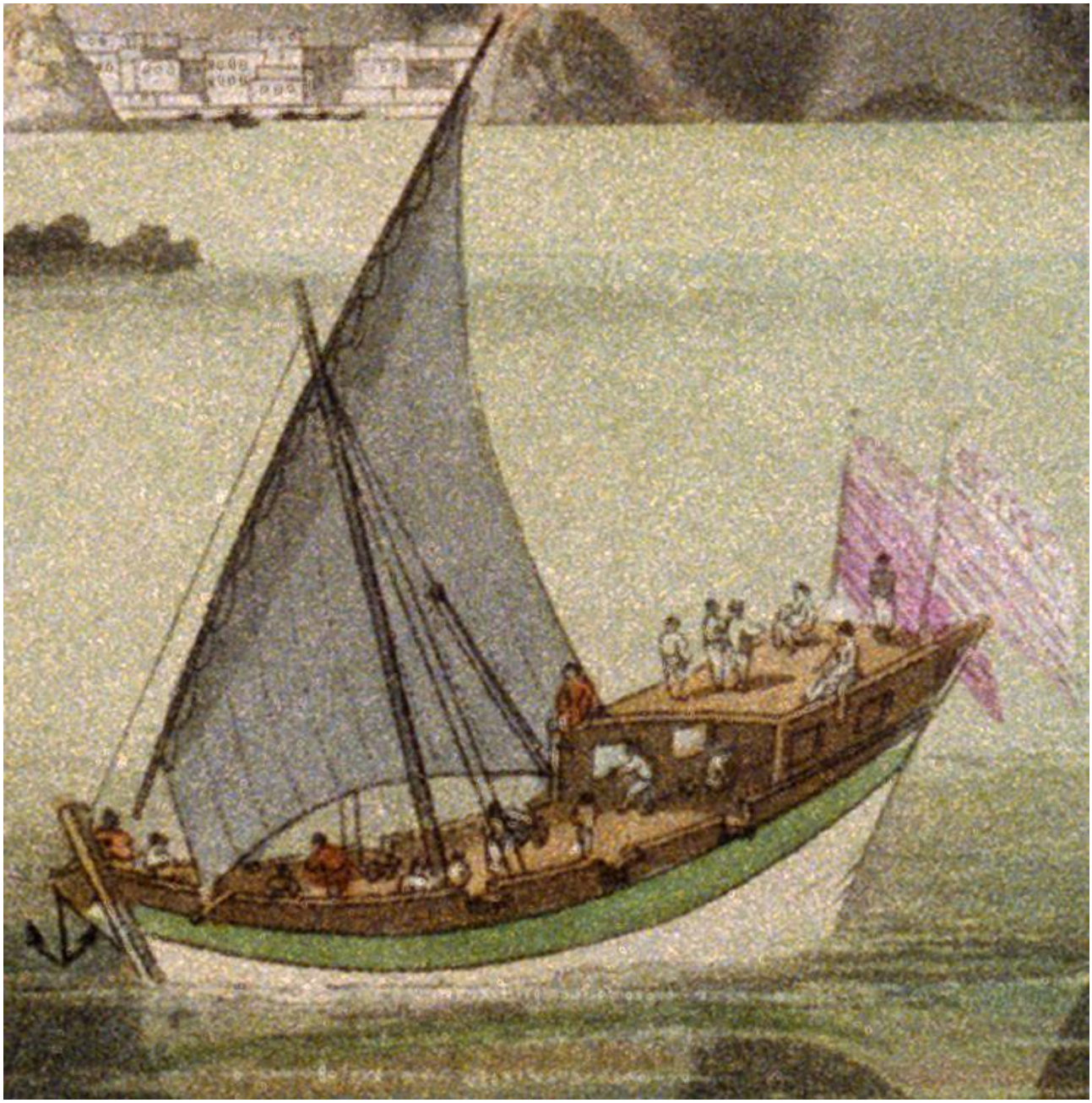


Figure 6.8 Detail of a 6-gun *dāw* with open-topped gun embrasures rather than gunports with lintels (Temple 1813c [B1.138]).

With the exception of gunports, there are no examples in the corpus of watercraft structures that are unequivocally designed to facilitate the employment of weapons or defence. Portuguese sources mention Persian forces employing ‘four large ships equipped with rams’ in a 1614 assault on Bandar Abbas (Floor 2006:215–216), but no such devices are identifiable in the corpus. Nevertheless, many vessels are shown with decorated or shaped stem finials that may act as weapons in this manner (Fig. 6.7 right). Elevated superstructures and platforms may just as well enhance visibility and passive cooling as facilitate the employment of weapons, and any advantages they offer in combat may have been incidental to the original design preference. These structures are observed in watercraft engaged in non-violent activities and there is no clear pattern of

association with fighting vessels. The *dāw* and *baghla* have prominent elevated superstructures or after castles, but they are also the largest of the vernacular watercraft and therefore the ones most commonly fitted with a broadside armament. The projecting counter stern of the *dāw* is also depicted in unarmed versions engaged in non-violent activities and cannot therefore be considered a deliberately designed offensive feature on the basis of evidence from visual sources alone. These features are discussed in detail in Chapter 7.

6.2.2.3 Strengthening watercraft to accommodate weapons and tactics

Documentary sources demonstrate that Omanis at least sought out 'ships both of burthen and strength' to use as fighting craft in the seventeenth century and had large warships built to order in Surat in north-west India (Rawlinson 1929:125–126). The size of vessels depicted in visual sources may be one indication of a trend towards strengthened watercraft, and the *baghla* and *dāw* that appear in the corpus from the early eighteenth century on may be examples of this. Nevertheless, without clear images of the internal structure of watercraft it is difficult to know if they have been strengthened to accommodate weapons, as both the *baghla* and *dāw* also operated as commercial vessels with minimal armament. Vessels mounting guns on carriages require decks and, while decks require support, they also obscure the interior of the vessel. The presence of carriage-mounted weapons does not necessarily imply that the vessel was constructed to appropriate standards or adequately strengthened. Even in the case of the ship models, the obscured internal construction is unlikely to be represented to scale. The corpus of visual sources therefore offers only limited evidence to demonstrate this correlate. The strengthening of vernacular watercraft to accommodate weapons is discussed in Chapter 7.

6.2.2.4 Change in watercraft building standards

Similarly, the many caveats to changes in watercraft building standards discussed in Section 3.3.4h above preclude the analysis of this correlate based on disparate visual evidence alone. While temporally dispersed images of the same watercraft, or of those from the same community or operators, might contain evidence of this nature, the corpus of visual sources is insufficient for this purpose. There is no direct evidence in the corpus to demonstrate this correlate.

6.2.2.5 Watercraft form enabling tactical employment

The most common type of watercraft form associated with violence in the Persian Gulf is the double-ended type, principally represented by the *battīl*. The appearance of numerous vessels of this type in graphic sources depicting engagements between British or Omani forces on one hand, and those of the Qawasim on the other, greatly influences this outcome [e.g. B1.17, B1.76–79, B1.89, B1.91, B1.139, B1.140]. The form of the *battīl* is discussed in Chapter 7, although here it is worth noting that it was considered one of the fastest of vernacular craft, making it useful for tactical

employment, and it was also very common. Square-sterned and counter-sterned vessels were the most common types depicted in visual sources with broadside armament. They were also usually larger than the more common double-ended types, the 'trankeys', including the *battīl* and thus provided sufficient room for the operation and recoil of weapons. The forms of these craft are also discussed in Chapter 7.

6.2.2.6 Watercraft symbolism related to violence

The use of symbols on sails is represented in iconography early in the period, principally in Portuguese or European sources. Ships of the European powers show crosses on the sails and those of Muslim powers show crescents in the maps of Lopo Homem in the Miller Atlas (Weismann 2012:132–136), although this may be an iconographic device for identification rather than an actual depiction of sail decorations, as these devices appear in no other sources. Only B1.4 and B1.5 show Portuguese crosses, while there are no images in the present corpus that show Muslim vessels with crescents on their sails. B1.36 shows crescents on red flags on a *baghla* described as an 'Arab dhow', although these may represent Ottoman devices. It may therefore be concluded that crosses and crescents on sails was an iconographic device favoured by European illustrators and not representative of reality. In Islamic manuscript paintings, sails are often decorated or coloured, but no consistent pattern emerges, and many images repeat the same 'banner sail' device [e.g. B2.5, B2.29, B2.32, B2.52, B2.71, B2.72, B2.80, B2.166, B2.167].

Vessels of all types are commonly depicted with flags when underway, most often flying at a staff at the stern, and sometimes from the masthead as well, although larger flags are commonly associated with martial activities. The Hormuzi fleet that met the Portuguese in 1507 was 'rigged out with flags and standards, and coloured ensigns, and made a very beautiful appearance' (Birch 1875:105). The plain red Arab flag is most common in the corpus, although B1.52 does show variants in addition to the red flag, and B1.3 and B1.110 show striped flags of red and blue. *Dāwat* are on occasions shown with two flags, one flying from each side of the after end of the superstructure [B1.79, B1.100, B1.105, B1.117, B1.138]. This latter arrangement is also observed in some Islamic manuscript images [B2.4, B2.18, B2.70, B2.89, B2.130, B2.132, B2.146], along with flags of all colours, and in the model *nūri* [B4.1]. The carved wooden door at B3.4 shows flags of three different types, perhaps representing national ownership. The vessels shown in B3.9.12–15 are unusual in that several flags of enormous proportions are shown, perhaps indicating warships. Apart from these observations, no clear pattern emerges from the study of flags in the corpus and vessels engaged in violence carry similar flags to the other vessels depicted.

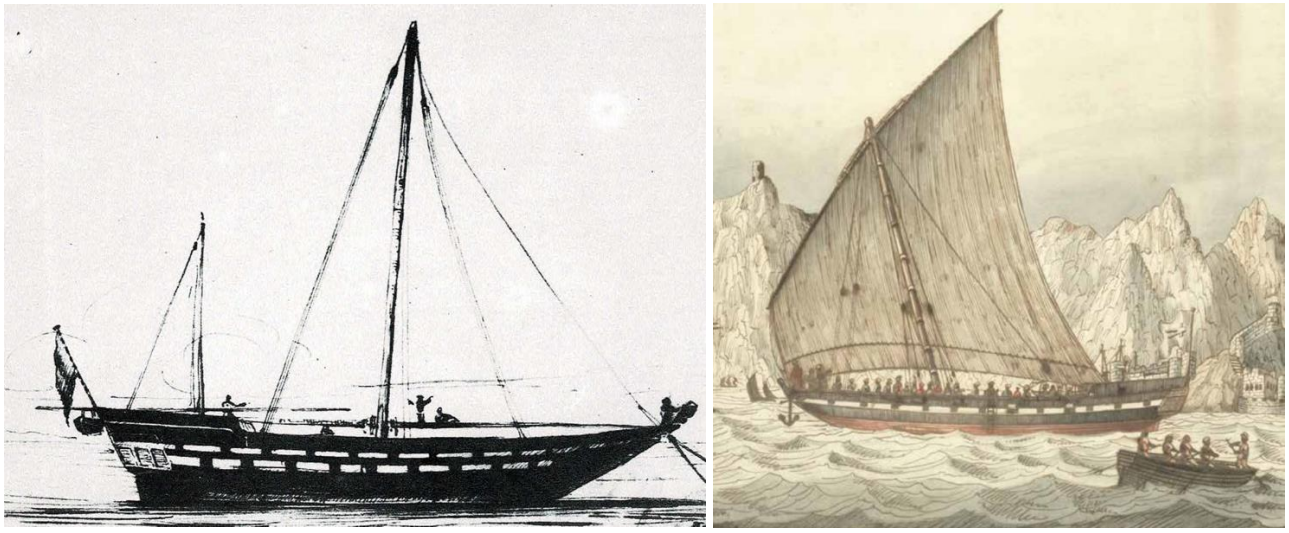


Figure 6.9 False gunports in Khaliji watercraft: left, an Omani *baghla* with two tiers in 1832 (Kirk 1832 [B1.82]); and right, a vessel described as a *patamar* but probably a *baghla* in Muscat c.1850 (Anon. c.1850 [B1.20]).

False gunports were painted on Khaliji watercraft from the early nineteenth century (Fig. 6.9), probably in imitation of the European practice of decorating East Indiamen and 'country' ships in such manner that had developed during the Napoleonic wars (French 1995:32). The effect was to show that a ship viewed from a distance was apparently armed, a form of deception or deterrent as well as fashion. In images of sufficient detail, the real guns may be discerned alongside, or more usually above, the decorated strake of false gunports. Guelye shows an excellent photograph of a *baghla* or *ghanja* with two tiers of painted gunports at anchor in Aden at the end of the nineteenth century (2012:291), although the origin of the vessel is not indicated. False gunports are apparent in vernacular watercraft in B1.20, B1.87, B1.94, B1.102 (lower left), B1.116 (left), B1.122, B4.1 and B4.13, all in square-sterned *baghāla* or *ghanjāt*. All of these sources also date from the nineteenth century when the practice was in European and colonial fashion. Miles observed a *dāw* 'painted with two tiers of ports' in Bahrain at the end of the nineteenth century, surely one of the last of its type (Miles 1919:414).

6.2.2.7 Construction of coastal defences and stockpiles

Coastal fortifications are clear in many images [e.g. B1.6, B1.9, B1.12, B1.16, B1.21, B1.22, B1.26, B1.43, B1.45, B1.47], as well as in contemporary images and charts that do not show watercraft and so were not included in the corpus (e.g. Bocarro and de Resende 1635; de Resende c.1636; Garcia 2009; Loureiro 2007). Documentary sources mention temporary defences, such as 'a breastwork of stones' around vessels drawn up on the shore (Al-Qasimi 1995:38), The corpus of visual sources nevertheless shows no evidence of the temporary defences, like chains or stakes driven into the seabed, or of sunken block vessels, described elsewhere in documentary sources (Floor 2006:139–141). Temple's *Sixteen Views* of the British raid on Ras al Khaimah in 1809 include a number of images that show watercraft and so were included in the corpus [B1.136–143], as well as a

depiction called ‘The Storming of a Storehouse near Rusal Khyma’ (Fig. 6.10). This image depicts a cannon and cordage stacked on the left, indicating the naval stores that were destroyed during the raid (Al-Qasimi 1986:137).

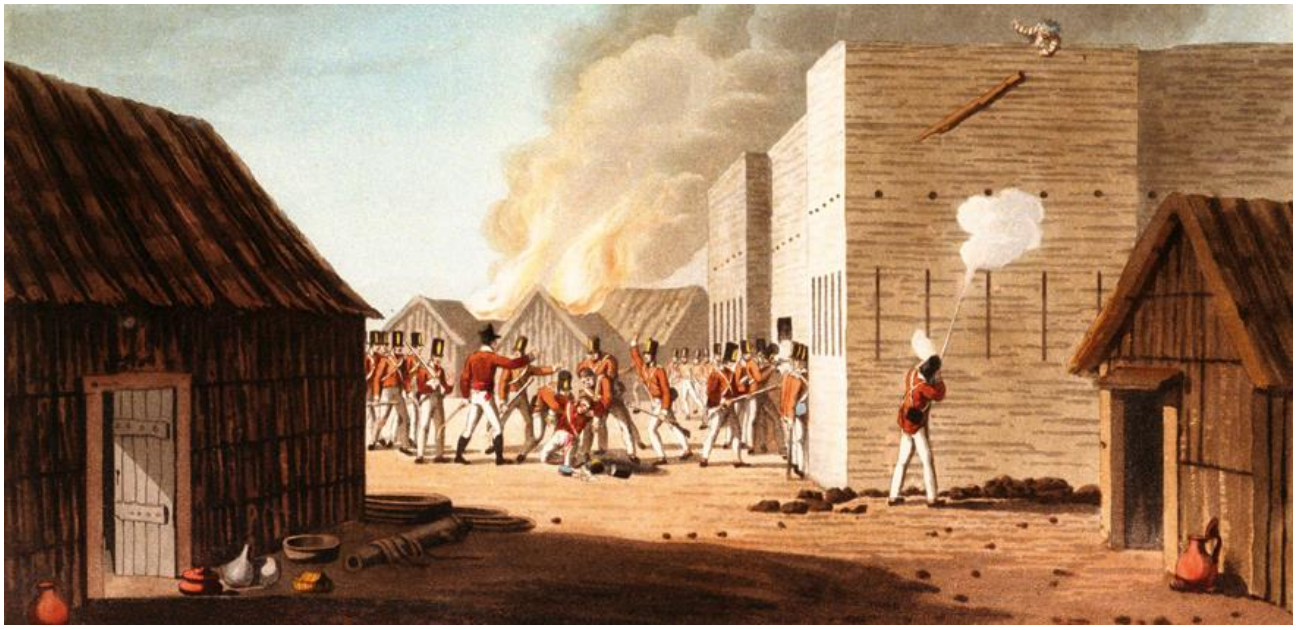


Figure 6.10 British forces storming a storehouse in Ras al Khaimah in 1809 (Temple 1813 *Sixteen Views of Places in the Persian Gulph No.8* [painting] National Maritime Museum, Greenwich, PW4800).

6.2.2.8 Change in deployment patterns or readiness of watercraft

Images of the Ottoman fleet in the sixteenth century, which employed an unknown number of Khaliji watercraft and mariners, show the vessels in formations and manoeuvring together in combat [B1.4, B1.5, B2.105, B2.107]. Khaliji craft manoeuvring in tactical formations are shown in B1.60, B1.76, B1.79, B1.84, B2.13, B2.16–18, B2.20, B2.68 and B2.186, and specifically Omani craft under British control in B1.17, B1.139, B1.140 and B1.146. The drawing B1.14 shows Khaliji craft pearling as a fleet off the island of Hormuz, and B1.40 uses the same model. Pearling fleets are shown operating together from the sixteenth century in B1.37, B1.71, B1.92, B1.93, B1.152 and B1.153. The watercolour in B1.52 (Cussons 1820) shows Indigenous craft potentially in convoy, although this may simply be an artistic construction to show a variety of types. There are many other instances of two or more watercraft shown in the same image, but without any indications of violence or in situations where they do not appear to be acting together, such as in harbour roadsteads. The petroglyphs at site 175 at al-Jusāsiyyah (Kapel 2017 [B3.8.16–22]) show vessels clearly acting together, but the context is unclear. The temporal and spatial distribution of these images indicates no particular pattern of change, although the images do confirm that Khaliji vessels often acted together and manoeuvred in tactical formations in combat. Contemporary observers of Khaliji fighting craft in the early nineteenth century claimed that Qasimi fleets had adopted a ‘new system’ of cruising in large numbers and using swarm tactics to overwhelm well-

armed European or Indian ships (Davies 1997:107), although there is no significant change in visual representations from this date.

6.2.3 Functional correlates

Functional correlates relate to the 'organisation, tools and procedures' of organised violence that evidence tactics and strategies, or that show 'evidence of the immediate effects of violence' (Wileman 2009:35). Functional correlates of organised maritime violence were identified in section 3.3.5 above as the remains of damaged watercraft or of watercraft prepared for action, the detritus of battle in submerged site and damaged coastal settlements or fortifications.

6.2.3.1 Remains of damaged watercraft

Watercraft casualties appear throughout the corpus, although not always as the result of violence. Storms or wrecking events were a constant source of concern for Islamic artists, as testified by the presence of sea monsters portending doom, grief or evil in more than a fifth of scenes in section B2 (Simpson 1997:56–57). Discounting those scenes that show Nūh's ark and the flood, Islamic manuscript images showing wreckage or flotsam include B2.39, B2.72, B2.132, B2.146 and B2.148. The only other images that depict watercraft casualties are the graphic sources B1.26, B1.30, B1.89, B1.108 and B1.141–143, and these all depict British destruction of vernacular craft the nineteenth century, mostly by burning. The clearest depiction shows a semi-submerged counter-sterned craft during the assault on Bushehr in 1856 (Fig. 6.11), although it is not clear from the context or original caption if the vessel was damaged before or during the battle. The cases listed at Appendix D1 and discussed below in Section 6.3.2 show that hundreds of watercraft were described in documentary sources as destroyed or sunk by violence during the period covered by this study.

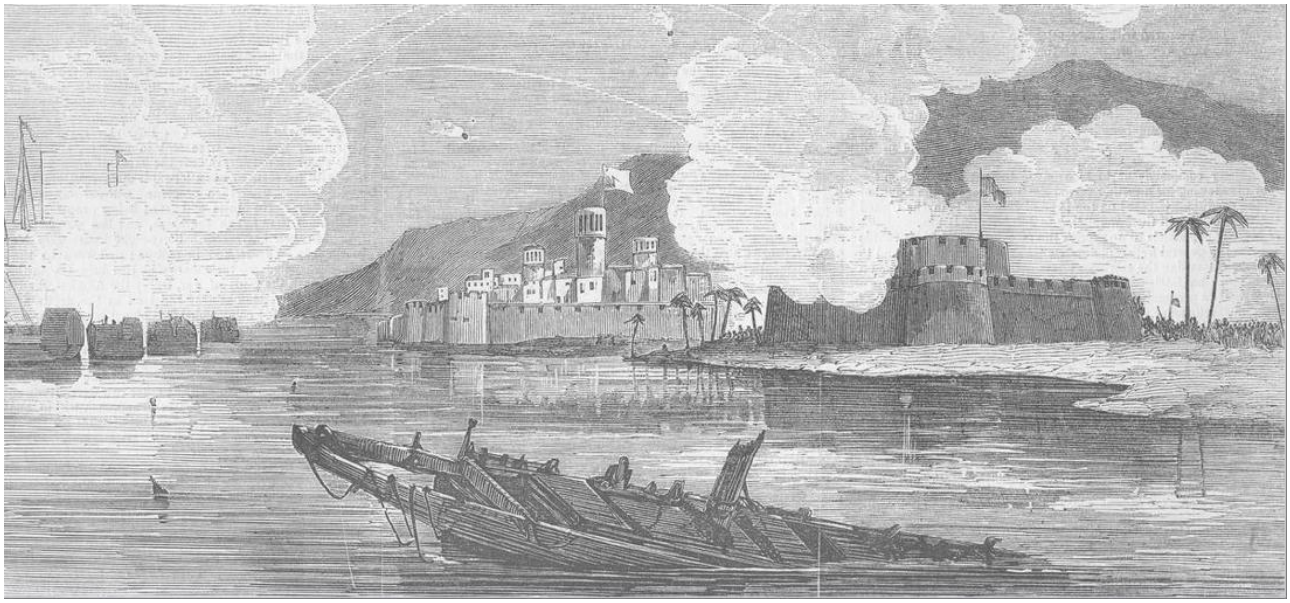


Figure 6.11 The remains of a damaged counter-sterned watercraft in a scene depicted the British assault on Bushehr in 1856 (Anon. 1857e [artwork] [B1.26]).

6.2.3.2 Remains of watercraft in readiness for action

Images of watercraft casualties that showed clearly armed vessels or those engaged in combat demonstrate readiness for action. This category would also include watercraft prepared for violence or defence that were lost in non-violent circumstances, although none of these were identified in the corpus. Other than those craft depicted as destroyed or damaged in combat in section 6.2.3.1 above, or those potentially so depicted in battle scenes (see section 6.2.3.3 below), visual sources are of little use here. In B1.84, the Qasimi *dāwat* are shown with their guns run out ready for battle, but no result is indicated in the source. This category of functional correlate would be better enlightened by archaeological remains, such as those from the vessel identified near Bu Maher Fort in Bahrain (Pedersen 2015b:159, 165–166). Fleets of fighting craft were dispersed by storms on a number of occasions (Floor 1987:45, 2014:6), and, while these instances possibly resulted in the loss of watercraft prepared for action, there are no corresponding visual sources in the corpus.

6.2.3.3 Detritus of battle in submerged sites

Images of watercraft engaged in battle demonstrate the potential detritus of that activity that may be observable in archaeological contexts. Spent projectiles like shot, arrows, spears and stones would litter sites of engagement, while helmets, shields and body armour could indicate casualties among combatants. Visual sources show a number of scenes where detritus like this could be expected, including Khaliji combat at sea or near the shore with the Portuguese [B1.4, B1.5, B1.60, B2.13], the British [B1.16, B1.26, B1.28, B1.73, B1.76, B1.79, B1.139–143, B1.146] and among themselves [B1.3, B2.46, B2.127, B2.130, B2.144, B2.154, B2.186]. The vessel above in Figure 6.11 is shown already semi-submerged [B1.26]. Documentary sources describe the use of fire rafts to attack coastal fortresses (Floor 2006:185), although again there appears no visual evidence of this tactic. The British ‘demonstration’ at Ras al Khaimah in 1816 resulted in the discharge of hundreds of iron round shot, most of which fell short of the shore into the shallows in front of the town, and invited a similarly ineffectual response from guns mounted in dhows drawn up close to the shore (Buckingham 1829:496; Davies 1997:118). An account of an engagement between a British cruiser and a squadron of vernacular fighting craft from Abu Dhabi in 1835 describes the latter jettisoning articles when pursued (Kelly 1968:355–356). Nevertheless, historical visual sources are not well suited to showing the submerged remains of battlefield sites.

6.2.3.4 Damaged coastal settlements or fortifications

Attacks on or near coastal settlements and fortifications that did or might have resulted in damage are shown in a number of sources [B1.16, B1.17, B1.26, B1.30, B1.77, B1.139–143, B1.146, B2.13, B2.186]. The tower illustrated on the right in B1.16 (Fig. 6.12), an image captioned ‘Capture of the Piratical Ship *Minerva* by the *Prince of Wales* Schooner and boats of the *Chiffone* and *Caroline*,

before the town of Ras-ul-Khyma, Persian Gulf, Nov. 1809' (TNA ADM 344/1229), was damaged during this raid. A British account of the attack records that 'a gun from the tower opened a fire on the boats which was quickly returned' (TNA ADM 54/335:f.105). A map of the disposition of forces during the subsequent 1819 raid marks the site of the tower already as 'ruins' and shows it immediately adjacent to the main British landing and occupied by British artillery (BL IOR/X/3213). Oral histories record that this particular tower was destroyed 'more than three times during the battles with the British forces' (Kharkhur 1992:22). The extant tower, now known as Abu Shaq, is not the original, but is built on the clearly visible square foundations of the slightly larger predecessor destroyed by the British (Kennet 1995:45–46). The Abu Shaq tower in Ras al Khaimah is merely an example of a damaged coastal fortification for which there is ample documentary and visual evidence. The remains of more than seventy similar towers have been located in the Emirate of Ras al Khaimah alone (Kennet 1995:1), although not all of them on the coast. Despite the extensively damaged eighteenth- and early nineteenth-century fortifications and settlements at al-Zubārah in Qatar, there are no images of the site in the corpus until 1895 when the British bombarded the town and burnt 44 alleged 'pirate' dhows (Busch 1967:135) [B1.108].

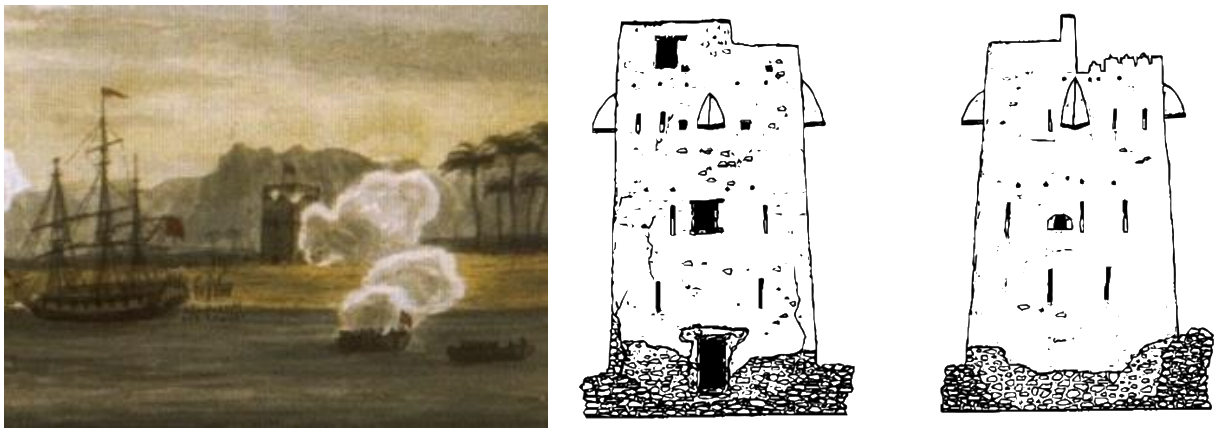


Figure 6.12 Damaged coastal fortifications: the Abu Shaq tower in Ras al Khaimah, (left) destroyed for the first time by the British in 1809, probably showing the west face (detail from Anon. 1809 [B1.16]), and (right) as currently reconstructed, showing the north and west faces with the remains of the original tower at the base (redrawn after Kennet 1995:45 pl.T6).

6.2.4 Resultative correlates

Resultative correlates demonstrate the medium- to long-term effects of violence on Khaliji societies (Wileman 2009:45). These correlates include changes in the number, types or quality of watercraft represented, changes in the ways that marine resources are accessed or exploited and the dislocation of maritime societies.

6.2.4.1 Changes in watercraft population

The most immediate indication of a change in watercraft population in the corpus is the increase in representations of vernacular fighting craft in the fifteenth century (Fig. 6.3), although this may well

be a function of the limited number of visual sources showing any watercraft in the era before this. The Islamic manuscript painting B2.154 shows two non-European vessels engaged in combat at sea, using archery and edged weapons, in a 1437 image. B2.181 and B2.182, folios from the same work dated to 1497 (TSK Istanbul H801), appear to show watercraft with cannons and metal fasteners. Other fifteenth century images generally show the use of archery and personal weapons in watercraft instead [B2.46 (c.1430–1434), B2.120 (c.1476–1487), B2.127 (c.1476–1486), B2.144 (1475), B2.155 (1400–1499)]. Square- and counter-sterned vessels appear in the corpus from the sixteenth century, although artistic conventions may preclude the identification of square-sterned vessels, typically shown in profile in Islamic art at least. The watercraft population of the Persian Gulf as a whole is discussed below in Section 6.3.1. Particular cases relating to changes in technology within the watercraft population are discussed in Chapter 7.

6.2.4.2 Changes in watercraft quality

Changes in watercraft quality are not clearly evident in the corpus until the use of realism in European art and photography in the nineteenth century. European-sourced images from this period may have been influenced by views of dhows as anachronistic or decrepit craft associated with slavery (Gilbert 2011:66), such as shown earlier in Figure 5.5. British attempts to ban the export of timber from India to Qasimi ports in the early nineteenth century may have had an effect on the quality of watercraft, forcing builders to use diverse, inferior or recycled material, but embargoes were generally ineffective and easily circumvented (Kelly 1968:124, 129, 204). Without close inspection, it may be difficult to differentiate an older vessel with newly applied oil and antifouling coatings from one newly built. B1.31 shows two such vessels in fine detail, the smaller appearing painted and coated and the larger showing the tell-tale streaks of metal fasteners, although there is no other way to determine the quality of the watercraft. Variation in the quality of wooden ship models appears more in line with workmanship and materials rather than any attempt to show decrepitude. Visual sources may well be misleading in this instance and should only be used to identify potential trends that require archaeological and documentary sources to confirm. There are no such trends in watercraft quality apparent in this corpus of visual sources.

6.2.4.3 Changes in resource exploitation

The destruction of watercraft on the scale perpetrated by the initial Portuguese assaults would be expected to affect the ability of maritime societies to exploit marine resources. This may be evidenced by the use of unspecialised or inappropriate craft for resource exploitation tasks. The depiction of watercraft with elongated sterns among the petroglyphs at al-Jusāsiyyah in Qatar could possibly be an instance of this. The petroglyph scenes [B3.8] have been interpreted as depicting pearling fleets, although the evidence for this is circumstantial and uncertain (Facey 1987:205–207).

Vessels with elongated sterns like the *kalbā* or *dāw*, would generally have high freeboards that made diving operations over the side difficult, thus making them less than ideal pearling craft. Ten images depict pearling fleets or activities [B1.1, B1.2, B1.37, B1.57, B1.71, B1.92, B1.93, B1.145, B1.152, B1.153] and three apparently show fishing [B1.121, B1.130, B1.145], although no clear patterns emerge relating to changes in resource exploitation. Nevertheless, it is known that changes in resource exploitation resulted in violence and were caused by violence. One of the two main pearl fisheries of the Gulf declined in the sixteenth century, probably due to overfishing, and resulted in the migration of Huwala Arab tribes on the coast of Persia, eventually bringing them into conflict with the Portuguese and other tribes (Floor 2014:1–2). Arab tribes fought over access to pearling grounds in the sixteenth and seventeenth centuries (Floor 2014:24), and in the 1830s a conflict between the Qawasim and the Bani Yas tribes on the west coast of what is now the UAE caused a dramatic reduction in the number of vessels engaged in pearling in the area for three seasons (Kelly 1968:247–248). Nevertheless, this correlate would be more easily demonstrated by environmental or landscape archaeology approaches that study temporal changes in resource exploitation and that can associate them with known violent events.

6.2.4.4 Dislocation of maritime social elements

Migration is a common response to violence and examples in the Persian Gulf are documented during the early modern period. In 1577, Huwala raiders were said to have caused so much damage in Qatif that the merchants relocated to Bahrain (Floor 2006:46). In 1701, two Arab tribes temporarily relocated to Basra ‘with 150 boats, each with 2 or 3 guns’ after being forced out of Bahrain by conflict (Floor 2014:25). British surveyors noted in the early nineteenth century that ‘tribes in the Musandam Peninsula sometimes migrated from one settlement to another to avoid hot winds and bad weather conditions’ (BL IOR/X/10309:f.10r), and that in 1822, ‘the people [of Rams] were in much distress on account of their trading boats having been destroyed, which obliged most of them to emigrate’ (BL IOR/X/10309:f.14v). Nevertheless, pictorial evidence has little to add to these cases and generally displays insufficient resolution to inform this correlate.

6.2.5 Evidence of correlates in sources

The correlates of maritime violence in the early modern Persian Gulf are variously evidenced by visual and documentary sources. Some types of visual source are inadequate for demonstrating particular correlates and Table 6.1 shows the sources of evidence for each correlate in these results. From this table it can be seen that glyphic sources and models are the least instructive, implying that the detail and contextual visual information offered by other sources is often superior.

Table 6.1 Evidence chart of correlates of maritime violence in visual and documentary sources.

Correlates of maritime violence	B1 Graphic	B2 Islamic MS	B3 Glyphic	B4 Models	B5 Photos	Documents
Preconditional						
Access to navigable water	●	●	○	○	●	●
Capacity to build or acquire watercraft	●	●	●	●	●	●
Capacity to operate watercraft	●	●	●	●	●	●
Performance preference for fighting with watercraft	●	●	○	○		●
Preparatory						
Proliferation of embarked weapons	●	●	○	●		●
Watercraft structures to facilitate employment of weapons or defence	●	●	●	●		●
Strengthening of watercraft to accommodate weapons or tactics	○	○	○	○		●
Change in watercraft building standards						●
Watercraft form enabling tactical employment	●	○		○		●
Watercraft symbolism related to violence	●	●	○	●		●
Construction of coastal defences and stockpiles	●	○				●
Change in deployment patterns or readiness of watercraft	●	●	○			●
Functional						
Remains of damaged watercraft	●	●				●
Remains of watercraft in readiness for action	○					●
Detritus of battle in submerged sites	●	●				●
Damaged coastal settlements or fortifications	●	●				●
Resultative						
Changes in watercraft population	●	●				●
Changes in watercraft quality	○	○				●
Changes in resource exploitation	●		○			●
Dislocation of maritime social elements						●

● Strong evidence

○ Weak or implied evidence

6.3 Archaeological signatures

The survey of documentary and visual sources for incidents of organised maritime violence in the Persian Gulf between 1500 and 1900 provides a view of potential archaeological signatures of the behaviour and of the distribution of potential sites throughout the Persian Gulf region. This view can only then be as comprehensive as the research that informs it, and anomalies and omissions should therefore be expected. In this case, estimates of the total number and specialisation of watercraft in the early modern Persian Gulf rely heavily on intertextual evidence.

6.3.1 The watercraft population in the Gulf 1500–1900

If no fantastical representations occur, and there is no evidence of such in this case, then visual sources will reflect the actual population of watercraft either past or extant (Flatman 2007:22–27; Wedde 2000:31–34). Referents for watercraft depicted may not all have been Persian Gulf vernacular forms, as appears to be the case in some Islamic paintings [e.g. B2.22, B2.34, B2.78, B2.131, B2.164, B2.165, B2.177]. Nevertheless, it is useful to gauge the size of the population of actual vernacular watercraft in the Gulf during the period under observation that has been 'sampled' by representations in visual sources. While visual representations are not samples in the same sense as archaeological finds, and may be replicated or biased in ways not clear to a modern viewer, analyses of their frequency and distribution generate useful categories for comparison and aid in identifying the potential archaeological signature.

There are no reliable global surveys of vernacular watercraft in the Gulf over the early modern period, as each attempt has been hindered by lack of access to or knowledge of some maritime settlements. Only those areas that regularly traded or fought with Europeans, or otherwise gave reason to be counted, appear in these surveys, which were all compiled by Europeans (Agius 2005:95). The Portuguese estimated the naval forces of the Persians and Arab tribes on the Persian coast in 1610 to be around 1,200 vessels, including 100 at Bushehr specifically to attack shipping from Basra (Floor 2014:9) [D2.11, D2.12]. The Dutch survey reported in 1756 is the first major survey after that, although this consists of estimates rather than counts (Floor 2007:32–38) [D2.26–38]. British interest in piracy, slavery and trade in the Gulf generated broader watercraft surveys from the early nineteenth century (Brucks 1856; Agius 2005:97–99), but their interest was more military than ethnographic [D2.57–78]. Surveys later in the early twentieth century concentrated on pearling as the predominant maritime industry (Agius 2005:99–107), or within certain areas, such as the former 'Pirate Coast' of what is now the United Arab Emirates [D2.101–109]. Even considering these restrictions, variable methods of counts or estimation, some probably based on hearsay rather than observation, and judgments of what constituted a large or a small watercraft—or indeed one worth reporting at all—further limit the accuracy of watercraft population estimates.

This limited survey data is supplemented by instances of counts in individual ports reported in military or travel sources throughout the period and this provides the only data before the mid-eighteenth century. Portuguese estimates of the number of watercraft destroyed in early engagements in the Gulf offer insight to the numbers available in major ports while simultaneously illustrating the nature of fluctuations in the record (Birch 1875:105; Fawcett and Burns 1947:103; Floor 2006:92–93) [D2.14–19]. The data compiled in Appendix D2 represents counts and estimates of watercraft numbers throughout the Gulf over the period 1500 to 1900. The overall population estimate produced is most likely an underestimate and the vagaries of historically recorded estimates can at least be acknowledged. From the data in Appendix D2 and the surveys already identified by Agius (2005:95–109), the total watercraft population of the Persian Gulf cultural world would have been around 6,000–7,000 vessels of all types at the end of the nineteenth century. The Dutch survey in 1756 makes clear that the watercraft population at the time would have been no greater than this, and probably several thousand fewer (Floor 2007:23–38) [D2.26–38]. The average watercraft population at any point over the four centuries from 1500 to 1900 was therefore somewhere around 5,000. If a vessel's average life could be estimated at 10 to 20 years, then the Khaliji population of the Gulf would have operated between 100,000 to 200,000 individual watercraft during that period. This crude estimate is intended only to give context to the potential archaeological signatures of maritime violence.

6.3.2 Incidents of maritime violence with potential archaeological deposition

The incidents recorded in Appendix D make it clear that maritime violence perpetrated in or on vernacular watercraft from the Persian Gulf was prevalent throughout the entire period of this study. Maritime violence was recorded on all major coasts and ports of the Gulf over this period. Given the reliance on secondary sources and selected non-visual primary sources, such observations should be considered contextual rather than definitive. The 158 incidents identified in Appendix D1 record the loss of at least 2,600 vernacular watercraft in violent circumstances. These incidents range from reports of the loss of a single vessel, through reports of unspecified numbers of vessels, to reports of the loss of 400 watercraft in a single incident [D2.49]. Portuguese reports estimate that 400 craft of all types were destroyed in the initial attack on Hormuz in 1507 [D2.3]. Some 900 vessels were estimated to have been destroyed at Bahrain, Laft and Lengeh by Portuguese forces in 1621 [D2.16–18]. British sources report as many as 103 vessels destroyed in their raid on Qasimi ports in 1809 [D2.47] and 177 in the same areas in the subsequent assault in 1819 [D2.56]. As many other reports have probably escaped the attention of this survey, and numbers based on ambiguous reports or estimates were deliberately restricted within it, it is highly likely that the real total of watercraft lost to violence would be much higher.

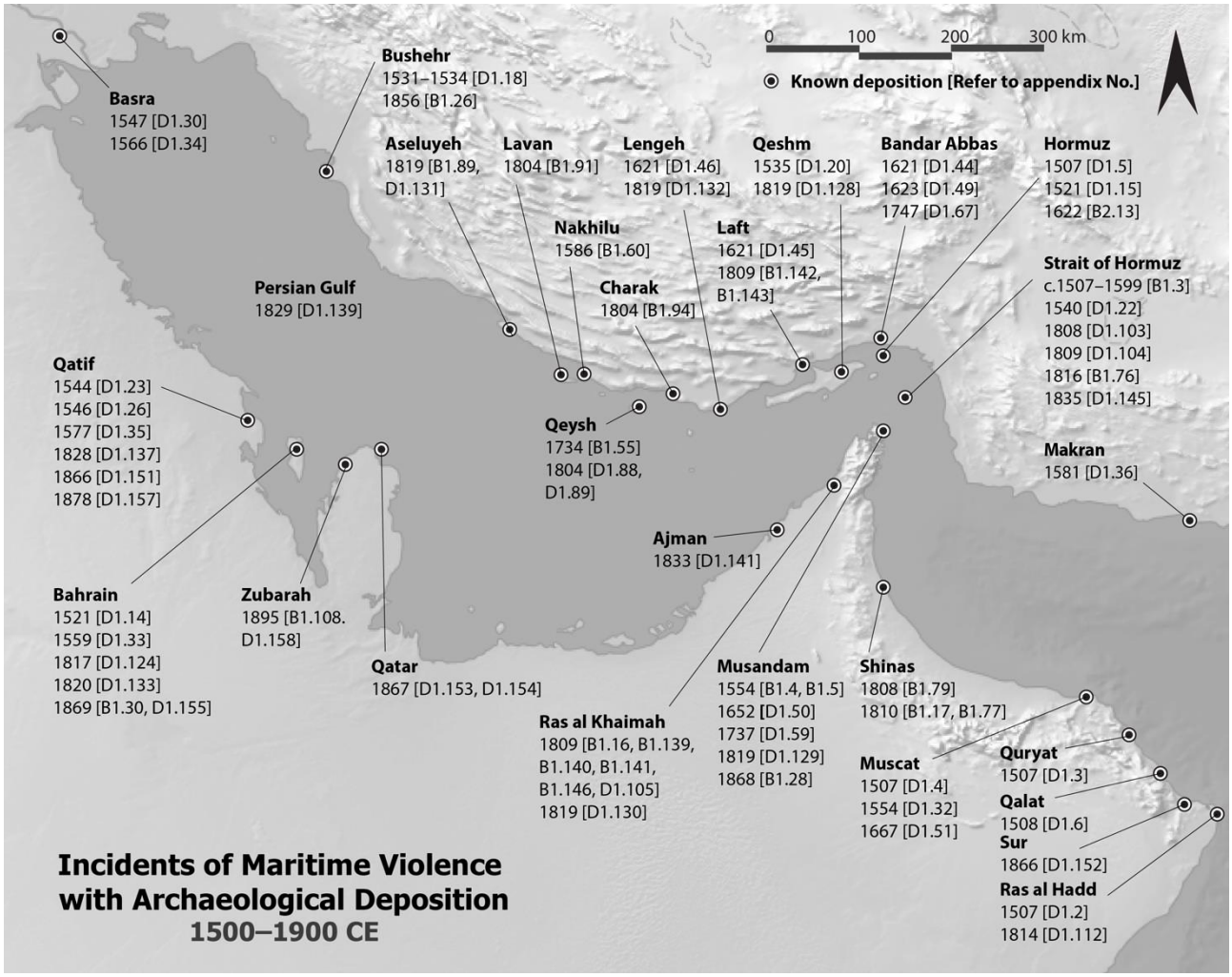


Figure 6.13 Incidents of maritime violence that resulted in the deposition of archaeological material in the Persian Gulf between 1500 and 1900, with references to the appendices.

Many of these craft were destroyed by fire and, given the paucity of metals in the construction tradition, would leave weak signatures in dynamic near shore environments. The resource impoverished Khaliji population maintained a deserved reputation for salvaging wrecks (e.g. Al-Qasimi 1995:62; Loane 1805:109–110), and the remains of any craft near or on the shore would have been quickly disassembled and recycled. Nevertheless, many of the incidents recorded in the appendices would have resulted in the deposition of archaeological material. Incidents include the destruction of entire fleets and settlements, the sinking or destruction of individual watercraft, combat at sea, building sites of vernacular fighting craft and the establishment or destruction of coastal defences. In many instances the visual or documentary source does not actually show destruction or a sinking vessel, so in these cases it cannot be assumed that deposition took place. Figure 6.12 therefore shows the location of only those incidents known to have resulted in the deposition of material that may be detectable by archaeological prospecting.

6.3.3 Losses of vernacular fighting craft

Incidents of maritime violence resulted in the loss of many watercraft, including many vernacular fighting craft, and the capture or commandeering of craft used by Khaliji forces. Khaliji fighting craft were also lost in non-violent circumstances, such as through stress or weather, misadventure or neglect, resulting in archaeological deposition of significant potential. Indeed, vessels wrecked in non-violent circumstances often have greater archaeological potential where they have avoided fire or explosion and when wrecked in deeper water away from immediate salvage. For example, a Siamese ship that had been pressed into service by the Omanis for use against the Portuguese was later wrecked off Cape Jask in 1670 after being returned to its owners (Floor 2006:385). Storms were reported to have dispersed Portuguese fleets off the Persian Coast in 1583, some vessels of which sank, while others were captured and used by Huwala Arabs (Floor 2014:6). Storms also scattered Khaliji fighting fleets off Musandam in 1737, but with unknown losses (Floor 1987:45). Several of the warships in Nadir Shah's navy were reported lost through 'shipwreck' rather than combat by 1747, and one of the best ships was reported sunk through neglect at Bandar Riq in 1755, with others in a dilapidated state (Floor 1987:52). A chart of Bushehr shows the wrecks of three of Nadir Shah's warships in 1774, sunk at their moorings years earlier (Simmons 1774 [artwork]) (Fig. 6.13).

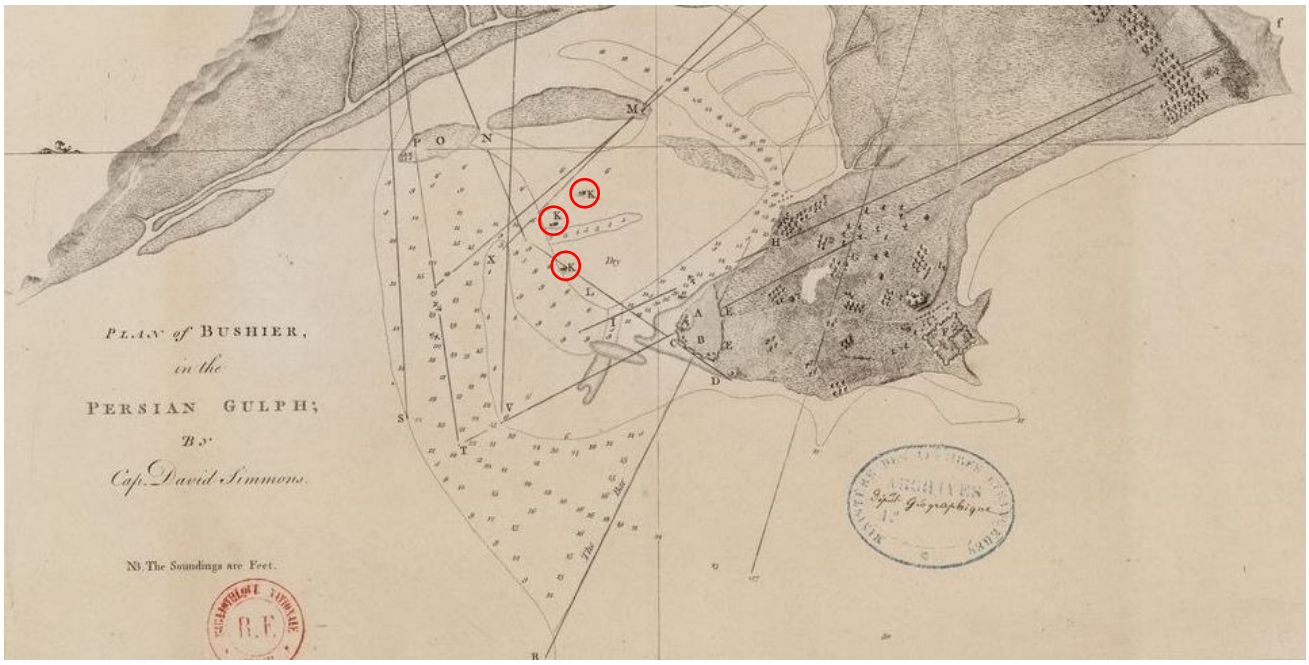


Figure 6.14 A *Plan of Bushier in the Persian Gulf* from 1774 showing the wrecks of three of Nadir Shah's warships, circled in red (detail from Simmons 1774 / BnF [artwork]).

The documented loss of vernacular fighting craft in violent events begins with the destruction of Hormuzi craft in the initial Portuguese assault on that city [D1.5]. Portuguese sources claim 60 large and 340 small craft destroyed, and also describe many burnt close to the shore or sunk by gunfire in the harbour (Birch 1875:105–106; Floor 2006:92–93). As a consequence of the loss of so

many craft, the island was short of water for a period afterwards (Floor 2006:92–93), implying that many utility craft were destroyed. A battle at sea off Bahrain in 1521 resulted in 147 *tarārīd*—small fighting and utility craft—destroyed [D1.14]. Portuguese raids in 1621 destroyed at least eight Arab galliots or small warships and 900 *tarārīd* [D1.44–46], and in 1623 a further six galliots and 400 *tarārīd* [D1.49], although what proportion of the smaller vessels might be counted as fighting craft is unknown. Descriptions of galliots and tarrādas in Portuguese sources gave way to descriptions of gallivats and trankeys in Dutch and British sources from the eighteenth century, and many of these craft were probably destroyed in poorly documented incidents [D1.53–74]. From the 1760s forces of gallivats and trankeys were supplemented with *baghāla*, *dāwāt*, 'ketches' and specifically *batātīl* and *baqāqīr* [D1.75–158]. Major destructive events occurred at Qasimi ports, principally Ras al Khaimah, raided by the British first in 1809 [B1.16, B1.139–141, B1.146, D1.105] and again in 1819 [D1.130], resulting in the destruction of nearly 300 watercraft. Again, what portion of these craft were actually fighting craft is in doubt, although some smaller watercraft were left untouched in these raids (Al-Qasimi 1986:136–144, 222–225; Davies 1997:190, 227). Conflict between Bahraini and Qatari forces in 1867 resulted in the reported loss of 60 fighting craft north of Qatar [D1.154], and in 1895 British forces destroyed 44 allegedly 'pirate' dhows in Qatar [B1.108, D1.158]. These incidents at least should leave detectable archaeological signatures worth investigating.

Some attempts have been made to locate submerged battlefield sites, but they have been limited by the imprecision of the documentary sources, as well as the inadequacy of the survey methods employed. A limited survey north of Qatar in 2014 failed to find any indications of the battles there (Bain et al. 2014), nor were any remains of major sea battles identified during a diver survey in Bahrain in 1993 (Pedersen 2015b:159). Indeed, there are relatively few cases where the location of the site of loss is known with sufficient precision to encourage archaeological prospection, and in many of these instances, the losses involved watercraft burnt on the shore or in very shallow water. Considering the number of watercraft lost and the precision with which the site is known, the most promising sites for archaeological prospection for the remains of Khaliji fighting craft are (Fig. 6.12):

a) the harbour of Hormuz (Iran) [D1.5, D1.15]: potentially hundreds of vessels destroyed;
b) Manamah and the northern approaches to Bahrain [D1.14, D1.33, D1.124, D1.33, D1.155]:147 *tarārīd*, 8 Qasimi vessels, 10 'pirate' craft and several other vessels destroyed;
c) Qatif and approaches to Dammam in Saudi Arabia [D1.23, D1.26, D1.137, D1.151, D1.157]: over 150 watercraft destroyed, including 2 *baghāla*;
d) Bandar Abbas in Iran [D1.44, D1.49]: as many as 8 galliots and 700 *tarārīd* destroyed;

e) Laft in Iran [D1.45, D1.130]: 3 galliots, 300 *tarārīd*, 3 ‘very large dows’ (Al-Qasimi 1986:141), and 8 other vessels destroyed;
f) Bandar e-Kong and Lengeh in Iran [D1.46, D1.130, D1.132]: 3 galliots, 300 *tarārīd*, 20 watercraft including 9 ‘large dows’ (Al-Qasimi 1986:140), and several other craft destroyed;
g) Ras al Khaimah in the UAE [D1.105, D1.130]: more than 100 vessels, including many of ‘very large dimensions’ (Al-Qasimi 1986:137) were destroyed;
h) off the north coast of Qatar [D1.154]: 60 fighting craft destroyed; and
i) the approaches to al-Zubārah in Qatar [D1.158]: 44 ‘pirate’ craft destroyed.

6.3.4 The potential of archaeological evidence

The archaeological potential of Khaliji fighting craft is indicated by the loss of at least 2,600 watercraft in violent circumstances in the Persian Gulf over the four centuries from the initial Portuguese invasion in 1507 to the end of the nineteenth century. During this period, Khalijis potentially operated 100,000 to 200,000 watercraft for a range of purposes, of which organised violence was only one, although this period of Gulf history was notably violent. The wreck of a Khaliji fighting craft is yet to be surveyed or excavated, despite the potential of the resource and some indications of their presence (Pedersen 2015b:165–166). The most promising sites listed above are all relatively shallow harbours or their approaches. The prevailing cultural conditions of the modern Gulf—coastal construction, oil infrastructure and extraction, dredging and aggregate extraction, dumping and discard practices, warfare and pollution—all negatively affect the preservation of coastal and underwater cultural heritage sites. The long history of pearl diving in the Gulf also suggests that any wrecks or sites in shallow water will potentially have been salvaged, although salvage practices are as yet little considered by ethnographers. The environmental conditions of the Persian Gulf may also be considered a limitation for the ideal preservation of underwater sites, but the fact that wooden shipwrecks are known or have been reported suggests this is not critical (Al Naimi et al. 2012:349; Pedersen 2015b:174). The Gulf is generally shallow, warm, salty, high energy, fertile and lacks the sediment loads that tend to protect underwater cultural heritage deposits in other areas (Al Naimi et al. 2012; Bain et al. 2014:39–40).

The principal limitation on maritime archaeology in the Gulf is the politicisation of archaeology in general, and the effect this has on research (see Brooks and Young 2016:26–29). This restricts the scope of research, access to sites and sources, publication and funding, and abuses the research that is conducted for political ends. Scham examined the politicisation of heritage in the Middle East and identified that nationalist archaeologies are often the impetus for excavations in the region and that notions like ‘world heritage’ are sometimes carelessly used (Scham 2014:4890). Issues of nationalism and ‘hegemonic’ heritage, effectively marginalising or excluding other ethnic groups

(Scham 2014:4891), can be seen operating in the Persian Gulf. Cooper asserts that future maritime archaeological research in the Gulf 'is likely to be sporadic, with issues of political stability, international diplomacy, national priority, and funding likely to skew activity towards countries […] with the resources, institutional capacity, and inclination to support archaeological work' (Cooper 2014:4062). Nevertheless, the progress of nautical archaeological research in the Red Sea in some conditions similar to those in the Gulf indicates that there is certainly potential to this resource (Pedersen 2015a; Ward 2001; Zazzaro et al. 2016; Zazzaro et al. 2017).

The identification of a watercraft wreck site as that of a Khaliji fighting craft will require consideration of the correlates of maritime violence identified above. For example, the presence of smooth-bore muzzle-loaded gunpowder weapons will probably be insufficient proof, as many craft carried these weapons for self-defence. Further contextual evidence will be required, such as a significant number of personal weapons, limited cargo and indications of a potentially numerous crew, scorching or evidence of fire, explosion or battle damage, association with a known type of fighting vessel (discussed in Chapter 7) or contextual association with a documented incident of organised maritime violence. Nevertheless, many watercraft wrecked in the Persian Gulf will have been built of similar materials, generally sourced from India, and will show similar construction methods, albeit modified over time. This problem may be shown by watercraft built using the methods and materials employed in Surat in north-western India.

Probably because of the construction methods and materials, many watercraft used as fighting vessels were built in Surat in India. The Omanis preferred these vessels for their strength and size (Rawlinson 1929:125–126), and many Surat ships were commandeered to serve in Khaliji forces (Floor 1987:50–51, 2006:385). Indeed, the Omanis and Persians had warships built to order in Surat (Axworthy 2011:37; Rawlinson 1929:125–126). The wrecks of any of these ships, if found, could be compared to the late-seventeenth century shipwreck in the Dominican Republic identified as the Surat-built *Quedagh Merchant* captured in 1698 by Captain Kidd (Hanselmann 2019:103–135), although fighting craft might be difficult to differentiate from the numerous Surat-built merchant vessels that operated in the Gulf over the same time period. This case indicates that evidence indicating additional correlates of violence or that otherwise identifies the vessel as a fighting craft would be required.

6.4 Summary

This chapter discussed the data of the survey of historical visual sources relevant to organised maritime violence in the early modern Persian Gulf. It showed the contextual significance of visual sources as correlates of maritime violence and it demonstrated the potential archaeological signatures of those activities. Five types of visual sources were catalogued, totalling 405 individual

sources that together depict 1,252 vernacular watercraft. Most, but not all, of the correlates of maritime violence identified in Chapter 3 can be observed in historical visual sources, while contextual evidence from documentary sources is required to observe the others. Organised maritime violence has resulted in the documented loss of over 2,600 Khaliji watercraft from the start of the sixteenth to the end of the nineteenth century. These and other undocumented losses result in an as yet little explored archaeological resource of significant potential. The next chapter discusses the evidence-based reconstruction of fighting dhows and shows the types of vernacular fighting craft that potentially left archaeological signatures in the Gulf.

7 RECONSTRUCTING THE FIGHTING DHOW

The vernacular fighting craft of the Khalijis can be reconstructed from documentary, visual and archaeological evidence. Given that vernacular fighting craft were either no longer used or nearly extinct when European ethnographers started observing dhow traditions in the late nineteenth and early twentieth centuries, there is no direct ethnographic evidence. Ethnography does, however, provide evidence of practices and elements of shipbuilding traditions that are shown in this chapter to be important to the operation of fighting craft, where analogies from more modern practice remain valid. The aim of this chapter is to show those elements of the Khaliji shipbuilding traditions that contributed to the fighting ability of their vernacular watercraft, and then to develop reconstructions of the major types of fighting craft. The reconstructions presented here accord with the five principles of reconstruction discussed in Section 4.2.3.3 and the evidence demonstrated in Chapter 6.

7.1 Visual evidence of Khaliji watercraft traditions

This section describes the visual evidence for elements of early modern Khaliji dhow-building traditions that contributed to the use of watercraft for organised violence, particularly the ability of wooden watercraft to bear a gunpowder armament. This ability—termed ‘gun-power’ by Nowacki (2006:4) and described in section 3.2.2 and shown in Figure 3.2—consists of those elements that contribute to stability, seaworthiness, resilience, strength, manoeuvrability, weatherliness and speed. These elements are present to a degree in all watercraft, yet may be considered correlates of organised violence when used ‘in *combination* and in *context*’ to support conditional interpretations (Wileman 2009:53, emphasis in original). Each section below shows how the elements described contribute to gun-power and lists the visual sources from Appendix B used as evidence in each case.

7.1.1 Form

The watercraft identified in the visual corpus were coded for their form and clustered as either counter-sterned, square-sterned, double-ended or undetermined, based on the definitions developed in Section 4.1.2.2 and shown in Figure 4.3. The visual corpus includes 734 depictions of watercraft that could be clustered by form and 518 that could not. As expected, double-ended watercraft were by far the most common form in the corpus, identifiable in the earliest images from the thirteenth century and throughout the period in proportion to the frequency of visual sources (Fig. 7.1). In all, 548 double-ended craft were counted, representing 75% of those craft for which the form could be

determined and 44% of all the watercraft in the corpus. Figure 7.1 shows the frequency and distribution of double-ended craft compared to square-sterned and counter-sterned vessels.

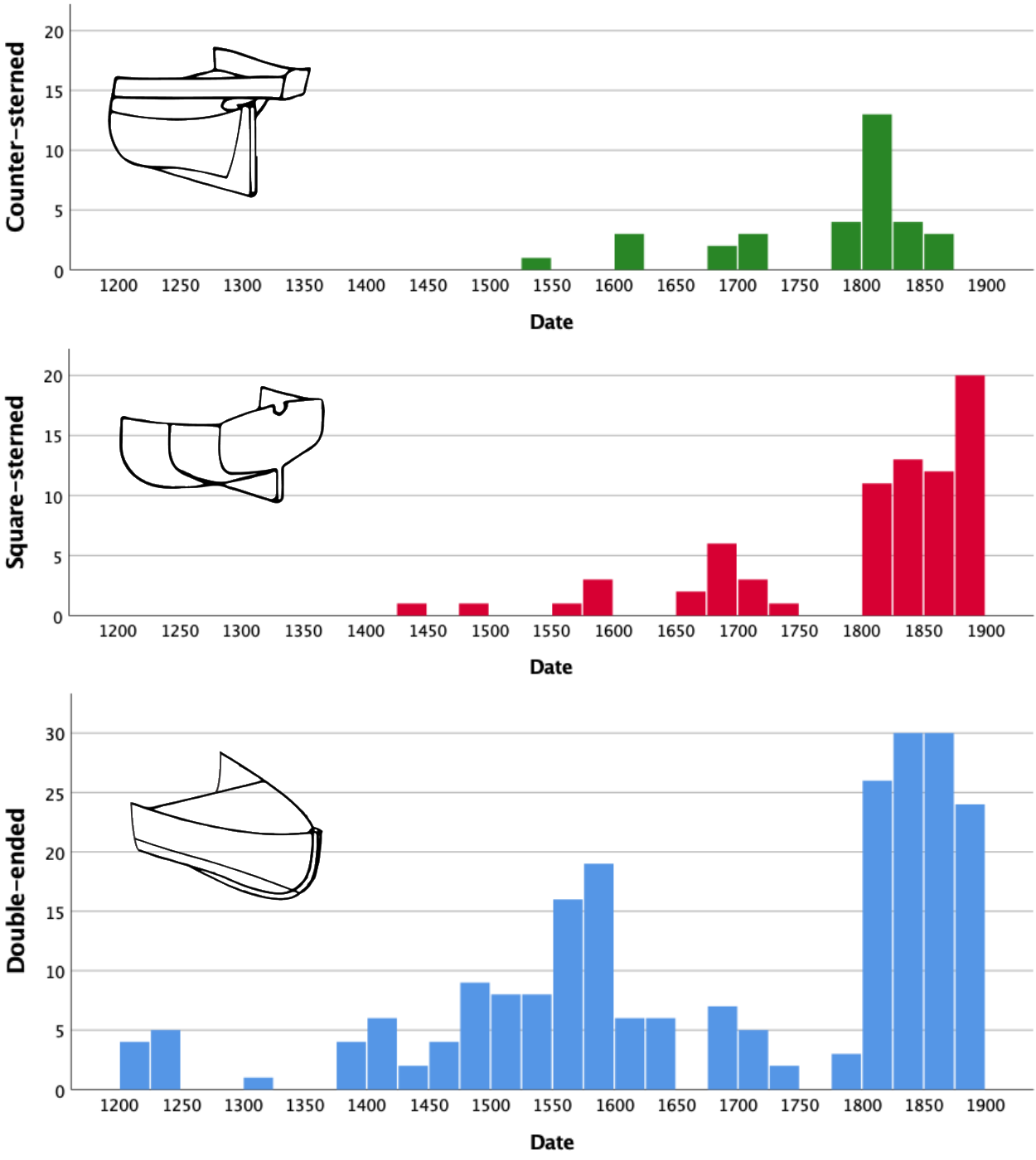


Figure 7.1 The frequency and distribution of depictions of watercraft by form in cases where the form is discernible.

The visual corpus includes at least 138 depictions (19% of those with identifiable forms) of square-sterned watercraft in 74 sources, the next most common form after double-ended craft. The earliest depiction identified as possibly square-ended is from 1427 [B2.58] (Fig. 7.2), one of only six square-sterned depictions in the corpus before the mid-seventeenth century. The frequency of depictions of square-ended watercraft increases in the later seventeenth century and then

considerably in the nineteenth century (Fig. 7.1). The apparent gap between 1750 and 1800 is reflected in the overall low numbers of visual sources from this period (Fig. 6.1). Square-sterned vessels are most apparent at the end of the nineteenth century, which coincides with the beginning of modern ethnographic interest and the rise in the popularity and convenience of photography. This rise should be compared with the simultaneous apparent extinction of counter-sterned vessels discussed below.

Figure 7.2 A vessel from a 1427 Islamic manuscript coded as square-sterned on the basis of the angular device overhanging the aftercastle (detail from CBL MS119:f.15b [B2.58]).

There are only 48 counter-sterned vessels identified in the entire corpus, 6% of the watercraft identified by form. The earliest is from 1544 [B2.188], an unmistakable depiction of a craft in profile. The vessel in B1.2 from the early fifteenth century was coded as double-ended, although it may well appear counter-sterned from another perspective. The peak distribution of counter-sterned vessels is from the late-eighteenth century to the mid-nineteenth century (Fig. 7.1). This corresponds with British incursions and raids in the Gulf, principally against the Qawasim, who were heavy users of the counter-sterned *dāw*, and also with a rise in the depiction of violence in general within the corpus (Fig. 6.3). The uses of these three forms of watercraft for violence are discussed below and in Chapter 8, and individual cases, often identifiable as particular named types, are contextualised in the sections below on reconstructions.

7.1.2 Construction elements

There are only two shipbuilding scenes, B2.37 and B2.91, in the entire corpus of visual sources. These two scenes are very similar and clearly based on the same model from the sixteenth century or earlier. Both show timbers and planks being prepared, but no actual structure of the ship. There are no curved timbers or metal fasteners in either of the scenes, hinting at some of the innovations that may have entered common practice after these paintings were created. The remainder of the

images provide indications of the ways that Khaliji watercraft were constructed and, in some cases, can show how this might have changed over time.

7.1.2.1 Shell-first method

Ethnographic observation of Khaliji watercraft building methods describe a shell-first technique, in which the planks that make up the bottom of the hull or 'shell' are fitted before frames (Agius 2005:36–42; Al-Hijji 2001:47–52). A frame-first technique requires the frames to be constructed before the planks of the shell are fastened directly to them, whereas the frame is a secondary stiffening in purely shell-first construction (Steffy 1994:279). Hulls with planks edge-fastened by ligatures—'sewn plank' or laced—are generally constructed shell-first, as the planks are difficult to lace together with the frames already in place (Burningham 2019b:145). Metal-fastened watercraft can also be constructed shell first and the Dutch were notable exponents of the 'shell-based' or 'bottom-based' method in early modern Europe (Hoving 2012:7–12; van Duivenvoorde 2015:8–9). The Dutch method is similar to that observed in the modern period in the Arabian seas in that the garboard strake and the first strakes of the hull are all fitted using temporary templates or cleats before the frames are in place. This initial building sequence, albeit in a modern Kuwaiti *būm*, is shown in Figure 7.2 and this suffices for the sequences described in this section. While the Dutch may have had some minor influence on shipbuilding in Khark in the early modern Gulf (Floor 2007:328), the Khaliji shell-first method is more likely derived from long practice of fastening with ligatures and was adapted to metal fastening during this period. This method has benefits in its simplicity and its adaptability to varied formulas or rules-of-thumb employed by shipwrights and constructors working without formal plans (Dhoop and Olaberria 2015; Hoving 2012:9), as remains the case in traditional shipbuilding in the Gulf (Agius 2005:39; Al-Hijji 2001:44). A frame-first or 'rib-skeleton' method was nevertheless observed in modern Gulf communities and was described in riverine traditions in ancient Mesopotamia (c.2,000 BCE) (Agius 2005:40). It is not yet clear how long these methods have co-existed in the Gulf or when a significant transition took place, although most sources identify a sewn plank method as the predominant pre-modern construction technique (Agius 2005:36–42).

In Dutch practice, the shell-based method conferred a number of advantages that may indicate the preference for a similar method in the Gulf. Firstly, it was faster than frame-first methods, as the framing simply needed to 'keep everything together' and was fitted 'where its form required the least amount of reworking' (Hoving and Emke 2000:56). The frames then were not faired and did not need to be distributed evenly, resulting in internal hull structures that appear 'untidy and sloppy in archaeological finds' (Hoving and Emke 2000:57). This method would enable Khaliji builders to use fewer and lower quality timbers for framing, an important consideration in a timber

impoverished environment like the Gulf. Another advantage of the shell-first method is that it is well suited to building traditions that used mental templates and rules-of-thumb, as both dimensions and shapes of watercraft can be varied within limits (Hoving and Emke 2000:56). Again, this 'freedom to vary the standard formulas' (Hoving 2012:9) may also have been important in a timber impoverished environment, where the size and shape of watercraft was limited by the wood resources on hand. The two shipbuilding scenes in the corpus [B2.36 and B2.91] show what appears to be laced planking, implying a shell-first technique, although this is discussed in more detail below. Other than these two scenes, there is no direct visual evidence of shell-first construction.

7.1.2.2 Keel, stem and sternpost

The keel was 'the main longitudinal timber' (Steffy 1994:273), into which the initial strakes, stem and sternpost were fitted in Khaliji watercraft (Al-Hijji 2001:44–47). While some Indian designs have curved keels, such as the concave keel of the *patamar* [A2.12], and some smaller craft had rockered keels [A2.1], this piece was often straight in larger Khaliji vessels and ethnographic practice indicates that the keel was sometimes only one piece of timber (Agius 2002:146; Al-Hijji 2001:44; Dziamski and Weismann 2010:60), which effectively limited the length of vessels so built. The stem was the vertical timber fitted to the forward end of the keel to which the bow was joined and the sternpost similarly fitted to the after end (Fig. 7.3.1) (Steffy 1994:280). In Khaliji watercraft the stem could be straight [e.g. A2.3, A2.4], convex [e.g. A2.13, A2.14] or concave [A2.1] and was often an assembly of several timbers (Dziamski and Weismann 2010:60). As the vertical stem and sternpost of Khaliji vessels are unsupported by knees when fitted to the keel, they are unable to form a weight-bearing frame as is the case in European building traditions (Dziamski and Weismann 2010:61), a situation that limits longitudinal strength but promotes flexibility. In modern practice, the stem is secured with a tenon joint and a large iron spike or bolt (Agius 2002:149; Al-Hijji 2001:44–45; Dziamski and Weismann 2010:62). A hog piece is then fitted to clamp the garboard strakes in place (Fig. 7.3.4) (Agius 2002:154; Al-Hijji 2001:49; Al Salimi and Staples 2019:131–132), although it is fitted before the frames in variance to common European practice (Steffy 1994:274). Visual sources provide specific evidence of keel, stem and sternpost, linking visual evidence to more recent practice [B1.91, B1.93, B1.104, B1.105, B1.106, B1.129, B1.132, B1.134].

7.1.2.3 Framing

The term frame is used for larger vessels as a collective term for the assemblage of timbers used to create a compound shape that supported the outer hull planking and inner hull ceiling (Steffy 1994:271). In early modern craft built to European traditions, the deck beams were attached to the frames by hanging knees to create a 'closed frame stiffening athwart the hull' that supported the

deck and acted against distortion (Dziamski and Weismann 2010:84). In pre-modern Khaliji watercraft, the deck beams were fitted into, or rested on, sturdy longitudinal strakes called clamps that acted to stiffen the side structure but did not comprise a complete frame (Burningham 2019b:145; Dziamski and Weismann 2010:84). In modern Khaliji practice, two or three key frame templates, made up of floor timbers, were fitted initially to provide the shape of the hull (Fig. 7.3.7), but only after the garboards and first strakes were in place (Fig. 7.3.6). The shape of these initial frame templates determined the shape of the hull—different for each type of dhow—and each individual master shipwright retained their own templates as their intellectual property (Agius 2002:155). The floor timbers alternated with half frames that were fitted after the planking to the waterline had been installed and shaped (Fig. 7.3.8) (Al-Hijji 2001:55; Steffy 1994:51, 272). As the number and density of frames increase, so generally does the rigidity of a frame-based hull (Helfman et al. 2019:307).

Framing are usually difficult to observe from an exterior view of a vessel, although lines of nails will usually indicate their presence if depicted in sufficient detail [B1.19, B2.108, B2.110, B2.181, B2.182, B5.19]. Some renderings of watercraft in Islamic manuscript images show framing emerging above the gunwale or washstrake, the uppermost plank on the vessel's side [B2.4, B2.89, B2.102, B2.121, B2.127, B2.130, B2.132, B2.146, B2.161]. Intriguingly, though the many open boats in Islamic manuscript images show no sign of framing and are usually depicted with 'clean' interiors, or with thwarts or decks, even B2.108, that seems to show nails in line on the exterior of the hull but no corresponding frame inside it. The graffito from al-Jusāsiyyah that is now in the Qatar National Museum [B3.5.5] includes a 'fishbone' pattern that could be interpreted as an x-ray style representation of substantial framing, potentially a noteworthy construction feature. The petroglyphs B3.8.44, B3.8.45, B3.8.51, B3.8.52, B3.9.24 and B3.9.26 may be interpreted as showing internal framing in a similar x-ray style. Some images, particularly later measured drawings such as those by Pâris, depict the interior of watercraft where framing is plainly visible [B1.14, B1.26, B1.30, B1.65, B1.101, B1.102, B1.108, B1.111, B1.113, B1.114, B1.115, B1.118, B1.143,]. Photographs and models show that by the latter half of the nineteenth century at least, framing without knees or supports was commonplace [B4.2, B4.3, B4.20, B4.22, B4.23, B5.4, B5.12, B5.14, B5.15]. The small sewn *badan* depicted by Pâris [B1.119, B4.5] has no frames at all and relies instead on thwarts for latitudinal stiffening (Ghidoni 2019:360), although so does the sewn model *baghla* in B4.14. This limited visual evidence, along with that derived from archaeological sources such as the ninth-century Belitung shipwreck and the medieval timbers from al-Balīd (Al Salimi and Staples 2019:173–174; Belfioretti and Vosmer 2010; Flecker 2000, 2008), creates the impression that framing was regularly used in larger Khaliji watercraft throughout the early modern period.

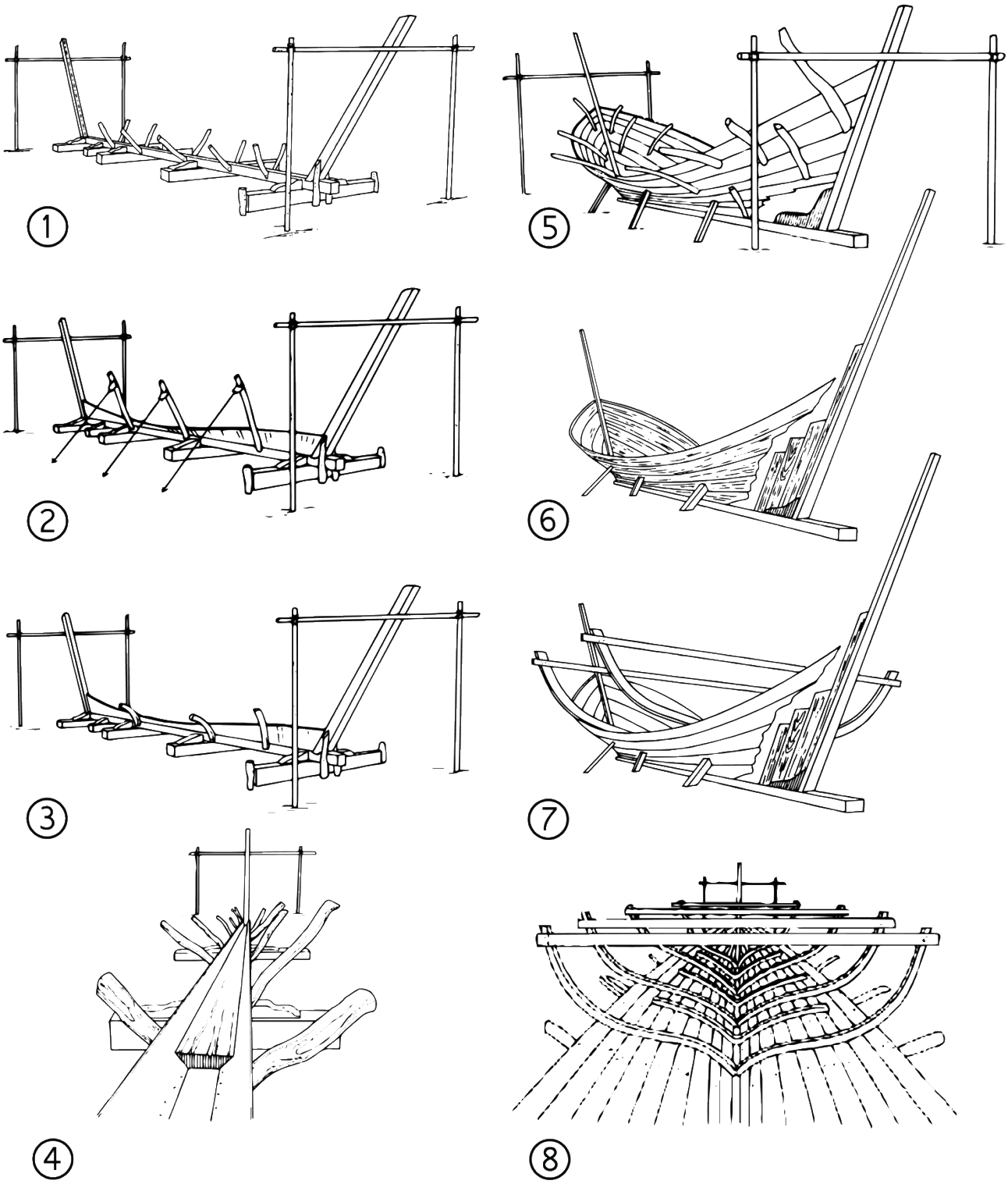


Figure 7.3 The initial construction sequence of a Kuwaiti *būm* as described by Al-Hijji (after 2001:44–54), showing (1) the fitting of keel, stem and sternpost, (2–3) fitting and shaping garboard strakes, (4) fitting the hog piece, (5–6) fitting lower strakes using temporary templates, and (7–8) fitting the key frames to shape the hull.

7.1.2.4 Beams and thwarts

Beams are timbers fitted athwartships that counter water pressure on the hull and support the decks (Steffy 1994:271), although in Khaliji watercraft they are 'not capable of keeping the walls together' as they are not firmly connected to the frame by hanging knees (Dziamski and Weismann 2010:84). In Khaliji craft, lodging knees connected the beams to the framing timbers fore and aft

but were often unable to support the weight of the hull walls when the vessel was out of the water. If such craft remain ashore for long without external support, they tend to ‘fall apart outwards fairly quickly’ (Dziamski and Weismann 2010:84). While smaller craft were often rested on their bilges, the use of external supports for larger craft drawn ashore is attested in historical visual sources [B1.56, B1.72, B1.141, B1.143, B5.5, B5.16]. In modern practice, beams were fitted athwart the hull at approximately 45cm intervals at the closest (Al-Hijji 2001:59), and often further apart (Agius 2002:163), supported by horizontal lodging knees. Through-beams extend through and beyond the shell of the vessel (Steffy 1994:281) and are often conspicuous in visual sources. Thwarts provide a similar function of lateral stiffening in smaller craft, while simultaneously offering seating for rowers or supports for masts (Steffy 1994:281). Given the relative ease with which they may be identified, evidence of beams and thwarts abounds in visual sources [e.g. B1.9, B1.26, B1.46, B1.63, B1.68, B1.74, B1.100, B1.101, B1.102, B1.105, B1.108, B1.111–115, B1.118, B1.143, B2.100, B2.125, B3.8.14–16, B3.8.21–23, B4.1–5, B5.12, B5.14–15].

7.1.2.5 Knees, clamps and stringers

Knees and clamps support decks, and clamps and stringers provide longitudinal stiffening (Helfman et al. 2019:307), both functions that are required to mount carriage guns. A clamp was a thick strake fitted to the inner side of the frame as ceiling timber that gave longitudinal strength and that, as a ‘shelf clamp’, supported the deck beams (Al Salimi and Staples 2019:167; Steffy 1994:269). In its simplest sense, a knee was a curved timber used to support the meeting of two other pieces in different planes, usually an athwartships beam and a vertical frame (Steffy 1994:274). Hanging knees were fitted vertically and lodging knees horizontally. The Arabic term for knee, *kurwa*, is derived from Portuguese, possibly indicating a non-Indigenous origin (Al Salimi and Staples 2019:196; Agius 2002:162). Stringers are longitudinal planks fitted across the inboard sides of frames in much the same way as clamps (Steffy 1994:281), but without directly supporting beams, provide strengthening to the hull (Al-Hijji 2001:58; Helfman et al. 2019:307). The stringers provided stiffening by holding the frames in place and the number used depended on the size of the vessel, with larger craft employing more (Al Salimi and Staples 2019:143; Agius 2002:160).

Visual sources in Appendix B provide some evidence for knees, clamps and stringers. B1.26, B1.65, B1.101, B1.111, B1.113, B1.114, B5.12, B5.14, B5.15 appear to show decks supported by clamps. The heavy wales or strakes separating decks in Islamic miniatures may be identified as clamps [B2.32, B2.76, B2.77, B2.104, B2.169, B2.187], but still with considerable doubt. There are no unambiguous depictions of hanging knees identified in the corpus, even in Pâris’ drawings showing the full internal structure [B1.111–115, B1.118]. Lodging knees are shown in the photographs B5.12, B5.14 and B5.15. There are no knees or similar curved timbers depicted in

either of the ship construction images in Islamic manuscript painting [B2.37, B2.91]. Other Islamic manuscript paintings appear to show curved or angled supports for timbers above the main deck level [B2.70, B2.121, B2.127, B2.132], although these may also be artistic features taken from more familiar terrestrial architectural contexts. The *ghanja* model in B4.10 supports decks with knees, but this piece is very late in the period. A Persian nautical glossary from the later nineteenth or early twentieth century mentions the use of carlings, akin to clamps, rather than knees for a metal fastened ship (Mohebbi 1996). While knees must have been used in some cases, as their continued use and appearance in maritime lexicons in the twentieth century shows (Johnstone and Muir 1964:318), there do not seem to have been as significant as the same timbers used in European warships. As stringers are usually deeper within the hull and under the deck, they are difficult to identify in visual sources, and none are clear in the corpus. Nevertheless, stringers and ceiling planks are described in ethnographic and archaeological contexts (Al-Hijji 2001:58; Al Salimi and Staples 2019:143, 149, 151–152).

7.1.2.6 Decks and platforms

In larger craft that supported a full-length main deck, this feature served not only to support the cargo but also as accommodation for the crew, as the space below it would often become insufferably warm (Mohebbi 1996:131). Khaliji craft often had separate raised and shorter foredecks towards the bow and poop decks over the stern, the former as a working platform and the latter providing accommodation for higher ranking passengers and crew (Dziamski and Weismann 2010:98). The open hold would allow access to the cargo [B1.48, B1.55, B1.105, B1.108, B4.14, B4.22], sometimes covered with matting, which would support the weight of the crew, but not guns (Welch 2007:139). Smaller craft often only had a poop deck, or a forecastle and poop, and were not fully decked (Agius 2002:164), an arrangement frequently observed in visual sources [e.g. B1.2, B1.14, B1.46, B1.55, B1.63, B1.65, B1.74, B1.93, B1.105, B1.111, B1.112, B1.118, B1.121, B5.1, B5.12, B5.14, B5.15]. Full or complete decks were required for the effective integration of a broadside battery of carriage guns in all but the larger, beamier ships, where a quarterdeck might suffice, but usually in addition to the main deck [B1.113, B1.138, B4.1–3, B4.13, B4.21]. In these cases where the deck and guns can both be observed, a full deck is required to mount the broadside battery.

Some vessels integrated a small deck on the superstructure as both a platform and shade [B1.32, B1.33, B1.52, B1.73, B1.104, B1.119, B1.138, B2.132, B2.192, B4.3, B4.4, B4.9], where other vessels fix an awning [B1.3–5, B1.41, B1.45, B1.46, B1.53, B1.55, B1.60, B1.68, B1.75, B1.76, B1.78, B1.110, B2.105, B2.196, B4.23]. In these cases, the superstructure roof does not support artillery and appears to be used for observation and for the protection of the space below it.

7.1.2.7 Planking and wales

The planking or outer shell of watercraft built in the Khaliji traditions was a major constructional element that provided much of the longitudinal strength (Dziamski and Weismann 2010:68). Modern era planks were usually teak, but also benteak or Indian laurel, five cm thick and around 30cm broad on average (Al Hijji 2001:38–39; Dziamski and Weismann 2010:70–71). Planks were fitted edge to edge in carvel fashion (Al-Hijji 2001:44). The garboards, the lower-most strakes, were fitted into rabbets cut in the keel and held in place by temporary templates (Fig. 7.3.2) (Agius 2002:148; Al-Hijji 2001:47–49). Other planks were fitted above using the templates as guides until the lower hull was formed (Fig. 7.3.5) and, in modern practice, the key frames were fitted to shape the hull only after several strakes were in place (Figs 7.3.7–8) (Al-Hijji 2001:50–52). The planks were fitted together following the templates attached to the outer hull, but in modern practice were only fastened to the frames when inserted and not to each other, a technique ascribed to the long practice of sewing planks together as they were fitted (Agius 2002:152–153). Wales are thick strakes fitted to the outboard shell of a vessel that act to gird and stiffen the hull (Steffy 1994:281). In modern practice, wales are several centimetres thicker than the average hull plank (Dziamski and Weismann 2010:70) and two or three are usually fitted above the waterline (Al-Hijji 2001:55). Almost all watercraft in the corpus show some evidence for planking, except for the potential monoxolon types, such as the *hūrī* on the right in B1.31 (Fig. 7.4). Evidence for wales abounds in the corpus [e.g. B1.31–34, B1.36, B1.52, B1.53, B1.57, B1.66–67, B1.70, B1.73, B1.102, B1.104, B1.110, B1.113, B1.115–117, B4.1–4, B4.13, B4.17–18, B4.21–22].

Figure 7.4 A scene from Muscat around 1870 showing (left) a *badan* with a wale at the approximate height of the deck, and (right) a *hūrī*, perhaps with a wash strake in blue (detail from Anon. 1870c [B1.31]).

7.1.2.8 Fastenings

Fastenings are a fundamental element of the strength and resilience of a wooden hull and the competence and durability of fastenings affects the work to which a watercraft may be put (McCarthy 2005:3). Early modern dhows were generally fastened with coir rope, with metal, or with a hybrid combination of both (Fig. 2.5), often supported by wooden treenails (Agius 2002:156, 2005:36–39). The practice of 'sewing' planks together is otherwise termed lacing, as the ligatures are drawn through bored holes in a continuous sequence, and is differentiated from lashing, where the ligature is tied off at intervals (McCarthy 2005:17–19). Coir, made from the fibrous husk of the coconut, was the most common ligature used in the medieval and early modern Arabian seas (Agius 2005:36–37). Holes for fastenings—organic ligatures or treenails, metal nails, bolts or spikes—are usually pre-drilled with bow drills to avoid splitting. Planks fastened by ligatures were drilled before they were fitted, while those fastened by metal were drilled after fitting to align with frames to which they were attached and, in both cases, wooden treenails and plugs were also used. Iron fastenings corrode more slowly in teak compared to other timber and this wood is also more resistant to biofouling, attributes that made it the preferred planking timber in the Arabian seas, although other species were used (Dziamski and Weismann 2010:72). Given the size of the resultant external indicators of fastenings—nail heads or ligatures—that were often covered in other coatings, recessed or practically invisible (Fig. 7.5), unambiguous evidence of fastenings in visual sources other than photographs or architectural drawings is rare (McCarthy 2005:19).

Figure 7.5 Western Indian wooden hulls sewn with coir: (left) interior before sealing, (centre) interior when sealed with bitumen, and (right) the resultant 'signature' on the exterior of the hull, together showing the potential difficulty in identifying fastenings in finished wooden hulls in visual sources (M. de Ruyter 2016).

Sewn planks are identifiable in visual sources when ligatures are represented as lines or patterned seams and the thirteenth-century *Maqāmāt* ships have long been accepted as pertinent examples

(Hourani 1995 [1951]:92–93, pl.7). While Pâris' 1838 observation of a sewn *badan sayyād* from Oman (Pâris' 1838b [B1.103, detail in B1.112]) offers the earliest architectural drawing of a sewn plank watercraft from the Persian Gulf, this was a small vessel used for fishing and all other types from the region he drew appeared to be metal fastened [B1.102, B1.104–B1.113]. A reconstruction of this vessel, based on Pâris' plans, was built for display in the National Museum of Oman (Figure 2.13) (Ghidoni 2019). Sewn plank methods survived to the twentieth century, mostly in the form of 'partially sewn' hulls (Figure 2.5) (Vosmer 2019a:305), but apparently only in small inshore craft. The senescence of the method in seagoing ships, like those from the *Maqāmāt*, is recorded in a fragmentary fashion in documentary sources where the use of fibre ligatures rated mention by exception (Ghidoni 2019:360; Staples 2019:314–315). Limited archaeological evidence of this transition is offered by two metal-fastened planks amid an assemblage of laced planks from al-Balīd in Oman dated to the fourteenth or fifteenth century (Staples 2019:315).

Visual sources other than those of the *Maqāmāt* in the thirteenth century or Pâris in 1838 show the continued use of the method throughout the intervening period. While ships in Persian art are generally depicted with patterns on their hulls that may be considered ambiguous indicators of fastening, two images from the sixteenth century of the prophet Nūh (Noah) constructing the ark show figures boring planks with bow drills (Figure 7.6 left and centre) [B2.35, B2.86]. Planks on metal-fastened craft were bored by bow drills, but only when in place and aligned with the corresponding frame, and there are no hammers or nails, or other metal fasteners, present in either image. These two images therefore represent unambiguous evidence of sewn fastening. It is nevertheless possible that the artists sought to depict an anachronistic method suited to the age of the subject, but apart from the absence of firearms there are no other indicators of this practice in these two images, nor is this practice generally detectable in other Persian paintings. A further image from around 1725 shows the after section of what is clearly a sewn plank vessel in Hormuz (Fig. 7.5 right) (Van der Aa c.1725 [B1.142]). The hatching patterns and dots in some graffiti is too ambiguous to be positively identified as fastening and may otherwise represent external decoration [B3.4.2–.4, B3.4.6, B3.9.7, B3.9.18, B3.9.23–.25, B3.10.1]. Four undated but probably nineteenth-century models—two *baghāla* [B4.6, B4.14], a *baqqāra* [B4.6] and a *badan* [4.16]—are sewn, although it is unclear if this was the modeller's method or a scaled representation. The *baghāla* at least were unlikely to have been sewn in the nineteenth century; indeed, these two models are the only visual evidence for a sewn plank *baghla* uncovered in this thesis. A fifth model is sewn but made directly from Pâris' 1838 observation of a *badan sayyād* [B4.5]. There are no photographs identified before the twentieth century that clearly show sewn planking.

Figure 7.6 Visual evidence of sewn plank fastening: (left) a sixteenth century image (detail from GPM Tehran Ms.2237 Vol1:44 [B2.91]), (centre) an image from 1580 (detail from BnF Pers.Supp. 54: f.19r [B2.36]), and (right) an image from around 1725 (detail from Van der Aa c.1725 [B1.142]).

Metal fasteners are, however, much easier to detect in photographs by the tell-tale dark streaks that nails leave on the hull exterior [B5.2, B5.5, B5.7, B5.8, B5.10–.12], although the earliest of these photographs is around 1870. Apart from those previously identified as sewn, all other models were fastened by metal, but again it is unclear if this was modelling method or scaled representation. Most of the craft that Pâris observed in 1838–1839 appear metal fastened [B1.102, B1.104–B1.113], as do craft in other graphic sources from the nineteenth century [B1.19, B1.31]. The presence of dots or circles on the hull in earlier graphic sources offers apparent evidence for metal fastening [B1.48, B1.83, B1.144], although these may also represent wooden treenails or artistic licence.

7.1.3 Propulsion and steering

7.1.3.1 Masts, rigging and sails

The use of sails to provide propulsion in watercraft in the Indian Ocean long predates the images in this corpus (Whitewright 2015), although there are again some distinctive Khaliji arrangements [A1.6]. The sail shapes and patterns used for identification within visual sources are shown in Appendix A1.4–6. The stylistic ‘banner’ sails shown in Islamic manuscript images were discussed in Section 6.1.3, the occasional conflation of flags and sails in the same sources was considered in Section 6.2.1.3, and colours and decorations on sails in Section 6.2.2.6. The current section considers visual evidence for the shape and arrangement of masts and sails.

While it has been excluded from the corpus of visual sources, the 1835 Gujarati chart of the Gulf of Aden and Red Sea discussed in Section 5.2.3 (Fig. 5.8) undoubtedly shows Khaliji watercraft,

probably along with ‘Egyptian, Hijazi, Yemeni or Somali’ craft (Agius 2019:60). Unfortunately, they are impossible to distinguish based on form or flag as they appear much like the others. Nevertheless, this is an important visual source on western Indian Ocean watercraft for a number of reasons, notably that it provides a snapshot of masts, sails and rigging in the first half of the nineteenth century that can be compared to sources with identifiable Khaliji watercraft. This chart shows that exclusively lateen or settee rigs were in the minority outside the Persian Gulf, where square sails were added, possibly to provide more propulsive power on longer voyages. The 26 watercraft depicted on this chart show nine different rigs (Fig. 7.7), the most common being ten examples of the ketch or topsail rig (centre right) [A1.6g] and eight of the ship rig (bottom right). While the ship rig cannot be totally discounted as a Khaliji arrangement [e.g. B1.12, B1.16, B1.45, B1.122, B2.23, B2.86, B3.4.5, B3.9.10, B3.9.13, B3.9.20], it was certainly far less common within the Gulf than without, and many of these depictions of vessels so rigged may have been based on European referents. The ketch rig, on the other hand, appears sufficiently frequently in documentary sources of Khaliji watercraft, that it is worth further investigation. Parsons describes the Sultan of Muscat’s naval forces in 1775 as including 25 ‘galliotes and ketches, from fourteen to eight guns’, all built locally in Oman and represented as smaller than the ‘ships of war’ and frigates in the Sultan’s service (Parsons 1808:206).

To European observers, a ketch rig included a square course and topsail on the main mast and a lateen or fore and aft sail on a shorter mizzen [A1.6g], as shown on the centre right of Fig. 7.7, although European craft often also carried a triangular headsail. The description of a vessel as a ketch referred to the rig rather than the hull form, which was usually similar to larger merchant vessels (Gardiner and Lavery 1992:47). Of the ten craft shown as ketches on the Gujarati chart (Figs 5.8 and 7.7), none are shown with European hull forms and two at least are counter-sterned craft, one of which carries a square headsail. While there is no ketch-rigged counter-sterned craft in the corpus, a mid-eighteenth-century observer in north-west India clearly associated the ketch rig with the counter-sterned hull form.

> The ketches named *Dorioh*, or the one-and-a-half, from its having a main and mizen [sic] mast, rigged with yards and shrouds like our ships; and having square sails, topsails, and topgallantsails, a driver and mizen [sic] topsail, with trysail and jib. The only thing remarkable in these imitations of Ketches, is a long narrow strip of stern which extends several yards from the sternpost, and on a level with the Poop, or upper Deck, having a parapet railing two feet high running on each side, and closed with a plank at the stern: it seldom exceeds two to three feet in width, and being planked below, forms a sort of projecting gallery from which the whole vessel, when under sail, may be viewed. These Ketches are peculiar to Surat (Vaupell 1846:99).

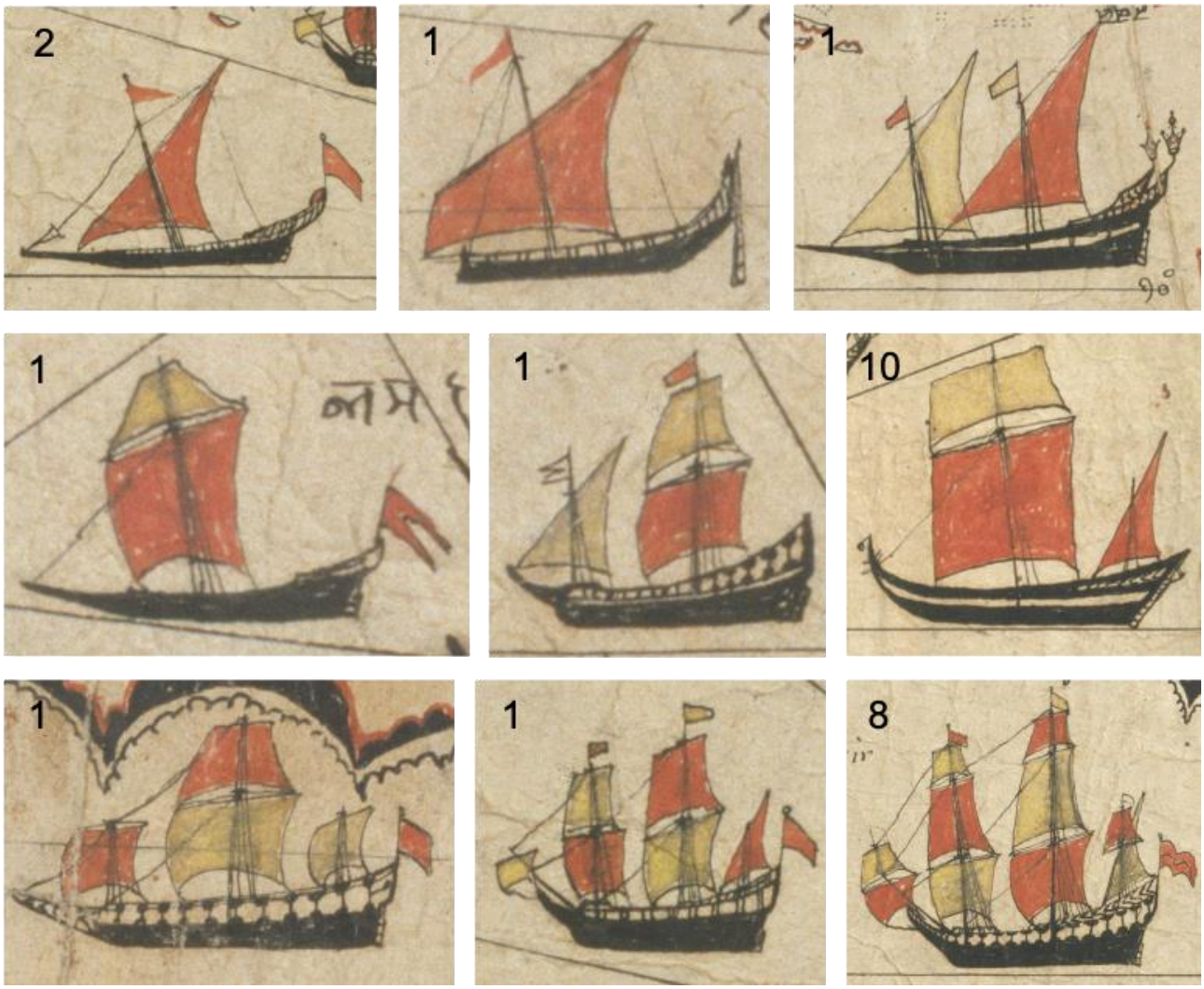


Figure 7.7 Rigs used by western Indian Ocean watercraft depicted in a Gujarati chart from 1835, showing the number of instances used (detail from Anon. 1835 [artwork]).

The name ‘dorioh’ mentioned here is apparently unique and may be a corruption of *dāw*. A view of the harbour of Bombay observed in the 1790s shows an unmistakably counter-sterned vessel rigged as a ketch (Wales 1804 [artwork]), shown on the left in Fig. 7.8, and possibly another in the foreground. Pâris likened a vessel he observed on the Malabar coast of India in the 1830s with a ketch but did not give this craft an Indigenous name like most of the others in his work (1841:pl.18). This vessel, shown on the right in Fig. 7.8, is undoubtedly a *dāw*, but rigged as a ketch (de Ruyter 2020:137). Together, these images show the connection between the European description of a ketch with the Indian Ocean vernacular hull of a *dāw*, although this is not always the case, as the other ketches in the Gujarati chart of 1835 show (Fig. 7.7 centre right).

The typical sailing rig employed in Khaliji watercraft during the early modern period is a lateen or settee sail on one or two masts, the mizzen or aftermost mast being shorter than the main. These rigs are so widely represented in the corpus that it is better to discuss rigs by exception to this general pattern. The earliest European images show square sails [B1.1, B1.48], and square sails remain prevalent into the eighteenth century [B1.4, B1.75, B1.92, B2.36, B2.130]. Trapezoidal sails appear

in Islamic manuscripts from the sixteenth century [B2.4, B2.15, B2.44, B2.132, B2.161], although a diamond-shaped sail dates from 1476 [B2.197], and settee sails are represented in other sources from the late seventeenth century [B1.12, B1.13, B1.39, B1.69. B1.86]. Settee sails are shown in insecurely dated glyphs and graffiti [B3.3, B3.4, B3.9, B3.10.2]. The earliest apparently triangular sail is from 1222 [B2.35], although this shape does not reappear until 1520 [B2.152]. This evidence from visual sources supports the representation of the typical Khaliji rig *within the Gulf* as lateen settee sails on one or two masts from the sixteenth century to modern times, while it is possible that square topsails or courses were added when venturing further into the western Indian Ocean.

Figure 7.8 Counter-sterned ketches of the western Indian Ocean: left, in Bombay in the 1790s (detail from Wales 1804 [artwork]); centre, from a Gujarati chart of 1835 (detail from Anon. 1835 [artwork]); and right, from the Malabar Coast in the 1830s (Pâris 1841:pl.18).

7.1.3.2 Oars, paddles and poles

Oars were used in most Khaliji watercraft close to the shore or in shallow water, when becalmed, or when manoeuvring for fishing, pearling or fighting. Larger or heavier watercraft required more propulsive power for movement and speed. Oar blade shapes are potential cultural identifiers within Khaliji nautical traditions, although spatial and temporal variations are by no means certain (Hawkins 1977:137). In Mediterranean practice, the number of banks of oars was a differentiating feature between classes of galley, so early Portuguese descriptions of Khaliji watercraft often refer to them by their more familiar equivalents, such that a *fusta* in the Indian Ocean was a small oared warship of between 10 and 20 banks of oars (Mathew 1988:283). In the Renaissance Mediterranean, a *fusta* has 10 to 15 banks of oars each rowed by two men (Konstam 2002:20). Visual sources can therefore potentially provide indications of cultural origin, warship class and methods of employment. Nevertheless, examples of the use of oars within the corpus are so numerous, and their methods of depiction so diverse, that only the exceptional cases are discussed here.

Small Khaliji fighting craft are depicted in the few available Portuguese sources with seven or eight banks of oars [B1.3–5], but as few as five in later sources [B1.49, B1.60, B1.110]. The *batātīl* in Hornbrook's paintings have ten banks of oars [B1.76, B1.78] (Fig. 7.29), and the *dāw* he painted is

shown being towed into action in light winds by a small boat under oars [B1.79]. A *baghla* and a *dāw* are shown similarly towed by boats under oars in B1.109 (top and centre right). The *batātīl* involved in the assault on Ras al Khaimah in 1809 are shown being towed into action or rowed with as few as two banks of oars [B1.139, B1.140, B1.146]. Coastal small craft are shown with between one and six banks of oars [e.g. B1.1, B1.12, B1.71, B1.103, B1.116, B1.117, B1.120, B1.121, B1.125, B1.137, B1.145] (Fig. 7.8). Islamic manuscript images often show craft rowed or paddled with one or two oars only [e.g. B2.2, B2.5, B2.7, B2.8, B2.11, B2.12, B2.19, B2.30]. The small *hūrī* on the right in B1.31 is propelled by paddle, and the small craft in B1.152 and B1.153 appear to be paddled, although this artist may not have observed the practice firsthand. Oar blades shapes are well depicted in B1.49, B1.111, B1.120, B1.121, B2.104 and B4.19. Islamic manuscripts show watercraft that appear to be propelled by poling or a combination of oars and poles [e.g. B2.26, B2.41, B2.100, B2.125, B2.137, B2.170, B2.174], although in some cases these may well be poorly represented steering oars or oars with their blades submerged. Glyphs and graffiti show craft with between one and twelve banks of oars [e.g. B3.5.6, B3.5.8, B3.8.13, B3.8.45, B3.9.3, B3.9.8, B3.9.15]. Visual sources therefore show that Khaliji fighting craft were often propelled by oars in combat and that this changed little over the early modern period, such that the sixteenth century *tarārīd* in B1.3 are much the same as the nineteenth century *batātīl* in B1.76 and B1.78. While fighting craft were able to employ many oars because of the number of people embarked, so were pearling craft, rendering a large bank of oars a dubious indicator of organised violence in the Gulf.

7.1.3.3 Steering mechanisms

The manoeuvrability of fighting craft is affected in part by the type of steering mechanisms used. This usually means rudders but can also include steering oars or poles. Rudders can be fitted on the centreline of the vessel as median rudders, or on the side as quarter rudders. Median rudders can be completely external to the hull or penetrate the hull with the rudder stock. Khaliji nautical traditions include the use of a median rudder (*sukkān*) with either a forward or reverse tiller arrangement (*bahū*) (Al Salimi and Staples 2019:293–294). Later seagoing vessels employed a wheel rather than a rudder, and some rudders are controlled by ropes only or ropes attached to a yoke (Al Salimi and Staples 2019:246, 296). Median rudders are hung with rope lashings or iron pintles and gudgeons. Quarter rudders were employed in medieval craft, but the assertion that the Paris *Maqāmāt* image [B2.32] shows a quarter rudder is dubious when it is compared to the earlier St Petersburg image [B2.104] that clearly shows a broken mast in the same position (Fig. 5.2). This comparison is discussed above in Section 5.1.3. In double-ended vessels like the *battīl*, *baqqāra* and *badan*, the tall stern fin to which the rudder is attached (*fashīn*) is distinctive (Al Salimi and Staples 2019:184–185).

Except for the yoke, all of these steering arrangements appear in historical visual sources. The reverse tiller median rudder is prominent from the earliest images from the thirteenth century [B2.32, B2.104] to some from the end of the nineteenth century [B5.18, B5.19]. Some European images show strange steering arrangements that appear to have been drawn from imperfect descriptions rather than actual observation [B1.92, B1.93]. Islamic manuscript images often show no functional steering arrangement, or equally often oars that act as both propulsion and steering, whereas competent depictions of median rudders are relatively rare [B2.19, B2.95, B2.104, B2.106–107, B2.188]. Some attempts at depicting detachable rudder blades are shown in B2.56, B2.114, B2.156, but other artists appear content to avoid showing the stern altogether. Even when compared to these depictions of varying quality of rudder types, the Maqāmāt ‘quarter rudders’ appear grossly oversized and out of context [B2.32, B2.169], further supporting the conclusion that these are indeed inaccurate copies of the earlier broken mast [B2.104]. Excusing clearly flawed depictions in Islamic manuscripts, there are no competent depictions of quarter rudders after the fifteenth century. Kapel interprets the features emanating from the sterns of the two largest boats in his fig.3 (Site 175) [B3.8.21–22] as steering oars (1983:35, 120), although in this case they are more likely to represent small boats towed astern. None of the vessels shown in profile have steering oars, and the *battīl* in Site 421 [B3.8.45] is even depicted towing a small boat. The only clear depictions of wheels are on models at B4.13 and B4.19 from the late nineteenth century at the earliest.

Forward and reverse tiller median rudders are both associated with fighting craft, although they each present distinct advantages and disadvantages in combat. The reverse tiller arrangement uses ropes, toggles and a tiller that are all outboard and hence vulnerable to collisions when boarding another vessel, or to damage by gunfire or edged weapons. A forward tiller in a small craft negates most of these problems, but also negates the advantages of a rudder hung from a high stern fin that aids hydrodynamic efficiency (Al Salimi and Staples 2019:184). Median rudders on larger ships like *baghāla* and *dāwāt* have the tiller inboard after the post passes through the counter in the transom, which offers both the helm and the helmsman some protection from attack. Rudders fitted in this way are difficult to unship when entering shallow water or landing on a beach, where the outboard rudders offer a slight advantage. Rudders shown in the corpus demonstrate no clear associations between rudder types and fighting craft, other than what is expected for the species of watercraft depicted. Drawings of merchant *dāwāt* in the more peaceful Red Sea show the vessel fitted with a reverse tiller (Bruce [Balugani] c.1768 [artwork]; El Abassi 1816:pl.vi:2), an arrangement absent from images of armed *dāwāt* in the Persian Gulf.

7.1.4 Fittings and armament

7.1.4.1 Fittings

Fittings are those portable or discrete elements of a ship's structure that enable its function, such as anchors, capstans and galley facilities. The visual sources in the corpus contain sufficient information on ships' fittings to fill out an entire chapter, but the concern here is primarily with those that contribute to the fighting function of a vessel, hence the sections below on armament. Nevertheless, some mention must be made of the visual evidence for those fittings that contribute to the ability of fighting craft to keep to sea—the water storage, cooking and sanitary facilities.

There are no structures identified as water storage tanks (*tankī* or *fintās*, see Al Salimi and Staples 2019:329) in the corpus, although these are usually stowed below decks or in the bilge, although the small vessel in the foreground in B1.47 may have a *tankī* embarked. Waterskins and jars are also difficult to detect in visual sources. Cooking or food preparation or service is visible in B1.120, B2.18, B2.28, B2.92, B4.17 and B4.19 at least. Both B1.120 and B2.18 show clearly an open cookbox or brazier (*sarīdān*, see Al Salimi and Staples 2019:291–292) next to the mast, with a pot resting on coals, nearly three centuries apart (Fig. 7.9). The embarkation of sometime hundreds of men in fighting ships must have posed significant problems for the provision of water and food for longer voyages, although visual sources are not well suited to showing how this was done.

Figure 7.9 Open cookboxes (*sarīdān*) in Khaliji watercraft, (left) forward of the mast from c.1590–1595 [B2.18], and (right) abaft the mast from 1841 [B1.120].

A portable toilet box or head, known as a *zūli* in Arabic (pl. *zwāli*), is a common convenience in larger seagoing dhows (Al Salimi and Staples 2019:288). Most later versions are wooden boxes or semicircular 'tubs', but earlier versions appear in visual sources as simple wooden frames or platforms (Fig. 7.10). Paintings from a late-sixteenth-century Persian manuscript show *zūli* frames

rigged over the side with a metal or leather bucket for washing [B2.16–18] (Fig. 7.10.2). *Zwāli*, or frames or platforms used as toilets, are visible in several visual sources from at least the sixteenth century [B1.19, B1.65, B1.73, B1.116, B1.117, B2.15–18, B2.44, B2.132, B2.161, B5.18]. Indeed, B2.15 leaves nothing to the imagination, showing a person defecating from a platform at the stern (Fig. 7.10.1), and the vessel in B2.16 shows two framework *zwāli* slung outboard. The images in Figure 7.10 are arranged in chronological order and show that there was relatively little change in outboard toilet fittings over time, as the image on the right shows a simple structure lashed to the side in 1890 that is very similar to the structure from three centuries before (Fig. 7.10.2).

Figure 7.10 *Zwāli*, or toilets, fitted in Khaliji watercraft: from left (7.10.1) from c.1566 [B2.15], (7.10.2) from c.1590–1595 [B2.16], (7.10.3) from 1841 [B1.117], (7.10.4) from 1873 [B1.73], and (7.10.5) from 1890 [B5.18].

7.1.4.2 Fixed armament

Fixed armament in this case refers to carriage or swivel mounted gunpowder weapons, and potentially rams. While there is one mention of ships fitted with rams during this period (Floor 2006:215–216) [D1.37], and the Portuguese *fusta* on the coast of India in Figure 3.3 appears to sport a metal clad ram or spike at the bow, there is no other unequivocal evidence of rams in the corpus. The sharp stem finials of the two fighting craft in B2.154 from 1437 may represent spikes or rams, similar to that fitted to the *fusta* in Figure 3.3. The bronze-coloured stem finials on the fighting craft in B2.186 from 1526 may also represent metal clad rams or spikes. These identifications are uncertain, but gunpowder weapons are widely and unambiguously depicted in visual sources and are the principal focus of this section.

The sixteenth-century Portuguese image B1.3 shows vernacular vessels in combat armed with forward firing weapons little bigger than handheld firearms, therefore probably one or two pounders. The Khaliji craft shown engaging Portuguese craft in B1.5 and B1.60, both again from the sixteenth century are not so well detailed, but nevertheless show craft discharging weapons forward from the bow. This forward firing arrangement is typical of small craft in this era as only longitudinal strength is required, something that most competent watercraft possess, and can be

seen in B1.3, B1.5, B1.60, B1.69, B2.13, B2.16–18, B2.105, B2.107. In these cases, the watercraft involved are small, double-ended or galley types from the sixteenth century, with the exceptions of B2.13 from the seventeenth and B1.69 that depicts a small *dāw* or *kalbā* from the eighteenth century with a single forward-firing iron gun.

Figure 7.11 One of the first depictions of an apparently Khaliji watercraft with a broadside armament, from an Islamic manuscript of the late sixteenth century (detail from CBL MS277:f.14 [B2.62]).

A broadside armament firing either over the gunwale or through ports or embrasures is far more commonly depicted in visual sources, but generally later in the period and after the sixteenth century. The earliest depictions of watercraft with broadside armament are from 1497, the same year of the Portuguese intrusion in the Indian Ocean [B2.181, B2.182]. This may be significant as the ships are also depicted with metal fastenings, bow and stern castles and three masts like the larger Portuguese naos. As there is nothing else like these craft in Islamic manuscripts, they are probably based on European referents—observed firsthand, sketched or from European manuscripts. Later Islamic manuscript images shows broadside mounted weapons in ships that may also be modelled on European referents [B2.23, B2.78, B2.131, B2.141, B2.153], although others are more likely to represent Khaliji vessels [B2.62, B2.93, B2.97, B2.107, B2.142, B2.192]. Of these, the first potentially Khaliji vessels with a broadside armament are from the sixteenth century [B2.62, B2.93, B2.107] (Fig. 7.11), although B2.107 may actually show an Ottoman vessel with little Khaliji involvement. An image from 1526 shows a firearm embarked in a vessel, but no fixed

armament [B2.186]. The late sixteenth century images B2.16 and B2.17 show small brass and iron weapons arranged on the gunwale, like swivels. Apart from the two images discussed above [B2.181, B2.182], there are no depictions of firearms or fixed gunpowder weapons in any visual source from before the sixteenth century.

7.1.4.3 Iron and brass gunpowder weapons

The general poor state of maintenance of iron gunpowder weapons in Khaliji watercraft and fortifications is attested to in documentary sources (E.g. Fawcett and burn 1947:127). European travellers observed that 'their artillery, when discharged, would […] do them more injury than their enemy, from the state they appeared to be in' (Loane 1805:30). Military officers approached Qasimi fortifications 'without apprehension from the artillery of the enemy, which is in a state of the most contemptible inefficiency' (NMM GOS/14, Reports Received from Captain Taylor 1818:f.7). There were weapons aplenty in Khaliji ports, up to 12-pounders, but most were described as 'honey-combed' or heavily corroded, dismounted and buried in the sand (Loane 1805:29). A photograph of a battery in Ras al Khaimah at the turn of the twentieth century, albeit long after the maritime truces were enacted, shows weapons in just this state (Fig. 7.12), and a dismounted weapon is also shown in the left foreground of Figure 6.10. Corroded, improperly maintained or poorly manufactured iron weapons are liable to burst, like the one shown on the left in Figure 7.13.

Figure 7.12 A dishevelled battery of guns on naval carriages arranged ashore at Ras al Khaimah at the turn of the twentieth century (Cox 1908 [artwork]).

Not only was the maintenance of guns an issue degrading Khaliji combat efficiency, but the actual operation of these weapons also attracted unfavourable comment. Stocqueler travelled in a merchant *baghla* in the early nineteenth century and observed that:

> our arrival [in Muscat] was announced from the vessel by numerous discharges from a rusty old six-pounder, mounted on a decayed wooden carriage. The first discharge knocked off one wheel, the second carried off two others, the third split the carriage in twain, and for the rest the gun was coolly laid upon the bare deck and suffered to caper *á discretion* (Stocqueler 1832:16).

Europeans were frequently sought as gunners by Khaliji forces, as ‘the opinion held invariably on each side of the gulph, [is] of the superior skill our countrymen [Europeans] possessed in the art of gunnery’ (Loane 1805:75). This was not always the case, and Muslim (not necessarily Khaliji) gunners were employed in some Portuguese ships (Al-Salimi and Staples 2015:323). Nevertheless, there is no visual evidence in the corpus to support the notions that Khalijis were incompetent gunners or that Europeans were employed in their stead.

Brass weapons required far less maintenance but were also considerably more expensive than iron guns of equivalent calibre. Brass weapons were certainly used by Khalijis, as survivals in museums testify (Fig. 7.13 right). Iron and brass weapons may be distinguished by colour in visual sources, although this is not an entirely reliable method; iron guns are shown in B1.3, B1.69, B1.102, B1.138, B1.139, B2.17, B2.62, B2.93, B4.21, and brass guns in B2.13, B2.16, B2.18, B2.23, B2.78, B2.97, B2.107, B2.181, B4.6. While this appears to show that they were used in roughly equal measure, many of the Islamic images appear copied from European sources and may reflect a choice of pigment rather than a realistic representation, and many other monochrome images show guns that cannot be identified by metal.

Figure 7.13 Left: unprovenanced, burst 3pdr iron gun, cast between 1760 and 1820 as indicated by the cypher of King George III, Ras al Khaimah National Museum, UAE (M. de Ruyter 2015; cypher after Glasshouse 2012); and right, a brass gun captured from a slaving dhow by HMS *Penguin* around 1853 (National Maritime Museum, Greenwich, London, KTP0069).

Arab forces commonly used stone shot in gunpowder weapons in the sixteenth century at least (Serjeant 1963:50 n.3), and stones were regularly used as hand-thrown projectiles (Al-Qasimi 1986:92). Iron shot is widely attested in documentary sources and several examples have been recovered at archaeological sites in the region (e.g. Hansman 1985:18–20; Leisten 2014:16), but the only image to portray round iron or stone shot in the corpus [B1.3] is indeterminate. There is no

specific evidence of the use of stone or iron shot or projectiles in visual sources, although they should certainly be considered in archaeological investigations.

7.2 Counter-sterned fighting craft

7.2.1 Fighting functions and minor types

7.2.1.1 The projecting stern platform

Weismann categorises ‘a long, overhanging poop, not or only partly integrated into the hull’ as an identifying feature of a type of Indian Ocean ship commonly represented in iconography of the fifteenth through to the nineteenth century (Weismann 2002:140–142). A projecting stern platform can be distinguished in Indian art from as early as the sixth century CE (Deloche 2012:201–204), and Burningham’s reconstruction of a ‘late-medieval Indian ship’ clearly includes this feature (Burningham 2019b:146, fig.6.1) (Fig. 4.8 right). While the projecting stern platform was clearly common in the Indian Ocean in the fifteenth and sixteenth centuries (Weismann 2002), it was also common in the Mediterranean and other parts of Asia during the early modern period. None of the vessels Pâris illustrated in the Persian Gulf include a projecting stern [B1.111–122], but many from other parts of Asia, mostly China, do (e.g. Pâris 1841:plates 50, 51, 52, 53, 56, 58, 61, 65, 66, 77, 79, 91), including prominently the Malabar ‘coaster’ that is almost certainly a *dāw* (Pâris 1841:pl.18) (7.8 right). Pâris’ later work includes yet more craft, mostly from the Mediterranean, with prominent counter sterns or projecting platforms, including several *xebecs* (Hitchcock 2013:25, 28, 30, 56, 60–61, 78, 90). The point here is that the projecting stern platform or counter stern was an architectural feature used widely in the early modern period and was not restricted to the western Indian Ocean. Given that it was mostly used in warm climates, its prominence may be due in part to a passive cooling effect, like a verandah. This sort of elevated platform also allowed good visibility forward with which to better operate the ship (Vaupell 1846:99). The use of the platform as a fighting structure in the *dāw* is discussed below in Section 7.2.2.

The projecting stern platform is prominent in petroglyphs at the al-Jusāsiyyah site. Some of these glyphs were originally identified as having ‘an appendage at one end, indicated by a lower relief’ (Kapel 1983:120), but only illustrated in simple two-dimensional line drawings. Facey’s re-assessment of some of these carvings in 1987 effectively ignored the apparent stern projections or reliefs (Facey 1987), and they have only recently been considered to represent potentially counter-sterned vessels like the *dāw* or *kalbā* (de Ruyter 2020:135–137). The shallower appendage at the stern is clearest when viewed at an oblique angle, as in Hassiba et al. fig.11 (2012:9), Isitt pl.3 (2007:399), and Pelling et al. fig.3 bottom (2015:221). Many of the glyphs have meaningful three-dimensional relief and the most prominent examples with the ‘appendage at one end’ were

photographed by the author and Enrique Aragon and modelled by John McCarthy as part of the research for this thesis. Figure 7.14 shows the modelled results for B3.8.21 (Site 175).

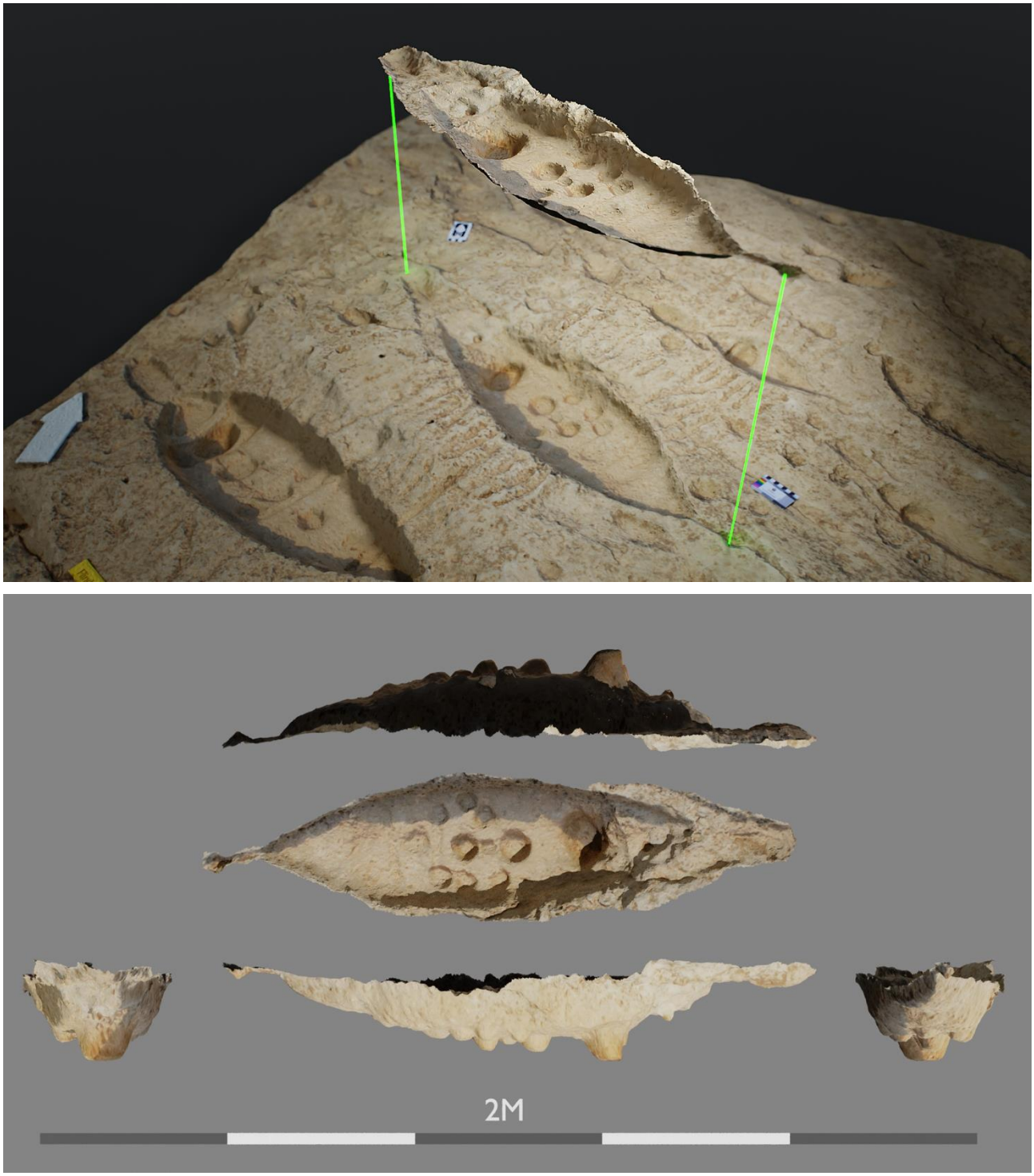


Figure 7.14 A photogrammetric model of petroglyphs at Site 175, al-Jusāsiyyah, Qatar, showing the prominent counter stern shape in the lower image that has been extruded and vertically exaggerated to demonstrate relief (Images J. McCarthy 2019, from photographs by M. de Ruyter and E. Aragon).

Close inspection and modelling of the glyphs at al-Jusāsiyyah shows that those with the stern appendage do indeed belong to the counter stern cluster [B3.8.13—15, B3.8.20–23]. The lower image in Figure 7.14 shows how the counter stern becomes apparent in the glyph when extruded

and vertically exaggerated to enhance the relief. Such an identification is nevertheless an unreliable dating method, given the earliest counter stern in the corpus is from 1544 [B2.188] and the last from 1869 [B1.29], although *kalbāt* were prominent in the eighteenth century and *dāwāt* in the period from 1760 to 1820. Hassiba et al. (2012:9–14) posit a date in the eighteenth century for these glyphs through analysis of calcium oxalate layers, and the carvings are unlikely to be much older given the rate of weathering (Hassiba et al. 2012:9–14). The presence of counter-sterned vessels among numerous double-ended types in B3.8 (6 of 45 shown in plan view), and only one glyph that can be described as square ended like a *baghla* [B3.8.8], suggests that this site may have been made by people engaged in organised violence rather than pearling or trade. The proportion of counter-sterned to double-ended craft at this site is similar to that in fighting fleets described in documentary sources, where counter-sterned vessels are prominent but less common [D1.13, D1.14, D1.17, D1.24, D1.33, D1.37, D1.44–46, D1.49, D1.56, D1.64, D1.69].

The depictions in the counter stern cluster potentially represent a range of watercraft types that varied over time. Prominent early modern counter-sterned types include the *ghurāb*, the *kalbā* and the *dāw*. The fusta is representative of the galley-type vessels used by the Ottomans, Portuguese and occasionally Khalijis in the sixteenth and seventeenth centuries. Ottoman fighting galleys are discussed in detail by Güleryüz (2004), and Portuguese and other Mediterranean types by Bamford (1973), Eliay (2013a, 2013b), Gardiner (1995), Guilmartin (1974, 2002) and Konstam (2002). The following sections discuss the extent to which particular types of counter-sterned craft can be identified in the corpus of visual sources.

7.2.1.2 The Portuguese fusta

Comparisons to small, oared warships more familiar to a European readership are common in early modern texts (e.g. Birch 1875:105; Rawlinson 1929:131; Welch 2007:139). The *fusta* of the sixteenth and early seventeenth centuries was a small, oared warship frequently mentioned in European sources in the western Indian Ocean (e.g. Floor 2006:108, 110–111; Mathew 1988:283). Descriptions of the type in the Mediterranean have it ranging 50 to 90 feet long with between 10 to 20 banks of oars and usually only a single centreline cannon and several swivels (Anderson 1925:146–147; Konstam 2002:20; Lane 1934:24, 27). The best image of an Indian Ocean *fusta* from the period is shown at Figure 3.3, which depicts a small projecting stern platform. While this type of warship was common in Portuguese service, many other types of small, oared warships are mentioned in sources with little to differentiate them other than size and numbers of oars [e.g. D1.13, D1.14, D1.15, D1.17, D1.18, D1.24, D1.33, D1.37, D1.45, D1.46, D1.49, D1.56]. The general impression gained from these descriptions is that the *fusta* was bigger than the *tarrāda* and the ‘galliot’ was in turn bigger than the *fusta*. The *tarrāda* (plural *tarārīd*) is discussed below in

Section 7.4.2. The Arabian form of the galliot, or gallivat, the *kalbā* is discussed below in Section 7.2.3. Regardless, these names must be treated with caution, as they varied with user, region and time. While Khaliji forces undoubtedly captured *fustas* from the Portuguese, they are usually indistinguishable from other similar galley-type craft that appear frequently in visual sources in the sixteenth and seventeenth centuries [B1.4, B1.5, B1.14, B1.41, B1.42, B1.60, B1.75, B1.86, B1.124 (probably HEIC), B3.5.6, B3.9.15], and even into the nineteenth century [B1.110].

7.2.1.3 The ghurāb *(pl.* aghriba*)*

The *ghurāb* is commonly mentioned as a warship in the early modern Indian Ocean, initially in the same sense as the Mediterranean type (Agius 2008:348–351; Al Salimi and Staples 2019:96–97), but later in its own right as a distinctive Indian warship, often referred to as a 'grab' (MacDougall 2014:28; Orme 1861:408–409). This type of vessel is reported sufficiently frequently in Khaliji contexts to warrant inclusion here [e.g. D1.20, D1.33, D1.56, D1.61, D1.66, D1.101]. The eighteenth-century *ghurāb* was made distinctive by a long, sharply raked stem with a bulwark at the head of the forecastle through or over which guns could fire forward. The stern is often depicted as countered like a *dāw* or sharply raked square like a *baghla* (Fig. 7.15). This type of vessel is occasionally mentioned in Khaliji forces and was reported to have been built in Muscat (Al Salimi and Staples 2019:97), but was more commonly and numerously associated with the west coast of India or with HEIC forces (MacDougall 2014:28; Orme 1861:408–409). The Persian Navy included at least two *aghriba* in the 1735 attack on Basra, having unsuccessfully attempted to buy, presumably from India, 10 of this class of fighting craft in 1718 (Floor 2007:5, 9).

Figure 7.15 Annotated depictions of *aghriba*: left, a Maratha *ghurāb* from 1770 (detail from Hennin 1770 [artwork]); centre, a Maratha *ghurāb* from an eighteenth century painting (detail from Anon. c.1750–1799b [artwork]); and the EIC *ghurāb Bombay* from around 1780 (Anon c.1780 [artwork]).

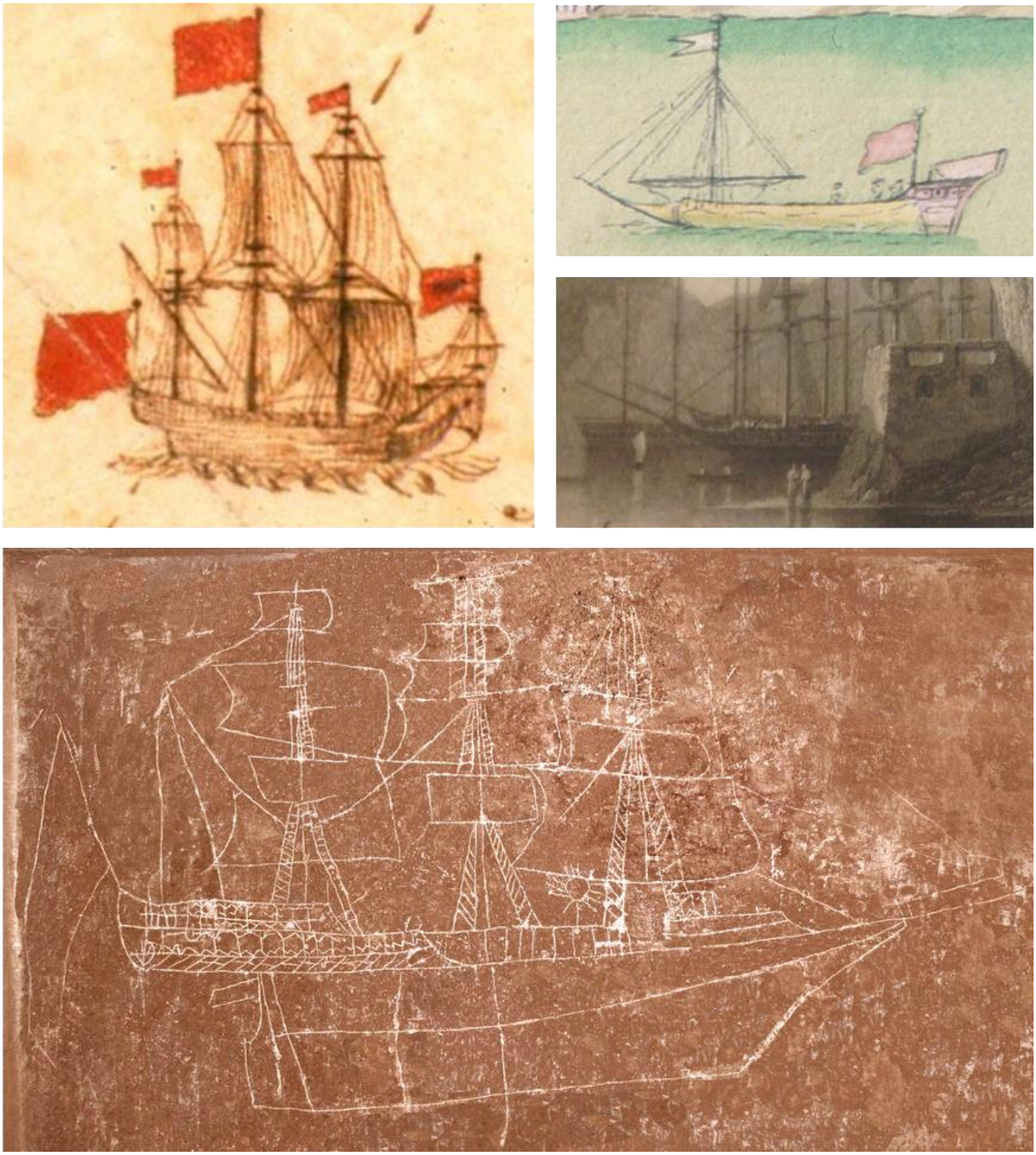


Figure 7.16 *Aghriba* depicted in the Gulf: top left, at Muscat in 1704 (detail from Anon. 1704a [artwork] [B1.12]); top right, at Basra in 1704 (detail from Anon. 1704b [artwork][B1.13]); centre right, at Muscat in 1836 (detail from BL ST1062a [B1.45]); and bottom, undated at Na'man, Oman (photograph courtesy T. Vosmer) [B3.9.20].

In the sixteenth and seventeenth centuries, watercraft may have bene considered *aghriba* because of their similarity to the Mediterranean type of galley (Agius 2008:350–351). Indeed, Al Salimi and Staples use the graffito at B3.9.15 to illustrate their description of the *ghurāb* (2019:fig.45). Other watercraft that may fit this early galley-type description of the *ghurāb* abound, and are shown in B1.4, B1.5, B1.41, B1.42, B1.60, B1.75, B1.86, B1.110, B1.124 (although probably HEIC), B2.105–107. The later Indian type of *ghurāb* is included in this section as it is often, although not

always, depicted with a counter stern. There are only four examples of this later *ghurāb* type readily identifiable within the corpus (Fig. 7.16). Vessels in B1.12 and B1.13, both from 1704, appear to fit this description. The vessel in B1.13 is shown at Basra and the *ghurāb* in B1.12 is specifically identified as an Armenian flagged vessel at Muscat. The first vessel moored behind the fort in B1.45 is undoubtedly a *ghurāb*, identifiable by the 'grab' stem and forecastle bulwark, as is the vessel in B3.9.20, both pictured in Oman. The vessel at B3.9.9 may also be a *ghurāb*, but the depiction of the forecastle area is unclear. This admittedly limited evidence tends to confirm that the *ghurāb* used by Khaliji forces was little different to that built on the west coast of India and therefore was most likely a vernacular design employed the wider western Indian Ocean.

7.2.2 The *dāw* (pl. *dāwāt*): 'like a vessel of war'

The *dāw* was the most distinctive Khaliji fighting craft of the early modern period and was operated in the Gulf 'like a vessel of war' (Low 1877:169). There are four annotated images of *dāwāt* in the corpus where the type is specifically identified [B1.53, B1.69, B1.84, B4.3]. Of these, only one lacks a superstructure or awning [B1.69] (Fig.7.19) and this case is discussed below in Section 7.2.3. By using the annotated images as guides, other *dāwāt* can be identified in B1.29 (possibly), B1.52, B1.55, B1.56, B1.79, B1.98, B1.104–107, B1.109 (possibly), B1.136 (possibly), B1.137. B1.138, B1.141 and B3.9.8. The counter-sterned vessels at the al-Jusāsiyyah site [B3.8.13—15, B3.8.20–23] are not identifiable by type and may well be *kalbāt* or other types. The *dāw* is further depicted in images, some annotated, outside the Persian Gulf, and prominently in the Red Sea (Anon. c.1750–1799 [artwork]; Conant 1806:200v; El Abbassi 1816a:pl.vi:2; Moresby c.1829–1834a [artwork]). The vessel is probably the 'dorioh' (Vaupell 1846:99) discussed above in Section 7.1.2.1 and is almost certainly shown in Pâris' drawing of a Malabar coaster (1841:pl.18) (Fig. 7.8 right). In these latter cases the vessels were rigged as ketches, so the frequent use of the term 'ketch' in European descriptions of western Indian Ocean sailing craft may anonymise *dāwāt* in documentary sources.

The best source on the *dāw* for reconstruction purposes is the Science Museum model (Figs 1.2 and 1.3) [B4.3], described in Section 5.4.2.1. This *dāw* has unlidded ports for eight guns, a full deck with hatches, a fully enclosed superstructure, two masts and is completely fastened with metal. Low (1877:169) described the fighting dāw as 'defensible' by the inclusion of full decks with hatchways that could be secured against intruders. All images of armed *dāwāt* in the corpus show a deck were the interior of the vessel can be seen, and the presence of a deck is implied in cases with broadside gunports. The vessel on the right in B1.55 has cargo piled above the line of the deck, making its presence unclear (Fig. 7.17 bottom left). A full deck is an important feature in the late eighteenth and early nineteenth centuries when many commercial craft had partial or temporary decks for

access to cargo spaces. The general hull lines of the *dāw* model [B4.3] can be confirmed by glimpses of the lower hull in B1.56, B1.84, B1.104, B1.137, B1.141, most of which show a small transom below the projecting counter (Fig. 7.17). This transom and the same hull shape are confirmed in Red Sea *dāwāt* (Conant 1806:200v; El Abbassi 1816a:pl.vi:2; Moresby c.1829–1834a [artwork], c.1829–1834b [artwork], c.1829–1834c [artwork]). The projecting counter of the model is lined with stanchions, on which were allegedly mounted barasti or palm-stick bulwarks for protection in battle (Davies 1997:230). B1.52 shows these stanchions supporting an awning (Fig. 7.17 bottom right), and the semi-enclosed structures in B1.137 and B1.141 suggest a similar temporary arrangement.

Figure 7.17 *Dāwāt* in visual sources: top left, detail from Temple 1813c [B1.138]; top centre, detail from Igglesden 1819 [B1.84]; top right, detail from Hornbrook c.1840d [B1,.79]; bottom left, detail from Daniell, T. c.1793 [B1.55]; bottom centre, detail from Morier 1812:pl.II [B1.104]; bottom right, detail from Cussons 1820 [B1.52].

The original description card that accompanied the Science Museum model claimed that the stern projection was as an offensive boarding platform: ‘The Pirates used to impel the Dow, by sweeps stern foremost, having a long paddle at the bow to Steer with; and board from the projecting gallery at the Stern’ (Science Museum 1926b). There is no evidence in visual sources of this method of

boarding, although the sharp end and small transom means this type of vessel could be impelled ‘stern foremost’ with reasonable efficiency. A contemporary description of the tactics of Qasimi *dāwāt* makes it clear instead that the bow (‘prow’) was swung over the defending vessel and, when alongside, the attackers board from the ‘fighting stage’ erected ‘one third of the length of the vessel[’s] deck from the stern’ (quoted in Davies 1997:229–230). This first-person account describes the use of the superstructure as the boarding platform rather than the stern projection. The same source also claims that the bow and stern were ‘barricadoed’ in combat to protect those throwing ‘spears, stones and other missile[s]’ (Davies 1997:230). Another contemporary description is very similar, with the *dāwāt* attacking the quarters of the defending ship, with the crew ‘heaving spears and large stones’ (Al-Qasimi 1986:92). The inclusion of the projecting stern platform in unarmed versions of the *dāw* suggests that any offensive use made of the structure was incidental to the design.

Measured drawings or photographs can confirm the proportions of the Science Museum model as these sources suffer the least distortion from production, the nature of the support or artistic licence. Nevertheless, there are no photographs of the *dāw*, or any other counter-sterned craft, in the corpus, nor any architectural drawings like those Pâris produced of other craft [B1.111–115, B1.118]. Three extra-regional sources can therefore be used to fill this gap. Pâris’ drawing of the Malabar coaster (1841:pl.18) (Fig. 7.8 right) is an excellent source, if it can be accepted that it represents a merchant *dāw*. El Abbassi’s plans of a Red Sea *dāw* (1816a:pl.vi:2) are also worthwhile, although they are not to Pâris’ standard. The third source is an unpublished drawing of an unnamed Red Sea watercraft made in the late 1760s by the Italian Luigi Balugani, artist to James Bruce (Bruce [Balugani] c.1768 [artwork]) (Fig.7.18). The image is contained in Bruce’s papers and attributed to him, but it is annotated in Italian. Bruce’s expedition carried with them two camera obscuras that he and Balugani used to record scenes and architecture (Bredin 2000:41; Bruce 1790:viii–ix). The measured quality of this image suggests that it was probably sketched using the camera obscura, and Bruce and Balugani sailed on the Red Sea on several occasions in the late 1760s. Although the vessel is not named, the drawing shows a small *dāw* with a rig reminiscent of Niebuhr’s drawing of a *dāw* in Jedda around the same time (Niebuhr 1776:pl.LIII). Without the foremast, this rig would be classed as a ketch (see Section 7.1.31.), with the mizzen and main stepped in the same place as in Pâris’ Malabar coaster (1841:pl.18) (Fig. 7.8 right). This small *dāw* has a reverse tiller on a median rudder, a balustrade supported by stanchions on the poop and some form of superstructure or awning. Generally, this craft conforms closely with the *dāw* drawn by El Abbassi (1816a:pl.vi:2), although the stem is more sharply raked than in other *dāwāt*. This remarkable image, if created using a camera obscura projection, is the most photo-realistic impression of a *dāw* yet discovered.

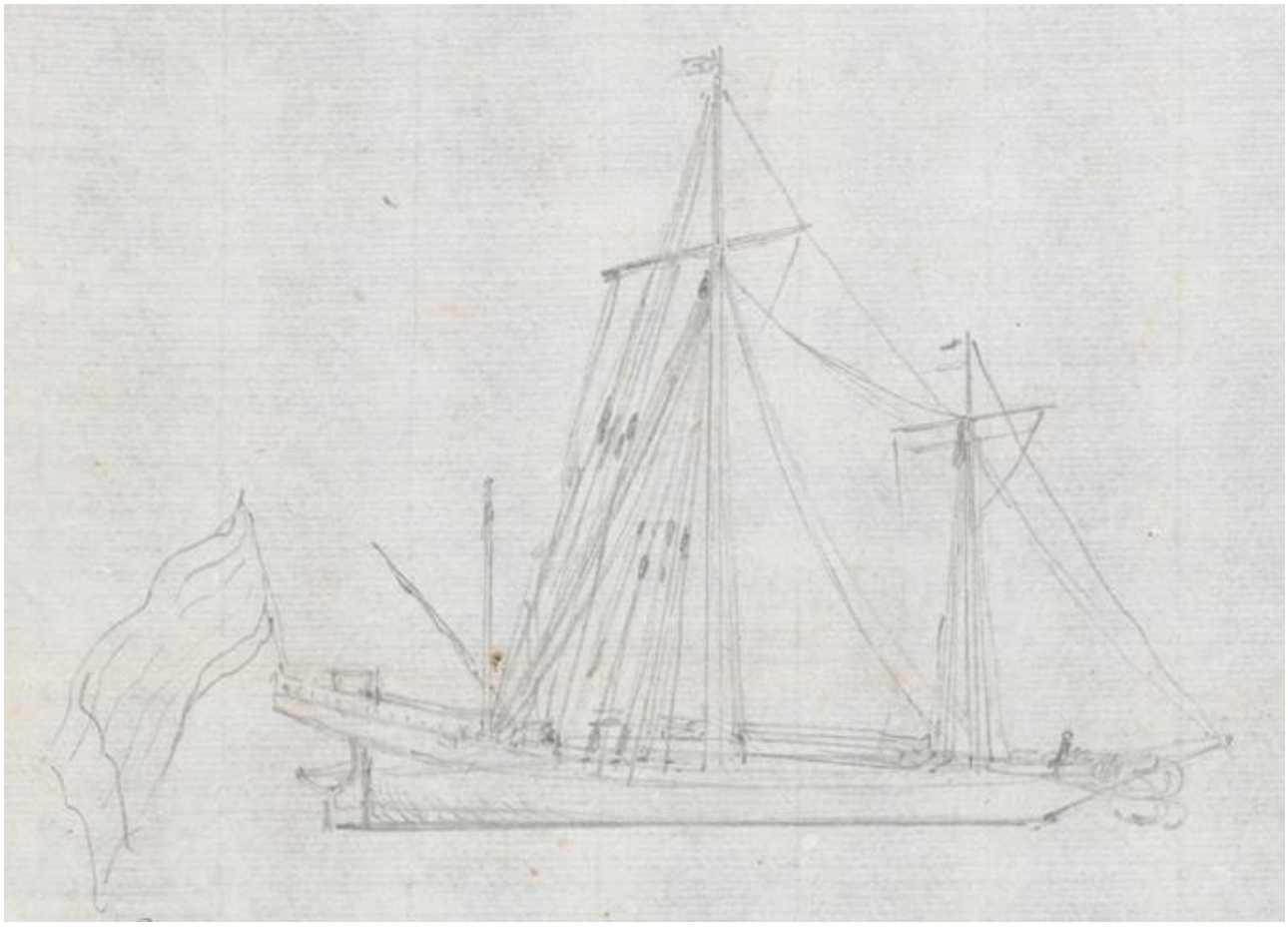


Figure 7.18 A drawing of a Red Sea *dāw*, probably from a camera obscura projection, from the 1760s (Bruce [Balugani] c.1768 [artwork]).

The graphic reconstruction shown in Figure 7.19 is based on Weismann's drawing of the Science Museum model, with modifications and additions. The superstructure was lowered to remain in proportion with those shown in B1.79, B1.84, B1.104 and B1.138. The internal construction is mostly conjectural and reflects more modern vessels from the twentieth century (Dziamski and Weismann 2010), which provide the only detailed information other than the interior of the model itself (Fig. 1.3). There is no evidence for platforms or bulkheads below the main deck in this class of vessel. This vessel as reconstructed would be 106 feet long overall (32.3 m) and could mount eight 6- or 9-pound carriage guns. While stepped for two masts like the original model, only one is shown here, as in B1.79, B1.84, B1.98, B1.105 and B1.138 (Fig. 7.17). Clamps are used instead of hanging knees, and lodging knees are small. The hull is completely metal fastened and there are no gunport lids. The 'decks, hatchways, ports, poop-deck' described by Low (1877:169) are all included. The stanchions on the projecting counter stern are included, as evidenced in B1.52, B3.9.7, B3.9.8 and B4.3, although the majority of *dāwāt* and *kalbāt* omit this feature.

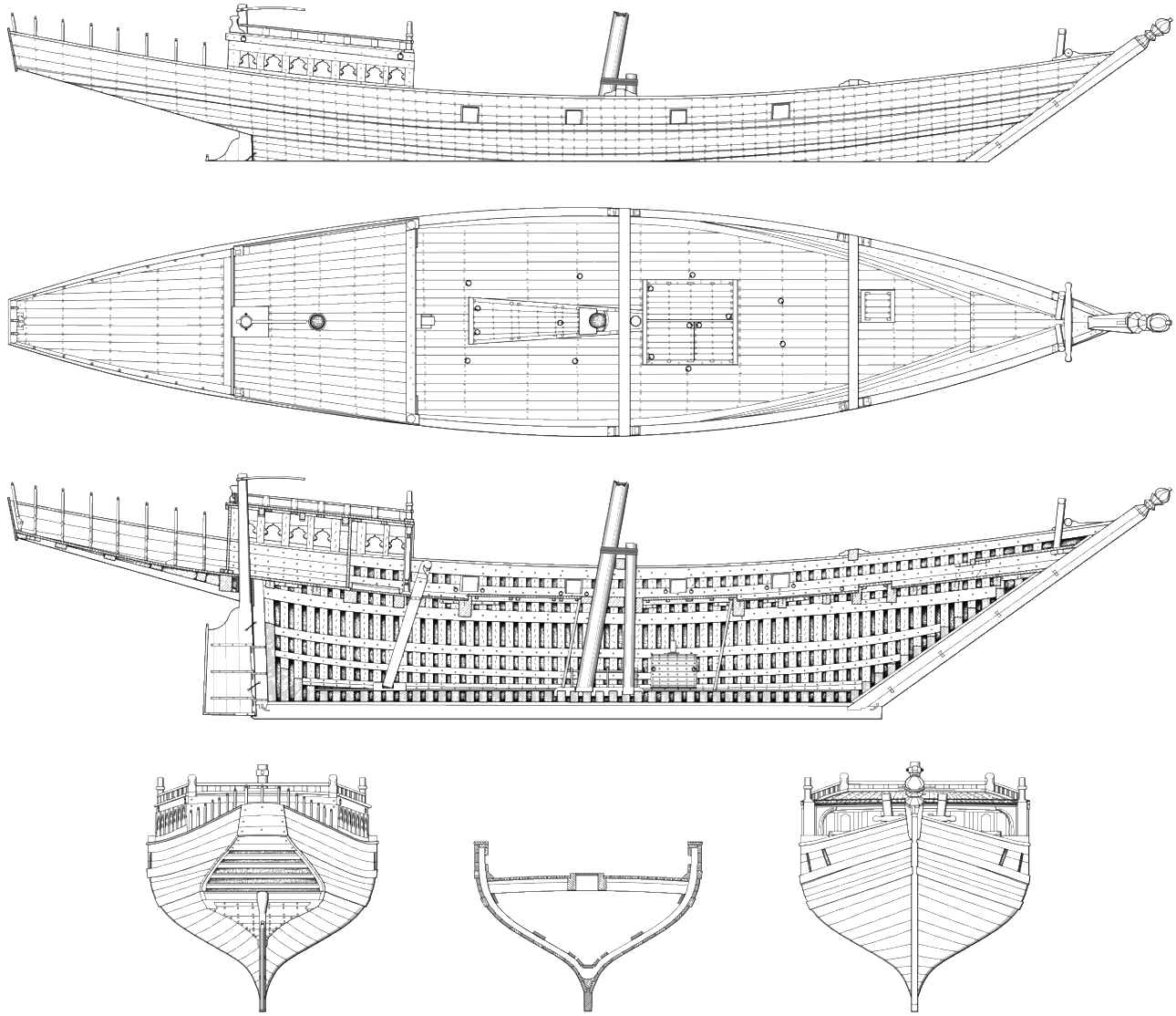


Figure 7.19 A graphic reconstruction of an 8-gun *dāw* from the early nineteenth century, based on the model in the Science Museum, London (M. de Ruyter 2020, after N. Weismann 2002, with permission).

The graphic reconstruction shows the typical form and architectural features of the *dāw*, but examples in visual sources also demonstrate a variety of colour patterns. The colours may have been meaningful, such as for identification purposes, or merely for decoration. The Qasimi *dāwāt* in B1.84 have different colour schemes, with one showing a projecting counter stern painted red (Fig. 7.20 top) and the other unpainted. The Qasimi *dāw* in B1.79 (second from the left) is also unpainted, although the sides of the counter stern are not clearly shown. The *dāwāt* in Temple's paintings show a variety of patterns [B1.136, B1.137, B1.138, B1.141]. The nearest *dāw* in B1.137 has an aquamarine full-length stripe and little or no coloured antifouling (Fig. 7.20 second from bottom), whereas the vessel in B1.138 has a green stripe and a full coat of white antifouling (Fig. 7.20 second from top). Both vessels are depicted in Muscat at the same time. The other vessels in Temple's scenes do not appear to be painted. These three examples show *dāwāt* depicted within a ten-year span. Pâris' Malabar coaster from the 1830s (1841:pl.18) (Fig. 7.8 right) shows a white

stripe with false gunports (Fig. 7.20 bottom), a configuration also described by Miles (1919:414). The colour schemes shown in Figure 7.20 are all painted over the same hull and are intended merely for comparison, rather than as reconstructions of the vessels shown in the original images.

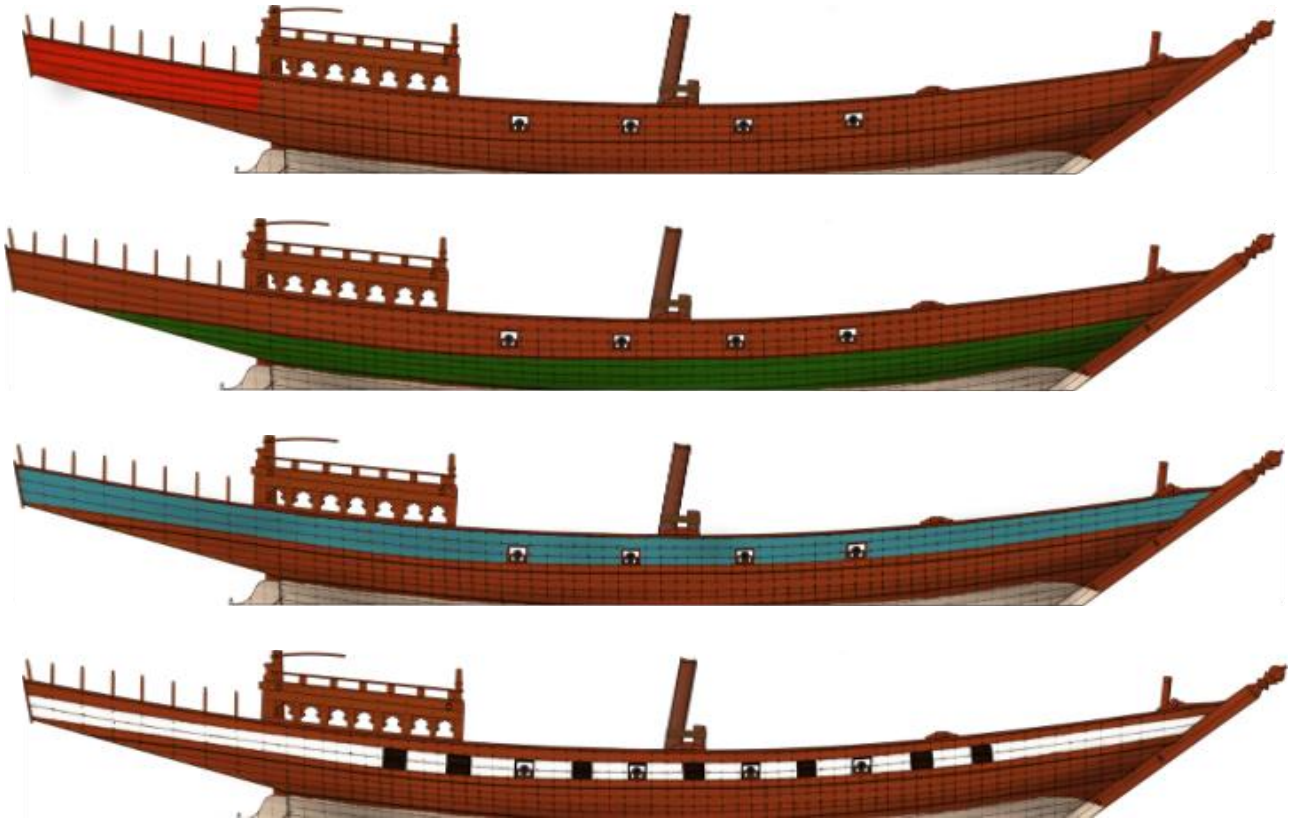


Figure 7.20 Colour scheme of early-nineteenth-century *dāwāt*: top after B1.84, second from top after B1.138, second from bottom after B1.137, and bottom after Pâris 1841:pl.18.

7.2.3 The *kalbā* (pl. *kalbāt*): the Arabian gallivat

This section examines the evidence for the gallivat, a small warship used in the Persian Gulf in the long eighteenth century. Possession of one or more of these vessels, rendered *kalbā* by the Arabs who operated them (Niebuhr 1776:75), conferred power on regional actors, giving them leverage over events ashore and allowing them to intimidate potential or actual adversaries (Fawcett and Burn 1947:115; Floor 2007:29). Other than a few descriptions of this vessel, little is known about it compared to other dhows, and it is often assumed to be analogous with the gallivat used on the Malabar Coast of India (Agius 2002:94–94; Orme 1763:401–402). While there is evidence of gallivats being built in the Gulf during this period (Parsons 1808:195, 206), the type appears to have been originally sourced from the more northern Indian ports, principally Surat in Gujarat. By the time Niebuhr visited the Gulf in the 1760s, the *kalbā* was established as a principal type of small warship, differentiated from other types such as the larger *dāw*, and the *battīl*, *tarrāda*, *trankī*, and *dānik* described in Section 7.4 below (de Ruyter 2020:132–134; Niebuhr 1776:75, 153, 186–187).

An English traveller in Basra in 1774 described a captured gallivat that he observed closely:

> the galliote which the *Eagle* had taken; she is eighty-four feet long, twenty-four feet broad, mounts ten carriage guns, six pounders, and is built forward like a London wherry, with a pink or lute stern, and has only one tall mast, which rakes forward, to which is attached a lug sail; she carries twenty-four oars (Parsons 1808:169).

This latter observer also distinguished the type from the 'trankees and ketches' and described the deployment of *kalbāt* as gun platforms 'in line of battle', while *trankīs* served as amphibious craft (Parsons 1808:179, 206). The Abbé Carre described Portuguese 'galliots' operating in the Gulf in the later seventeenth century as 'small light craft, built rather like galleys, and very suitable for coastal expeditions, as they have both sails and oars' (Fawcett and Burn 1947:115). In 1736, the Persian fleet already included two 'galwets' as well as two 'trankis' (Floor 1987:41–42), and the type was prominent as a fighting vessel in the Gulf in the eighteenth century (Agius 2002:94–95). In 1774 the Sultan of Muscat's armed forces included around two dozen galliotes and ketches, 'from fourteen to eight guns, all built in this and in the other port to the north' (Parsons 1808:206), and the Persian fleet of 1775 consisted of 'near sixty sail, among which were twenty-two large gallivats and dows' (Anon. 1874:60).

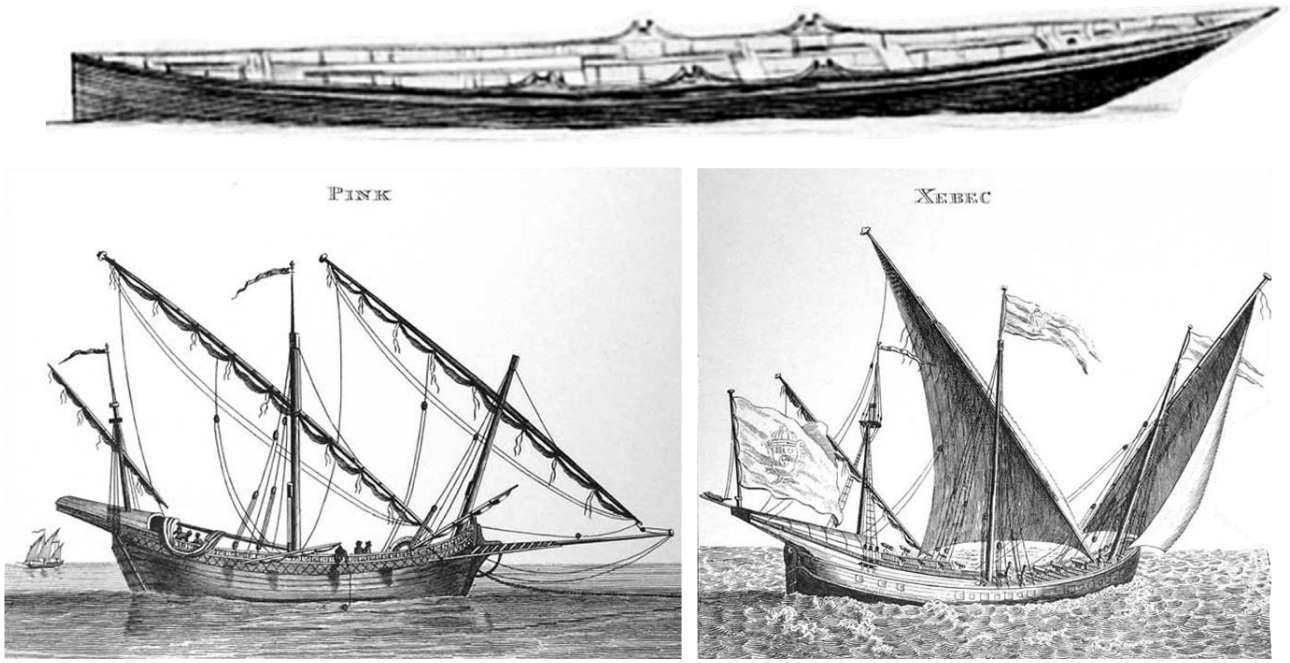


Figure 7.21 An early-nineteenth-century London wherry (top), showing its sharply raked bow (detail from Pollard 1808 [artwork]); a late-eighteenth-century Mediterranean pink (left) and a xebec (right), showing the projecting counter stern to which the *kalbā* and *dāw* were compared (detail from Steel 1794:236–237).

While none of these sources are clear on what distinguished *dāwāt* from *kalbāt*, the former are almost always shown in annotated images with a deckhouse while Indian gallivats have none, and it is usually implied that the latter were smaller (de Ruyter 2020:133). However, some vessels in the Red Sea described as *dāwāt* also lack a deckhouse (El Abbassi 1816a:pl.vi:2; Elwood 1830:347).

Writing of his observations in the late nineteenth century, Miles described the *kalbā* and the *dāw* as extinct warships similar in form, the *kalbā* being 'the earlier type and of peculiar architecture' (Miles 1919:414). The *kalbā* captured in Basra in 1774 had a pink stern and a bow like a London wherry (Parsons 1808:169). A London wherry of this time had a sharply raked bow, as shown in the top image in Figure 7.21. A seamanship treatise of the late eighteenth century describes English vessels with narrow sterns as 'pinks' and compares Mediterranean pinks to xebecs (Steel 1794:236). The illustrations of the pink and the xebec from this treatise are shown for comparison in Figure 7.18, where the projecting counter stern is apparent. Indian gallivats, such as those shown above in Figure 4.9 bottom, Figure 5.3 and Figure 5.4, also compare well with Parsons' description.

Figure 7.22 A vessel annotated as a 'dow' in an eighteenth-century depiction, but that is probably a *kalbā* (detail from Farington c.1700–1799 [artwork] [B1.69]).

There are no annotated images in the corpus that specifically identify the *kalbā*. While it is clear from contemporary descriptions that the vessel was similar in form to the *dāw*, albeit usually smaller, it is not clear what other features differentiated the types. Given the frequent confusion and misappropriation of names that attended non-Indigenous descriptions of vernacular watercraft, it is entirely probable that some *kalbāt* were later identified as *dāwāt*. Visual sources of counter-sterned craft discussed above are all readily identifiable or annotated as *aghriba* or *dāwāt*. The image that stands out from this pattern is Farrington's eighteenth-century depiction that he annotated as a 'dow', a type of 'coaster from Bassorah [Basra] to Surat of 30 to 100 tons' (Farrington c.1700–1799 [artwork] [B1.69]) (Fig. 7.22). The image shows a very small *dāw*, if the scale of the figures and the single gun is true. Of the two masts, the mizzen is stepped impossibly on the rudder post and the mainmast is stepped too far forward for this type of vessel. Most intriguingly, there is no deckhouse or superstructure of any sort, nor any stanchions. Given the limited descriptions of the *kalbā* available, the vessel in this image accords with the principal features of the type—a vessel of the same form but smaller than a *dāw*, with a projecting counter stern and a sharply raked bow. The same might be said of the two counter-sterned vessels shown in B1.72 and the graffiti at B3.9.7,

B3.9.19 and B3.10.1–3, although the scale of the former drawing and the medium of the latter graffiti allows limited detail.

The graphic reconstruction of a late-eighteenth-century *kalbā* shown in Figure 7.23 is based on the vessel captured in Basra in 1774 (Parsons 1808:169). This vessel was described as 84 feet (25.6 m) long overall, with ten 6-pounder carriage guns, a single mast with a settee sail, and 24 oars, here shown as thole pins. The outline is conjectural but represents a smaller *dāw* to which it was compared (Miles 1919:414), with the pink stern and sharply raked bow of contemporary descriptions and images of gallivats from north-western Indian ports (Figs 4.9 bottom, 5.3 and 5.4). The rake of the bow in this case was taken from Balugani's drawing of a Red Sea *dāw* shown in Figure 7.18. The reconstructed *kalbā* also closely resembles the 'dow' shown in Figure 7.22 that may instead be a *kalbā*, but with one sail rather than two.

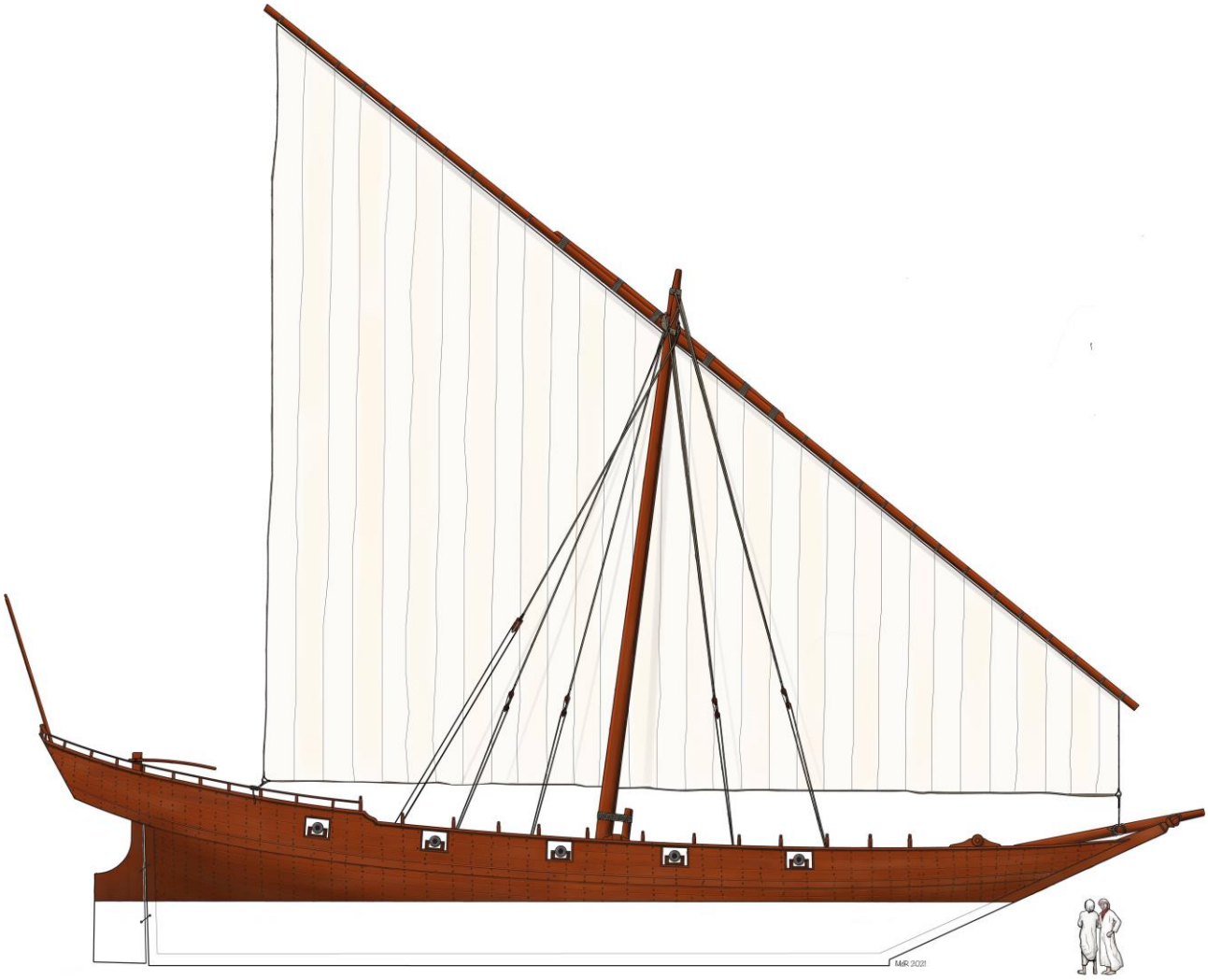


Figure 7.23 A graphic reconstruction of a 10-gun *kalbā* (gallivat) captured by British forces in Basra in 1774, based on documentary and visual sources (M. de Ruyter 2020).

7.3 Square-sterned fighting craft

7.3.1 Fighting functions

The square stern allowed for a broader deck at the after end, which effectively lengthened the usable length of the vessel's broadside. As crew-served gunpowder weapons needed room to be worked and to recoil, a square-sterned vessel of the same overall dimensions as a double-ended vessel could mount more weapons in broadside. Given the lack of harbour infrastructure in most ports in the Gulf from which fighting craft operated, the draft became the limiting factor on the size of vessel that could be accommodated. For a given size of vessel, a square or counter stern offered more gunpower than a double-ended design. Images of *baghāla* and other square-sterned vessels show weapons mounted in the aftercastle or gunports cut for their use [B1.15, B1.20, B1.28, B1.36, B1.91, B1.102, B1.113, B1.143, B4.2, B4.21]. Ports also allow ventilation and their existence in the aftercastle does not always indicate the presence of weapons. The square stern also allows for weapons to be mounted in chase, i.e. pointed astern, across the flat transom, an arrangement far more difficult to achieve in counter-sterned or double-ended craft. Nevertheless, there is no direct visual evidence of chase guns in square-sterned vessels in the corpus.

A watertight square end is also a difficult structure to create in a vessel with laced planking (Tom Vosmer pers. comm.), and square-ended laced watercraft appear to be much less common than double-ended types with similar fastenings worldwide. One exception is the small *murivallam* from south-west India that has a laced square stern (Swamy 2012:70:fig.12). It is nevertheless possible that the immersed structure of a vessel would be double-ended and the raised aftercastle squared off, meaning that it does not have to be watertight. Of the three examples in the corpus of unmistakably square-ended craft with laced fastenings, two are models B4.6 and B4.14, and the third is a European drawing of a vessel at Hormuz [B1.151]. In the case of the models, this mode of fastening may have been a convenience of the modelmaker rather than a scaled representation of an actual vessel. The model B4.6 at least has metal tacks and a vertical lacing pattern that does not accord with any known Indian Ocean method, and certainly would not produce a watertight join. The drawing (Van der Aa c.1725 [B1.151]) depicts a scene in which the after end of a watercraft is incidental and the lacing appears messy and disordered, as if drawn from a verbal description or a poor sketch. The artist probably did not witness an actual vessel from Hormuz. While these three examples cannot be entirely discounted, they probably do not represent accurate reconstructions of actual watercraft. Square-ended vessels that show indications of metal fastenings can be seen in B1.19, B4.2, B4.13, B4.21 and B5.17.

7.3.2 *Baghla* and kin: adapted for violence

The *baghla* was one of the largest vernacular watercraft built in Arabia, but similar craft were also built in Persia, Makran and India (Al Salimi and Staples 2019:45–56). In the early nineteenth century, Stocqueler observed that the 'uncouth' *baghla* in which he was travelling was of a type that was 'generally built at Cochin and other places on the Malabar coast, and […] employed by the Arab and Hindoo merchants on the trade between Arabia, Persia, and the Indian coast' (Stocqueler 1832:1–2). The *baghla* is very similar to the *ghanja* built specifically in Oman and the *kūtiyya* built in India (Burningham 2007). In this section, reference to *baghāla* includes vessels of similar types that may have been known by these other names, but that are often indistinguishable in non-photographic visual sources. *Baghla*, or its linguistic variants, is the most common term used for these craft in documentary and inscribed visual sources [B1.34, B1.87, B1.91, B1.102, B1.113, B1.115, B1.116, B1.122, B4.2, B4.13, B4.21].

The principal attraction of the *baghla* as a fighting craft was its ability to mount a consistently heavier broadside armament than any other type of vernacular watercraft apart from the largest *dāwāt*. Its large size, square stern, full main deck and one or two partial decks in the aftercastle, and solid, metal-fastened construction allowed the *baghla* to mount a substantial number of carriage guns with relatively little modification. Gunports could be cut in the side and bulwarks raised in any port without dedicated shipbuilding facilities or expertise, so these craft could easily be modified after transfer from the original builder. An inscribed image of an armed *baghla* from 1819 shows ports for 24 guns (Fig. 7.24 top left), while Pâris' sketch of a modified *baghla* from the later nineteenth century shows a vessel with two tiers of painted gunports (Fig. 7.24 bottom right [B1.112]). Monleón sketched armed *baghāla* around 1870 (Fig. 7.24 top right and bottom left [B1.100, B1.102]), although these may have been based on other sources, such as drawings by Pâris. Many *baghāla* built in Sur in Oman, a noted shipbuilding port, ended up in Qasimi service and operated as fighting vessels from their ports. From the nineteenth century, *baghāla* were also regularly painted with false gunports in the European fashion [B1.20, B1.87, B1.94, B1.116 (left), B1.122, B4.13, B4.21]. *Baghāla* were built in or operated from many ports in the Gulf and were constructed with capacities ranging from 80 to hundreds of tons (Al Salimi and Staples 2019:45–46). The *baghla* was eventually replaced in commercial service in the twentieth century by the faster double-ended *būm*, which was also cheaper to build and required less timber (Al Salimi and Staples 2019:45). After the late nineteenth century, the martial advantages of the square-sterned *baghla* were no longer required.

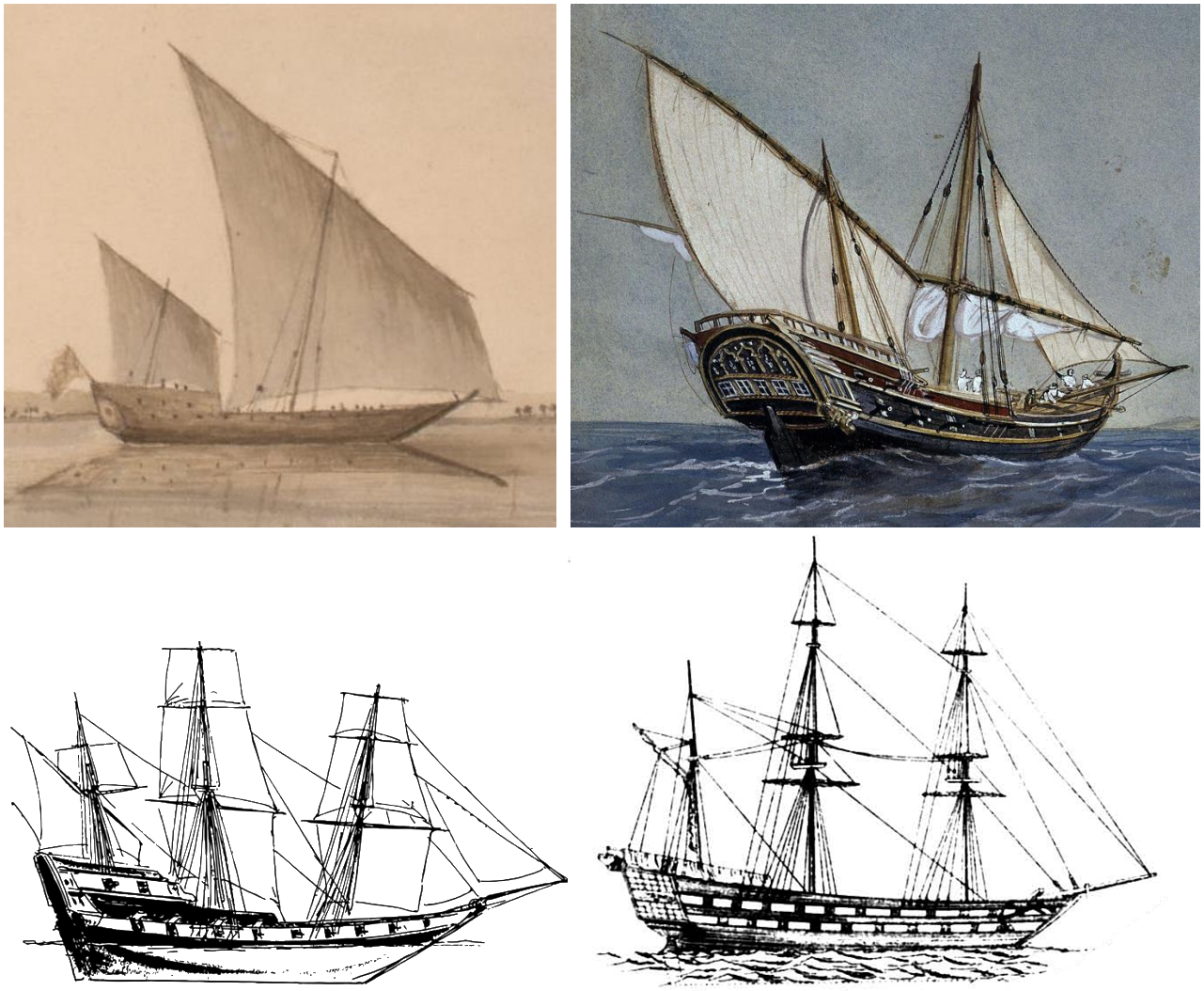


Figure 7.24 Nineteenth-century *baghāla* appearing as fighting craft: top left with 24 guns from 1819 [B1.91], top right from c.1870 with 18 guns [B1.100], bottom left from c.1870 with ports for 24 guns [B1.102], and bottom right from 1879 with two tiers of painted gunports [B1.112].

Given the richness of documentary and visual source material available on the *baghla*, and the survival of the type well into the twentieth century, it is comparatively easy to reconstruct this type of fighting craft. The restored Omani *ghanja*, *Fatah al Khair*, a near kin to the *baghla*, has been described in book-length detail (Dziamski and Weismann 2010). Weismann measured the Science Museum model [B4.2] of an armed *baghla* in 2001 (Norbert Weismann pers. comm.), and his subsequent drawings are used with permission to provide the basic outline for the reconstruction (Fig. 7.25). The form of the Science Museum baghla appears consistent with the majority of visual sources, including particularly measured drawings [B1.113, B1.115]. The main departure from the outline of Pâris' *baghla* is in the maintenance of the curved sheer, as discussed in Section 5.4.2.2 (Fig. 5.13). Other than sources based on Pâris' line drawings [B4.21], only B1.20, B1.36 and B1.91 show a sheer that is flat, or nearly so, and these are among the least competent or realistic images of

the *baghla*. Even Pâris' own engravings dispense with the flat sheer of the line drawings [B1.116, B1.121 left].

While the Science Museum model, built in colonial Mumbai, uses lidded gunports, the only other examples of port lids in *baghāla* are from Monleón [B1.100, B1.102], who potentially added these details second hand. Even if the Khaliji did use port lids, the most common arrangement excludes them [B1.15, B1.20, B1.28, B1.36, B1.67, B1.79, B1.91, B1.102, B1.113, B1.143, B4.2, B4.21]. The reconstruction mounts six carriage guns on each broadside, the larger four on the main deck and two smaller calibre weapons under the poop. The typical arrangement of two masts with lateen or settee sails (Fig. A1.6d) is maintained, as is the decoration on the stern galleries, as ample visual evidence exists for this [B1.19, B1.20, B1.36, B1.52, B1.66, B1.67, B1.79, B1.87, B1.91, B1.94, B1.102, B1.113, B1.116, B1.122, B1.149, B4.2, B4.21].

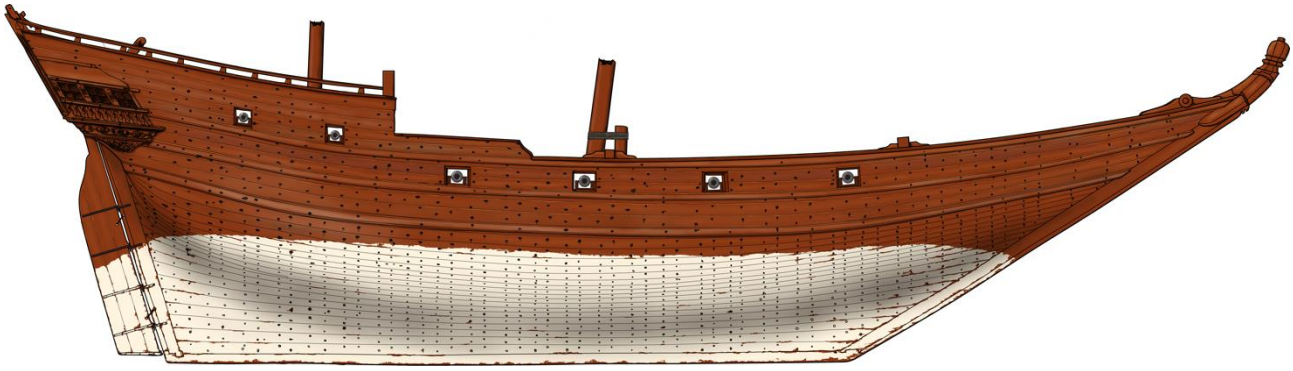


Figure 7.25 Graphic reconstruction of an 12-gun *baghla* from the early nineteenth century, based on a model in the Science Museum, London, and other visual sources (M. de Ruyter 2020, after drawing by N. Weismann 2014, with permission).

7.4 Double-ended fighting craft

7.4.1 Fighting functions

Double-ended craft of numerous types are the most common vessels in the corpus (Fig. 7.1). Documentary sources regularly attest to the many roles performed by double-ended craft in Khaliji maritime societies. The Abbé Carre reckoned one Arab tribe had 400 vessels and used them 'for war, pearl-fishing, and to go to Basra for dates, rice, corn, and nearly everything else necessary for life' (Fawcett and Burn 1947:103), and Niebuhr observed that 'all their fishing boats serve occasionally as ships of war' (Niebuhr 1792:138). As well as being general utility vessels in Khaliji societies, double-ended watercraft served in a variety roles in organised violence: acting as scouts, transports and landing craft; swarming together to overwhelm a ship's defences, and acting to quickly reinforce a boarding effected by one of the larger types (see Appendix D1). The general abundance and ubiquity of double-ended craft, and the large array of names used to describe them by Khalijis and others, renders a comprehensive survey beyond the scope of this research project. Nevertheless, several distinctive types of double-ended vessels are described in documentary

sources during the early modern period as being regularly involved in violence and are to varying extents identifiable in visual sources.

The most described double-ended vessel in the sixteenth and seventeenth centuries is the *tarrāda*, while *trankī* becomes the more usual term in the eighteenth and nineteenth centuries. These vessels are discussed below in Section 7.4.2. The *dānik* is described as a small ferry craft made of teak common in Iraq (Al Salimi and Staples 2019:66), and both the Abbé Carre and Niebuhr describe such vessels. In the seventeenth century, a *dānik* (daneque, dānak) was described as a small riverine craft, 'very narrow, low and about thirty feet long' (Fawcett and Burn 1947:78). Niebuhr describes the 'dauneks' as of the smallest kind (1776:187). These travellers and others may have been describing a vessel like the *balam* (Fawcett and Burn 1947:78 n1), although there were several types and sizes of *balamāt*, some with decoratively carved finials (Al Salimi and Staples 2019:49–50). These small vessels do not appear to have been adapted in any way to fighting, although they sometimes proceeded with firearms and personal weapons (Fawcett and Burn 1947:82). The earliest vessels in the corpus from the thirteenth century are Iraqi riverine types [B2.10, B2.30, B2.31, B2.35, B2.103, B2.155], and others are depicted in graphic sources [B1.6, B1.13, B1.63, B1.64, B1.65], although there are no inscriptions to securely identify the *dānik*. Plaisted mentions the potential of a voyage from Basra upriver to Baghdad in a 'teckna' (Paisted 1758:14), and Niebuhr implies that the 'tackne' was a type of small galley occasionally used in combat, but somehow different from the *dānik* (Niebuhr 1776:186–187). There are no obvious Khaliji homonyms of 'tackne' and many other names used for Iraqi riverine craft (Agius 2008:393–397, 422–423; Al Salimi and Staples 2019:29–124), many of which could answer the description of a small galley. The other types of early modern double-ended fighting craft are referred to by specific names or the generics *tarrāda* or *trankī*.

Larger ship-like or seagoing types of double-ended craft are difficult to identify by type in the corpus. Certainly, none appear like the *būm* with its distinctive rounded stem finial, usually painted in black [A2.6]. This tends to confirm the notion that the *būm* did not become common until the late nineteenth or early twentieth century when it was popularised in Kuwait (Al-Hijji 2001:4, 21; Al Salimi and Staples 2019:51–52). The *nūri* has a very similar double-ended form but has a stem finial more like a *baghla* and a superstructure like a *dāw*, and the model at B4.1 is the only identifiable example in the corpus. It is possible that the *būm* developed from the *nūri*, but the evidence is thin. The *nūri* model [B4.1] is shown with what appear to be false gunports, and as the type is barely mentioned in historical documentary sources, its association with organised violence cannot be confirmed. The vessel with the broadside armament in Figure 7.11 [B2.62] appears

double ended with a platform or superstructure and may be an early, although unconvincing, example of a *nūri*.

Similarly, the more common seagoing double-ended *dangiyya* [A2.8; B1.100, B1.101, B1.107, B1.115, B1.117 (Fig. 7.26 left), B1.121, B4.22] is usually associated with carrying trades from north-west India, although there are some indications that the vessel was also built in Gulf ports (Agius 2002:71). The *dangiyya* was sometimes involved in organised violence as a troop and possibly horse transport (Al-Qasimi 1995:14), and some vessels were occasionally reported captured by Khaliji forces (Al-Qasimi 1995:84–85). Craft of this type from Karachi, albeit outside the Persian Gulf cultural world, were also fitted out as warships *against* Khaliji vessels (Al-Qasimi 1995:84), and a watercolour from 1851 shows a *dangiyya* with gunports, but no guns, in Karachi harbour (Fig. 7.26 right).

Figure 7.26 Left, a *dangiyya* from Kutch in Muscat harbour (detail from Pâris 1841:pl.4 [B1.117]); and right, a *dangiyya* with gunports in Karachi in 1851 (Ainslie 1851 [artwork]).

7.4.2 The *tarrāda* (pl. *tarārīd*)

From the first major engagement between the Khalijis and the Portuguese in 1507, the *tarrāda* was frequently described as a small craft used for fighting: ‘there were also many terradas […] full of small guns and men wearing sword-proof dresses and armed from head to foot, most of them being archers’ (Birch 1875:105). The first European image of Khaliji fighting craft carries an inscription describing *tarārīd* in combat (de Matos 1985:pl.XXI [B1.3]) (Fig. 1.1), and is the only inscribed image in the dataset that names the *tarrāda*. Portuguese sources describe the small craft in Hormuz that supply water as *tarārīd*, so the small vessels shown near the island in B1.9, B1.11, B1.14, B1.40 and B1.144 could also be examples of this type of craft. *Tarrād* is a general term for a small, swift boat, even in modern use, although it appears to have been used interchangeably with *tarrāda*, a term that later during the twentieth century signified a high-ended canoe of the Iraqi marshes (Al Salimi and Staples 2019:90–92). In early modern sources the term *tarrāda* seems to be used generally for small, usually fast, double-ended craft.

Ambrosio Bembo, an Italian with naval experience in galleys, travelled in a *tarrāda* in the Persian Gulf in 1673 (Welch 2007:6).

> the jolly boat was put in tow behind the *terrada*, as they call these boats […]. I was stupefied to see that it had no nails or iron pieces, but that it was sewn together with mats and rope. It was not very big, but wide and short. In the prow [bow] it became narrow, almost like a *felucca*, which cuts the waves. In the bow [*sic* stern] it also got narrow and somewhat higher, and there was a partition of palm wood that made a sort of room. They have no other covered place but are all full of merchandise on top of which the sailors and passengers accommodate themselves. The captain with some sailors sits on top of this room to hold the rudder so that it will not turn more than a foot from one side to the other. He pulls some ropes that are arranged on some boards. It is easily managed because the bow is so narrow. There is only one mast, closer to the bow, and near it they make the fire for cooking. (Welch 2007:139)

This description could apply to any of a number of double-ended, sewn-plank watercraft of the Gulf with reverse tiller steering, one mast and a platform at the after end, and it also links the *tarrāda* to the *trankī*, discussed below. Bembo describes this *tarrāda*'s crew as 23 Arabs with a Persian master, with a lateen sail and occasionally propelled by oars with the rowers facing astern (Welch 2007:140). The rowers in B1.3 appear to be facing ahead, but in B1.76 and B1.78 they face astern. Bembo's *tarrāda* was armed with 'two cannons, six broken arquebuses, ten spears in bad condition, and several very old shields' (Welch 2007:140). These craft appear to have been frequently armed and often used for combat. Intriguingly, within a year of each other, the Abbé Carre in 1672 and Bembo in 1673 made the same passage down the Gulf in craft they described similarly, although Carre used *trankī* and Bembo used *tarrāda* (Fawcett and Burn 1947:91–95; Welch 2007:2, 6, 139–140). From the late seventeenth century, with the decline of Portuguese or Mediterranean influence in the Gulf, the term *trankī* gradually replaced *tarrāda* as a generic term for small, double-ended watercraft.

7.4.3 The *trankī*

Documentary and lexicological sources from the eighteenth century onwards leave no doubt that the *trankī* was a relatively small, double-ended vessel renowned for speed and frequently associated with maritime violence (Al Salimi and Staples 2019:53; Davies 1997:160). Nevertheless, the term *trankī* and its English variants (tranky, trankie, trankey, trankee) were applied to different types of craft, in much the same way that the term 'dhow' was more popularly generic than the specific *dāw*. When similarly rigged and operated, many double-ended types may have appeared superficially akin—or practically indistinguishable—to extra-regional mariners. The Arabic term *trankī* is probably derived from the Portuguese *terraquin* (Al Alimi and Staples 2019:53), for which there is evidence from the sixteenth century (Fawcett and Burn 1947:94 n.1). While descriptions of the

vessels to which the name was applied varied, the Abbé Carre made passage in a *trankī* in the Gulf in 1672, describing it as of laced construction, steered by a tiller, drawing six feet, with (probably) two masts and easily drawn a shore by its crew (Fawcett and Burn 1947:89–95). A contemporary Italian with naval experience described the *trankī*, a 'terranchini', as a small tender to a larger *tarrāda* (Welch 2007:139–140).

Eighteenth-century observers of Gulf watercraft could also distinguish the *trankī* from *dāwāt*, *kalbāt*, *aghriba* and *dangiyya* (Capper 1785:229–257; Parsons 1808:179). Niebuhr noted that the *trankī* was a small vessel, open with few nails, and equated it with the *tarrāda* and differentiated it from the *battīl*, *dānik* and 'tackne' (Niehbuhr 1776:71, 153, 186–187, 228). Plaisted took passage in a *trankī* in 1750, differentiating it from a 'tackne' and describing it as a surprisingly good seaboat of laced construction, without a deck and possibly with two masts: 'She behaved exceedingly well and rose to the sea like an empty barrel, never shipping the least spray of sea-water, though she was deeply loaded. This was owing to her not being top heavy with masts and yards as ours are and which cannot be struck on occasion' (Plaisted 1758:18). In the nineteenth century, British observers were most likely to associate the term *trankī* with the *battīl* (Al Salimi and Staples 2019:53; Rich 1839:202), although this was not always the case. The same Bahraini *baqqāra* in 1818 was described in British documents as a 'tranky' and in a translated letter from the Bahraini shaikh as a *baqqāra* (BL IOR/R/15/1/19, f.75r; BL IOR/R/15/1/20, ff.102v–104). Given the variety of ways that the term was used over time, it is safe to assume that the type of vessel it applied to was contingent on the user. Visual evidence offers further confirmation of this use of the term.

The earliest annotated image of a *trankī* in the corpus comes from a chart of Muscat in 1704 [B1.12], in which a small vessel under a single settee sail is annotated as a 'tranke' (Fig. 7.27). The small image gives a good representation of the high sternpost and *fashīn* rudder typical of the *baqqāra* and *badan*, but without the 'dog's head' of the *battīl*. The stem appears to be upright and shows none of the distinguishing shapes of finials of those types, although the nearly upright stem could indicate a *badan*. The end of the keel is possibly raised out of the water as is usual in *baqāqīr*. Otherwise, there appear to be four figures onboard and what appears to be three guns arranged broadside, implying that the vessel has a full deck able to support the carriages. While these latter dark shapes may be beam ends, a typical feature of smaller double-ended vessels, the scale of the figures in this craft and a comparison to the small vessels shown near it suggests otherwise. Descriptions of *trankīs* in Muscat from the mid-eighteenth century describe them with up to eight guns (Al Salimi and Staples 2019:53), an arrangement where some at least could be mounted broadside. Intriguingly, *trankīs* are universally described as laced rather than metal fastened before the nineteenth century, and quite often thereafter, implying that the vessel shown in this image may

combine a laced construction with a full deck and carriage-mounted guns arranged broadside. If this is the case, then this is the earliest image in the corpus of a vernacular watercraft of any type with carriage-mounted weapons arranged broadside, and, if laced, the only such one.

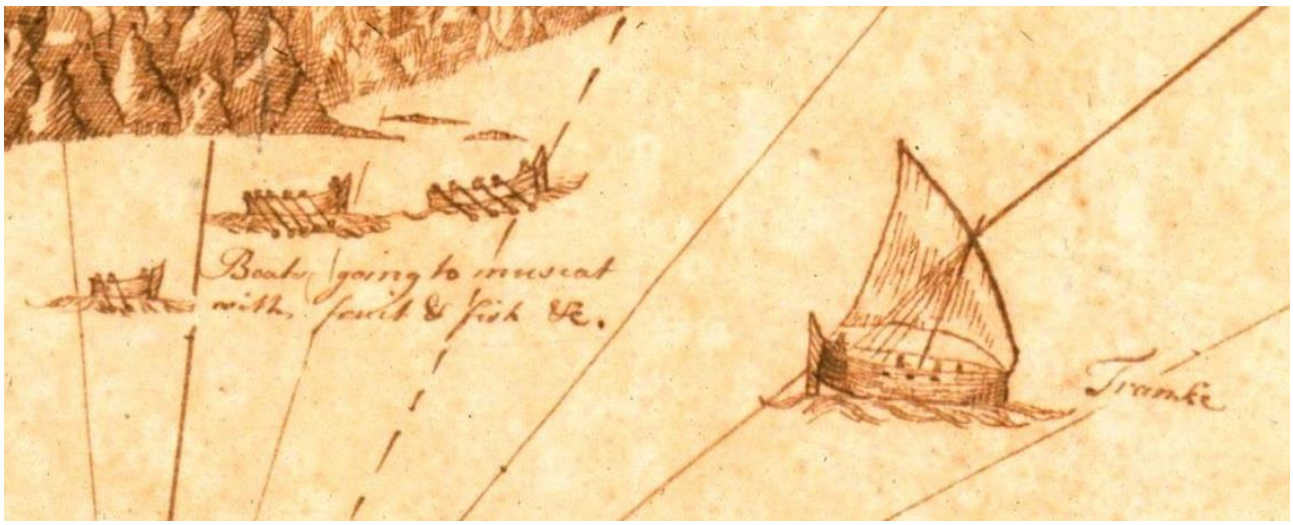


Figure 7.27 An annotated image of a *trankī* (right), possibly a *badan*, shown in the harbour in Muscat on an English chart from 1704 (Anon. 1704a [artwork] [B1.12]).

Visual evidence of the later British association of the term *trankī* specifically with the *battīl* abounds. The Omani *batātīl* that accompanied the British expedition against the Qasimi ports in 1809 appear distinctly in images, particularly those by Temple [B1.17, B1.77, B1.139, B1.140]. These vessels are described in contemporary British reports of the raid as *trankīs* (ADM 54/335, 9 Nov 1809). Even more convincing is Edgell's sketch annotated 'An Arab trancee or Piratical vessel' [B1.68], from around 1832 that depicts an unmistakable *battīl* with the 'fiddle-head' stem finial, although also without the 'dog's head' rudder finial (Fig. 7.28). This image appears to show beam ends or thwarts along the hull, interrupted by a palm thatched bulwark. If the image above in Figure 7.27 showed beam ends like this, there would likely be more (such as in Fig. 7.28), strengthening the interpretation that the features in that image do indeed represent guns. The association of the *trankī* and later specifically the *battīl* with organised violence is widely attested to in documentary sources (Agius 2002: 63–66; Al Salimi and Staples 2019:53; Davies 1997:160). The next section develops a reconstruction of the *battīl* as the prominent example of a double-ended vernacular fighting craft.

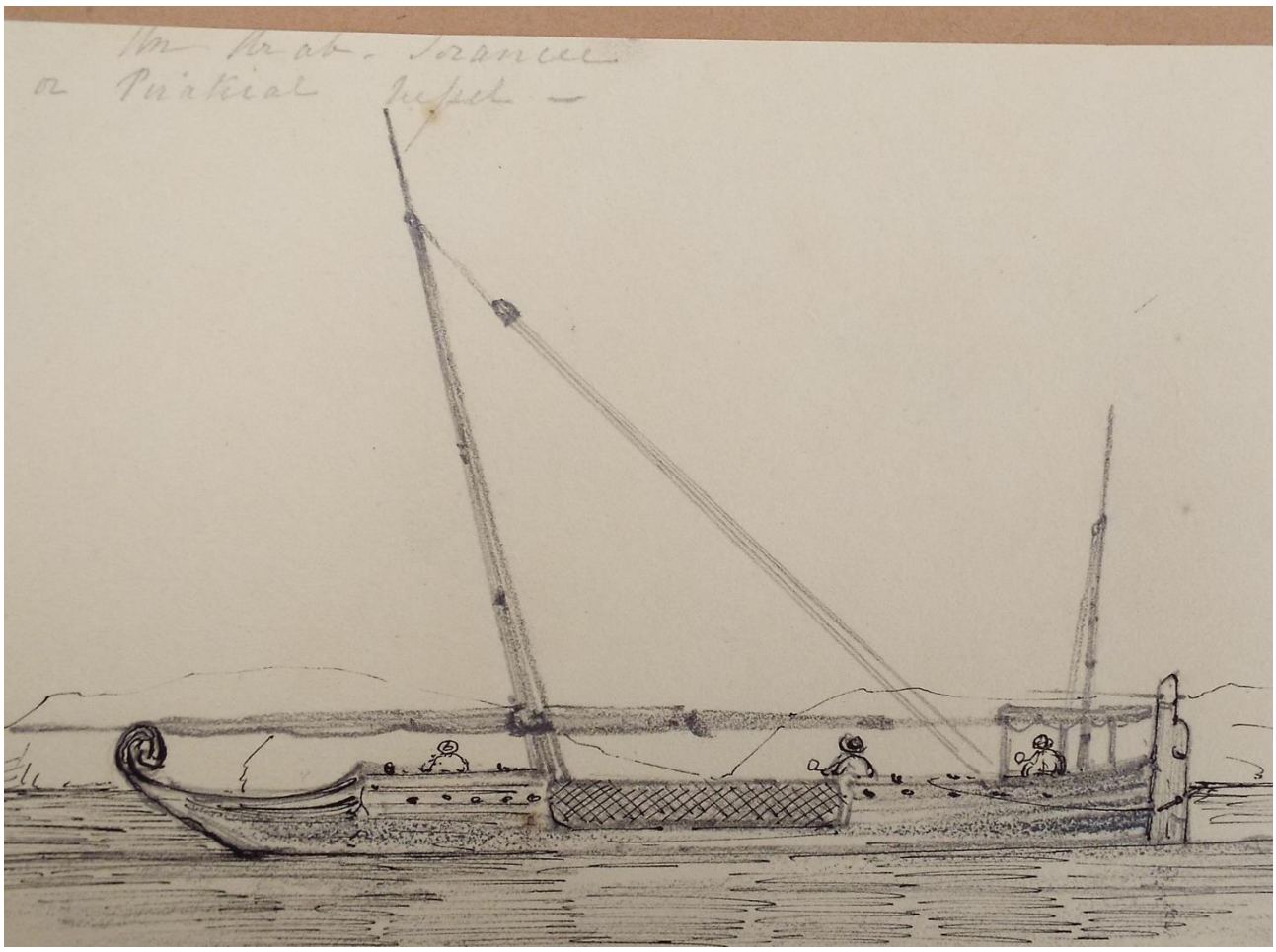


Figure 7.28 Detail from a sketched rendering of a *battīl* with the annotation, top left, 'An Arab trancee or Piratical vessel' from around 1832 (Edgell c.1832c [artwork] B1.68)).

7.4.4 The *battīl* (pl. *batātīl*)

The *battīl* was the prominent double-ended vernacular fighting craft for several reasons, but particularly for its speed and fine sailing qualities that attracted the envious attention of HEIC officials (Davies 1997:160). As noted in the section above, many historical references to *trankīs* in fact refer to *batātīl*. The type discussed here has a distinctive 'fiddle-head' stem finial and usually a 'dog's head' stern fin, although there are smaller variants from Oman with more muted finials (Al Salimi and Staples 2019:35–36). Vessels that meet this description, or that can be contextually revealed as *batātīl*, are common in visual sources [B1.17, B1.33, B1.46, B1.49, B1.50, B1.55, B1.62, B1.68, B1.73, B1.76–79, B1.89, B1.91, B1.101, B1.105, B1.109, B1.114, B1.119, B1.139, B1.140, B1.143, B1.146, B3.4, B3.8.45, B3.9.3, B3.9.26, B4.9, B4.15, B4.23, B4.24]. The frequent depiction of animal's heads as stem and sternpost finials in Islamic manuscript paintings makes it difficult to discern types on that basis. The earliest securely dated visual depiction of a *battīl* is from around 1793 (a *battīl bahwī*) [B1.55], although the undated glyphs may be older. Given the widespread depiction of the type from the start of the nineteenth century, and Niebuhr's observation of the *battīl* from the late eighteenth century (1776:153), it is certain that the type has a long history obscured by frequent use of the generic terms *tarrāda* and *trankī*.

The *battīl* was sometimes described as armed with gunpowder weapons, including up to eight guns (Al Salimi and Staples 2019:34). In 1824, a British officer observed a large *battīl* at anchor in Khor Dubai that had three guns, two of which were described as 'old, possibly non-operational, cannons that could be seen through two holes on either side' (Al-Qasimi 2015:133). If the armed *trankī* in Figure 7.27 is not a *battīl*, then the only clear images of *batātīl* with guns are two depictions by Temple, one of the assault on Ras al Khaimah in 1809 [B1.139] and another of the raid on Laft [B1.143]. In these images, *batātīl* are shown with up to eight guns mounted broadside in embrasures, while B1.143 only shows the embrasures. The same craft are shown in B1.140, again by Temple, although due to the scale the embrasures and guns are not shown. Thirtle shows the same Omani *batātīl* in the assault on Ras al Khaimah [B1.146], although none appear with guns or embrasures. Other depictions of the same Omani *batātīl* that accompanied the British expedition in 1809 are inconclusive due to the scale of their representations [B1.17 and B1.77]. Hornbrook's excellent depictions of fighting *batātīl* give no indications of the presence of gunpowder weapons of any description [B1.76, B1.78 and B1.79] (Fig. 7.29), and neither do the *battīl* glyphs or models [B3.4.1, B3.4.3, B3.8.45, B3.9.3, B3.9.26, B4.9, B4.15, B4.23 and B4.24]. This leaves Temple's work as the only visual sources that show cannon-armed *batātīl*.

Figure 7.29 Hornbrook's depictions of early nineteenth-century *batātīl*, showing the colouring of stem and stern finials, awnings and flags (left: detail from Hornbrook c.1840a [B1.76]; right: detail from Hornbrook c.1840c [B1.78]).

Smaller *batātīl* were often used as transports and for amphibious assaults, such as during the raids on Qasimi ports in 1809 [B1.17, B1.77, B1.139, B1.140, B1.146], although the British observed that they were not well suited to this work as they tended to fall over when grounded and were too high out of the water, making disembarkation difficult (NMM GOS/14, Letter from Brigadier Smith to Sir Evan Nepean, 18 October 1818). Nevertheless, their speed and fine sailing qualities were their main martial attributes. Hornbrook's paintings show white coatings added to the stem and stern finials of fighting *batātīl* identified as Qasimi [B1.76, B1.79] and Omani [B1.78]. They also

show the use of coloured awnings. The model B4.24 has a similarly coated stem finial, and B4.23, based on Pâris' drawing at B1.114, has a dark coating. Monleon's example at B1.101 also shows at white stem finial, but the inscription indicates that this was based on the model B4.24. Pâris' image at B1.119 shows a *battīl* with a superstructure, as does B1.33, although most illustrations of *batātīl* show stanchions around the quarterdeck instead. The profile of the *battīl* is sometimes altered by the addition of washtrakes, as seen in B1.68 and B1.119 and possibly B1.76 and B1.78 (Fig. 7.29), that serve both to keep the deck dry and as bulwarks for the protection for the crew. Embrasures can be cut in these wash strakes to accommodate carriage guns arranged broadside, as appears to be the case with the larger *batātīl* in one of Temple's images of the assault on Ras al Khaimah in 1809 [B1.139] (Fig. 7.30). Such adaptations are discussed further in Chapter 8.

Figure 7.30 The larger *batātīl* in the foreground in this image from the assault on Ras al Khaimah in 1809 have embrasures for guns cut in their wash strakes or bulwarks (detail from Temple 1813d [B1.139]).

The graphic reconstruction of an early-nineteenth-century *battīl* shown in Figure 7.31 is based in outline on Weismann's drawing of the *battīl* model at B4.24 (Weismann et al. 2014:fig.9), modified and detailed to represent one of the Omani vessels used in the assault on Ras al Khaimah in 1809, shown above in Figure 7.30. The washstrake or bulwark is shown cut in three places to accommodate carriage guns arranged broadside. The guns would be no larger than 4-pounders and the vessel as reconstructed would be approximately 70 feet (21.3 m) long overall. Larger versions of this craft sometimes carried two masts and had more significant superstructures built at the stern.

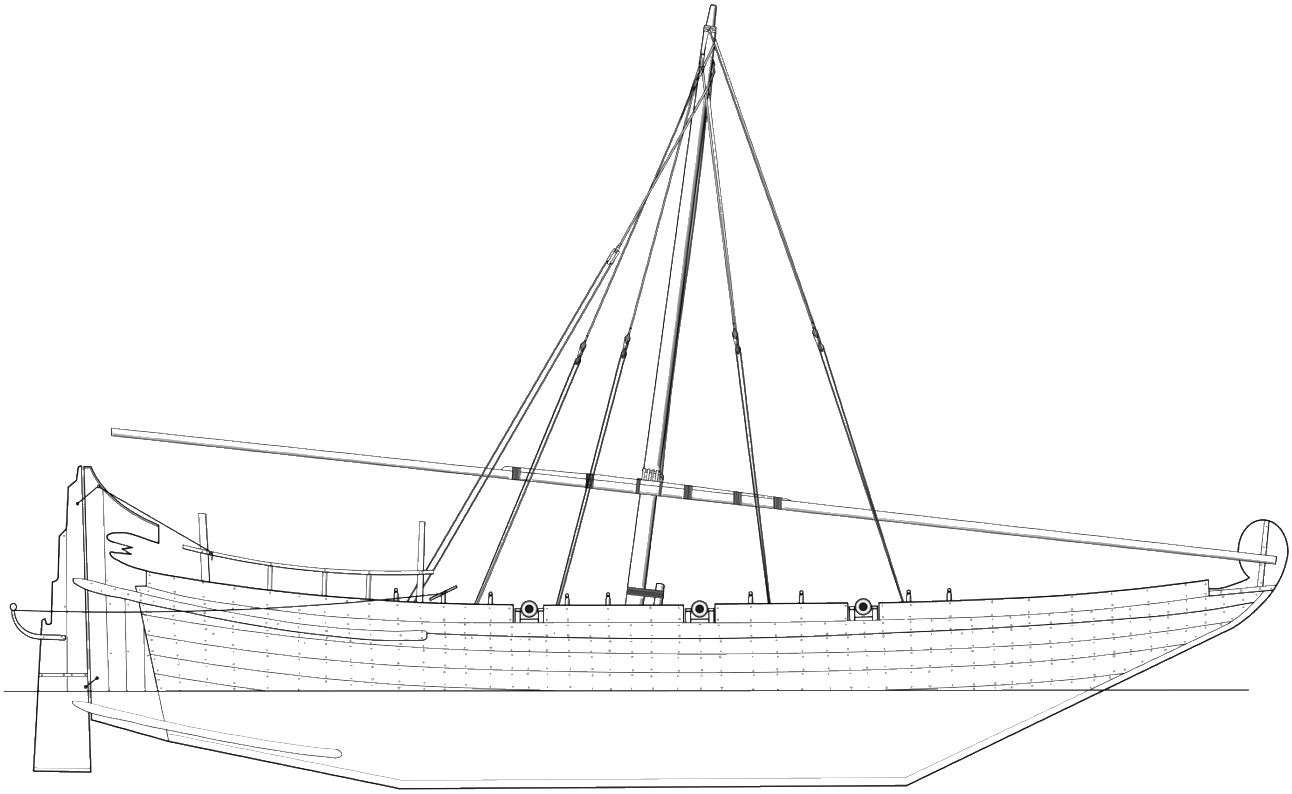


Figure 7.31 A graphic reconstruction of an Omani 6-gun *battīl* at Ras al Khaimah, 1809, based on a model in the Science Museum, London, and other visual sources (M. de Ruyter 2020).

7.4.5 The *baqqāra* (pl. *baqāqīr*)

The earliest annotated image of a *baqqāra* in the corpus appears in a watercolour by Francis Loch, commander of the British frigate HMS *Eden* in the Gulf 1819–1821 [B1.91] (Fig.7.32 centre). The painting was made to accompany Loch's journal and to show the difference between the vernacular fighting craft encountered during *Eden*'s cruises, and describes, from left to right, a *battīl*, a *baghla* and a *baqqāra*. The *baqqāra* is shown with a high stern fin, a sharply raked stem with squared off finial and the after end of the keel rising above the waterline, all features shown in later photographs and examples of the type (Cooper et al. 2020:figs 1–3; Weismann et al. 2014:fig.5). There were large and small versions of the type, but the larger ones were rare by the early twentieth century (Agius 2002:103–104; Al-Hijji 2001:10–11; Cooper et al. 2020:378). A photograph of the harbour front of Manamah in Bahrain around 1870 shows several vessels of various sizes that answer the description of the *baqqāra* [B5.5] (Fig. 7.32 right), and the type is shown clearly in a photograph at Doha in the early twentieth century (Cooper et al. 2020:fig.8).

Loch's watercolour is the first inscribed image that specifically names the *baqqāra*, rather than using a generic term like *tarrāda* or *trankī*. Loch describes the *baqqāra* as the smallest of the 'pirate' vessels, but his painting shows no obvious armament [B1.91] (Fig. 7.32 centre), while a British report of a *baqqāra* boarded in 1818 gives its armament as 13 swords, 15 matchlocks, 20 boarding pikes, a shield and a single iron gun with a crew of 47 men (BL IOR/R/15/1/19:f.75r). This

vessel was classified as a *trankī* in British reports and only identified as a *baqqāra* in a letter translated from Arabic (BL IOR/R/15/1/19:f.75r; BL IOR/R/15/1/20:ff.102v–104), which shows how the type may be hidden in documentary records.

Figure 7.32 *Baqāqīr* in visual sources: left, in Muscat in 1793 [detail from Daniell, T. 1793 [B1.54]], centre, at Aseluyeh around 1819 (detail from Loch c.1819c [artwork] [B1.91]); and right, at Manamah in around 1870 (detail from Anon. c.1870a [B5.5]).

Although difficult to interpret, the small vessels in the foreground of the late sixteenth-century Islamic manuscript painting B2.16 and B2.18 may be early versions of the *baqqāra*. The small vessel in B2.150 from the same period shows the same split and sharply raked stem feature with a high vertical stern fin. The split and sharply raked stem may indicate construction similar to the *baqqāra* shown in Pâris' drawing at B1.118, the petroglyphs at B3.8.44 and B3.8.46, and the model at B4.8. The small vessel on the left in Barlow's view of Bandar Abbas from 1686 shows features consistent with the type, particularly again the sharply raked stem and high vertical stern fin [B1.39], as do several small vessels in B1.44. Certain identifications are difficult due to the size or simplicity of these depictions. Other potential examples are shown in B1.24, B1.47, B1.70, B1.74, B1.84, B1.103, B1.127, B1.129, B1.148, B3.4.2. B3.8.44, B3.8.46–48, B3.8.52, B3.8.55, B3.9.4, B4.8, B5.3, B5.5, B5.11 and B5.14, although some of these graphic sources may have been copied from earlier images. *Baqāqīr* are definitely shown in fine detail from 1793 in the foreground of B1.54 (Fig. 7.32 left) and B1.56, and the vessel in the foreground of B1.55 may well be a *battīl bahwī* [A2.5], which is similar. Pâris drew a *baqqāra* but called it a 'Garookuh' [B1.118], a term he also applied to the *battīl* [B1.114, B1.119].

The graphic reconstruction of an early-nineteenth-century *baqqāra*, shown in Figure 7.33 is based primarily on Pâris' 'garookah' at B1.118, with minor modifications derived from visual and documentary sources. The sewn hood ends are included, as this feature is still visible on some small craft preserved in museums (Cooper et al. 2020; Weismann et al. 2014:420) (Fig. 2.5), although visual sources are insufficiently detailed to show this construction and it is unclear in B1.118.

Earlier versions may have been laced like the small examples in the Qatar Museums collection (Cooper et al. 2020) and larger versions all metal fastened. The single iron gun of one to two pounds was added after a description of an armed Bahraini *baqqāra* from 1818 (BL IOR/R/15/1/19:f.75r), although there was no information about how the weapon was mounted. Larger versions of this craft sometimes carried two masts (Al Salimi and Staples 2019:48), although, as this arrangement is not apparent in visual sources, the reconstruction has a single mast. In keeping with Loch's description (c.1819c [artwork]) and the limited comparative evidence available, the *baqqāra* is the smallest of the fighting craft reconstructed in this chapter (Fig. 7.34). This craft as reconstructed would be around 60 feet (18.3 m) long overall.

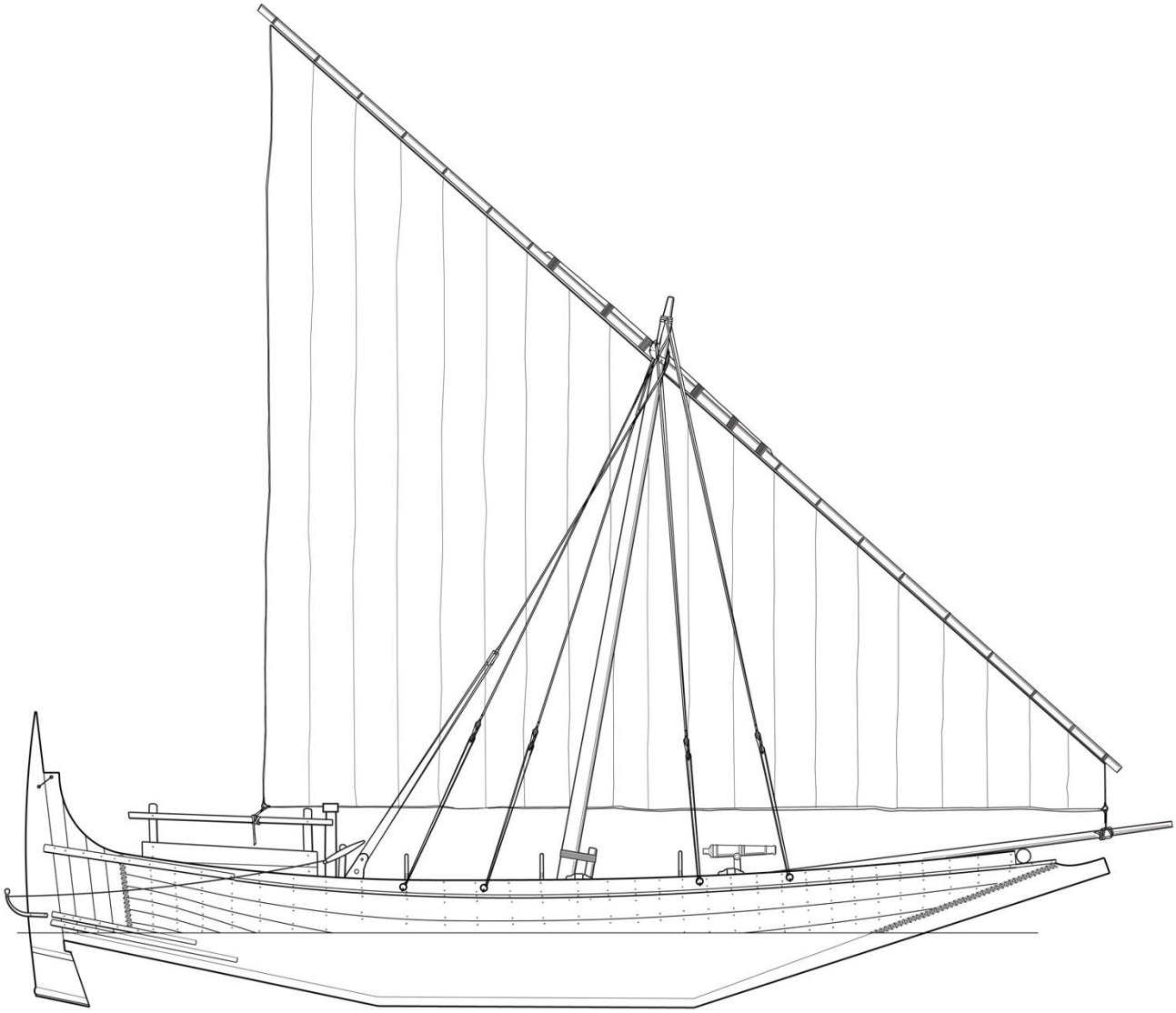


Figure 7.33 A graphic reconstruction of an armed Bahraini *baqqāra* from 1818, based on documentary and visual sources (M. de Ruyter 2020, after Pâris 1841:pl.5).

7.5 Summary

This chapter has presented evidence-based reconstructions of vernacular fighting craft of the early modern Persian Gulf. Visual sources complement documentary evidence and the limited

archaeological evidence available. Of the three principal forms of watercraft used in this period—double-ended, square-sterned and counter-sterned—the former is by far the most numerous in visual sources. There are 548 double-ended vessels identified in the corpus of visual sources, over half of which could be identified by type, 138 square-sterned vessels and only 48 counter-sterned vessels. Visual sources provide evidence for Khaliji dhow-building traditions and show the ways they used watercraft. The five main types of vernacular fighting craft were graphically reconstructed on this basis, and the resulting reconstructions are compared at the same scale in Figure 7.34.

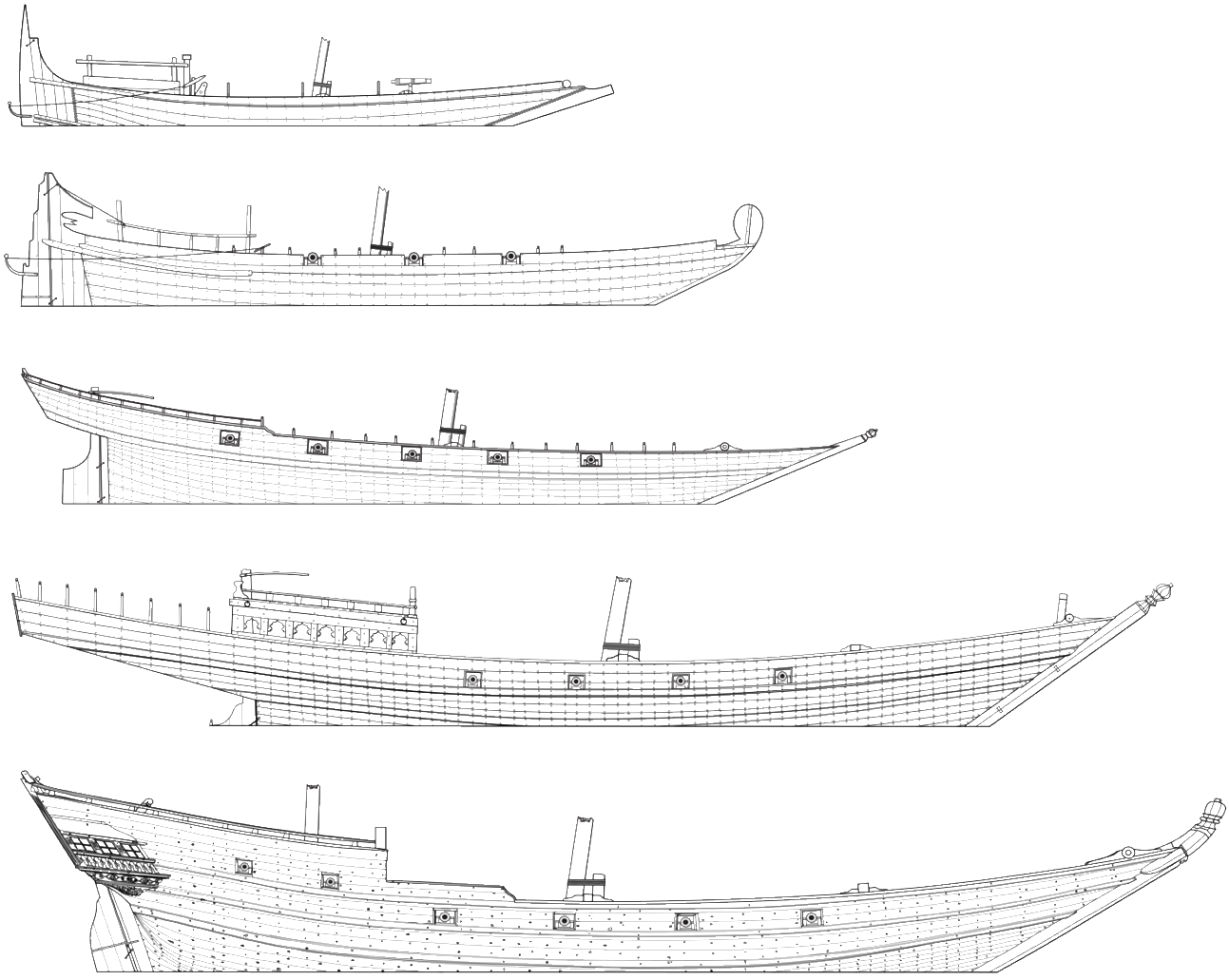


Figure 7.34 The five principal types of vernacular fighting craft used in the early modern Persian Gulf: top, *baqqāra*; second from top, *battīl*; middle, *kalbā*; second from bottom, *dāw*; and bottom, *baghla* (M. de Ruyter 2020).

The following chapter discusses the ways in which maritime violence was organised using these watercraft and how this changed Khaliji societies and nautical technology over time. This final chapter then achieves the last of the aims of this thesis outlined in Section 1.1.3, presents answers to the research question and considers the significance and future of research into vernacular fighting craft.

8 THE DYNAMICS OF FIGHTING WITH DHOWS

‘What numerous implements of destruction!’ (Nash et al. 1854: pl. India II).

So held one reviewer of the Khaliji weapons and ship models arrayed in the Indian Department of London’s Great Exhibition of 1851 (Fig. 8.1). This observer also thought ‘the models of the vessels employed by the natives conveyed the idea that they were constructed rather for piratical expeditions than to carry on commerce with the neighbouring states’ (Nash et al. 1854: pl. India II). The Great Exhibition was the first in a series of World fairs, ‘spectacles of “civilization” and “progress”’ (Rydell 2006:135), which served to demonstrate the technological pre-eminence of European imperial powers and, to this observer at least, the subjugation of violent primitive cultures. Yet, by the time of this exhibition in the mid-nineteenth century, the majority of the fighting in the Gulf was over and few vernacular fighting craft remained. These ‘implements of destruction’ were soon rendered colonial curiosities and then effectively erased by an Orientalist, even romantic, view of ‘the dhow’ as the primitive, ancient, trading and pearling craft of the western Indian Ocean (Davies 1997:19; Gilbert 2011:66–67).

Figure 8.1 Ship models displayed in the Indian Department of London's Great Exhibition, 1851 (Nash et al. 1854: pl. India No.3).

Visual sources offer qualified evidence of how and to what extent the Khalijis created, acquired and adapted watercraft to meet the needs of organised violence. When used together with documentary and archaeological sources and ethnographic analogy, the evidence derived from visual sources creates new insights into the ways that violence impacted Khaliji nautical traditions. These insights serve to highlight the erasure of fighting craft from the currently accepted view of dhow-building traditions, as presented in museums and collections in the region, and as reconstructed and presented by modern ethnographic research. Yet it is abundantly clear that fighting forms of dhows existed in sufficient numbers to be considered as culturally syncretic, and that such syncretism must have had an effect on Khaliji maritime culture. This chapter explains how.

The ways that vernacular watercraft are changed into new forms were discussed in Section 3.2.1, and Figure 3.1. shows these dynamics of form in a diagram. This conceptual framework includes four main steps to the creation of a vernacular watercraft form—inputs, filters, outputs and responses. The inputs relate to the forms of watercraft available, whether stabilised or evolving vernacular or Khaliji forms, or exogenous types from elsewhere in the Indian Ocean or even Europe. The filters are the conventions of the dhow-building traditions; the technical, social and environmental constraints on creating watercraft; and the performance preferences of the designers—the things they intended the new watercraft to be able to do. The outputs relate to the formal properties of the resultant form—the things that the watercraft can actually do—its performance characteristics and the contexts in which the watercraft is used. The responses determine what forms of watercraft will develop, either stabilised or new forms that may still be considered vernacular, or transplanted or idiosyncratic forms that are essentially copies of exogenous watercraft. Culturally syncretic responses arise when a sufficient number of Khalijis embrace the new design ‘in a collective and consistent manner’ (Heath 2009:12). New vernacular forms only arise with a culturally syncretic response to an altered set of original conventions. This could occur if an existing vernacular watercraft form was adapted to fighting, or when an exogenous type was adapted to the Khaliji building tradition, and the type was then widely reproduced within the region. It is through this sort of response that vernacular fighting craft are developed—watercraft adapted for organised violence that are nevertheless identifiably Khaliji.

Fighting craft have been identified in visual sources in this thesis by considering how correlates of organised maritime violence are represented beyond mere armament. Even when form or structure remain in stasis, organised violence can affect other steps in the development of vernacular form, such as by modifying the technical or social constraints imposed on their building. The following discussion is therefore organised around inputs, filters, outputs and responses, the four main steps to new vernacular forms. The last section of the chapter provides conclusions to this research by

addressing the question and aims, the applications and future of research into vernacular fighting craft and dhows in particular, and the cultural legacy of Khaliji fighting craft.

8.1 Inputs: vernacular forms of watercraft

Vernacular watercraft evolved over time in a fluid interchange of ideas and influence about form, building methods, rigs, size, usage, materials, builders and users. Some narratives of nautical traditions in the Gulf, 'where boats could last a century and design changes were slow' (Pedersen 2015b:158), have assumed the dhow forms are ancient, unchanging, simple and linear descendants of foreign or external influences—all with fairly limited evidence (e.g. Bowen 1951b:5; Pedersen 2003:17). Visual sources demonstrate that new types were developed or introduced during the early modern period, while other forms exhibited a degree of stability by appearing to change little for centuries. Each visual depiction of a vernacular watercraft represents a form somewhere on the spectrum of development outlined in Figure 3.1. The inputs to each iteration of this process were the stabilised and evolving vernacular forms already identifiably Khaliji, and the exogenous forms bringing influence from outside the region.

8.1.1 Stabilised vernacular forms

Double-ended types are the earliest and most common forms of watercraft in visual sources and make up 55% of those craft for which the form could be determined (Fig. 7.1). Even towards the end of the period in the nineteenth century, double-ended forms were more prevalent than either counter-sterned or square-sterned forms. Setting aside the probable copies of European craft in Islamic manuscript paintings, double-ended forms are also the earliest and most prominent fighting craft in the corpus. The *tarrāda* and *trankī*, probably the same craft in many documentary sources, were small but common, easily adapted for fighting or pearling, and possessed of the speed and shallow draft common to galley-type warships more familiar to European observers. Niebuhr's observation that 'all their fishing boats serve occasionally as ships of war' (Niebuhr 1792:140) is borne out by the *battīl* and *baqqāra*, common pearling craft frequently adapted for violence.

While double-ended types were the vernacular forms that appeared to change the least during the early modern period, they were certainly developed for activities other than fighting. The *būm* is probably a late development of a seafaring double-ended ship and does not appear at all in visual sources before 1900, although its simple form perhaps renders it anonymous. By the early twentieth century, the *būm* was the most common type of long-distance transport vessel (Al-Hijji 2001:4, 21; Al Salimi and Staples 2019:47, 51–52), having displaced square-ended types like the *baghla* and *ghanja* that became less common over that century. This development had much to do with economics—of construction materials, carrying capacity and seaworthiness—and nothing at all

with fighting. The identifiable double-ended types that *were* frequently adapted for fighting, the *battīl*, the *baqqāra*, and possibly even the *badan*, are not clear in visual sources before the eighteenth century and there are no major developments in their forms in subsequent centuries. Double-ended types therefore constitute the majority of stabilised vernacular forms that provided the inputs to the development of fighting craft, and double-ended fighting craft appear most frequently as adapted from existing types rather than as new forms.

8.1.2 Evolving vernacular forms

Projecting counter sterns were architectural features of some watercraft in the western Indian Ocean during the medieval and early modern periods (see Section 7.2.1.1 above). Nevertheless, there are fewer counter-sterned craft identifiable in the corpus than either double-ended or square-sterned (Fig. 7.1). The projecting counter stern was identified as a western Indian Ocean type by Weismann (2002) on the basis of representations on sixteenth century European charts (Fig. 8.2), but the extent to which these represent Khaliji building traditions is not clear. Given that these craft belonged to western Indian Ocean traditions at least, and that later identifiable types like the *kalbā* and *dāw* were also, but not exclusively, built in the Gulf, the counter-sterned form can be considered as transitional or evolving during the early modern period. By the end of the nineteenth century, the counter-sterned craft was an extinct vernacular form, ‘maintained largely through memory’ (Agius 2002:94; Heath 2009:19).

Figure 8.2 Counter-sterned watercraft forms in the western Indian Ocean on sixteenth century European charts, the lower right craft in Hormuz (redrawn after Weismann 2002:figs 1, 2, 12, 13, 14, 15, 17).

The counter-sterned types illustrated in visual sources are not exclusive to the Gulf, as is the case with the double-ended *battīl* and *baqqāra*. The *kalbā* is morphologically related to the gallivats of the north-west Indian coast (de Ruyter 2020:133), and even though some were built in the Gulf,

many were also built in Surat and elsewhere. While Agius points out there is 'no evidence that the *dāw* was of Indian provenance' (Agius 2019:62), the visual evidence suggests that it is probably Arabian. The Maratha chart of fighting craft from the late nineteenth century specifies the Arabian origin of this type, placed among many others, including gallivats and *aghriba*, presumably of Indian origin (Anon. c.1750–1799 [artwork]) (Fig. 5.7). The *dāw* and similar counter-sterned types were prominent in the Red Sea and southern Arabia, as shown at least in the Gujarati chart discussed above (Anon. c.1835 [artwork]) (Figs 5.8 and 7.7). Vaupell's mid-nineteenth century lament for the 'dorioh', a craft 'peculiar to Surat' (Vaupell 1846:99) and Pâris' depiction of a Malabar coaster (Pâris 1841:pl.18) suggest they were at least *built* in India in some numbers. Agius' suggestion that the type was taken to India as a transplanted vernacular form by Hadhrami shipwrights therefore has much merit (Agius 2019:62), and a similar process may have introduced the type to the Gulf. Nevertheless, the fighting *dāwāt* were almost exclusively associated with Oman and the Qasimi confederacy within the Gulf, making it a Khaliji vernacular form. While probably an exogenous form in the first instance, possibly from southern Arabia, the *dāw* was an evolving or transitional form in the Khaliji tradition, and subsequently an extinct form like the *kalbā*.

8.1.3 Exogenous forms

It is often presumed that square-sterned types were exogenous forms to the Indian Ocean, copied from European examples by Indian Ocean shipwrights (Burningham 2007:93; Chaudhuri 1985:151). The identification of square-sterned types in visual sources before the arrival of European ships in the late fifteenth century is dubious (Fig. 7.2), and they become more prominent from the mid-sixteenth century (Fig. 7.1). While this does not show the presumption of exogenous origins to be true, there is no evidence to support an exclusively Khaliji origin for types like the *baghla* and *ghanja*. Later square-sterned types, like the *jālbūt* [A2.10] and *shū'ī* (Al Salimi and Staples 2019:85–88), have more claim to exclusivity within the Khaliji tradition, yet, while common in twentieth-century photographs, they came too late to be readily identified in any visual sources in this corpus. The Arabian *baghla* and Suri *ghanja* are so similar to the Indian *kūtiyya* that origins are difficult to discern (Burningham 2007). Nevertheless, by the early nineteenth century the *baghla* was sufficiently common in the Gulf to be considered a vernacular form (Al Salimi and Staples 2019:45–47) and illustrations of them appear from then onwards. The type survived in the same form into the twentieth century, when it senesced under pressure from more economical, modern types (Al Salimi and Staples 2019:47; Burningham 2007:93–95). Visual sources therefore indicate that the *baghla*, and perhaps square-sterned craft in general, was based on an exogenous

form and reached a period of stability within Khaliji dhow-building traditions in the nineteenth and early twentieth centuries, but was extinct by the mid-twentieth century.

8.2 Filters: conventions, constraints and preferences

Khaliji dhow-builders set out to create or modify watercraft to perform particular roles, guided by sets of conventions or traditions and constrained by technical, social and environmental factors. These filters determined what forms watercraft would take and how well they were able to perform either their intended roles or new roles imposed during their working life. Whether craft were built from the keel to fight or were modified to do so sometime during or after building, they were still influenced by these filters. Visual sources demonstrate the range of forms and modifications of watercraft employed in organised violence and from them the workings of these filters can be inferred.

8.2.1 Khaliji dhow-building conventions

Firm statements about dhow-building conventions are difficult to make on the basis of visual sources alone. Laced fastening is prevalent in the early period until at least the eighteenth century and metal fastening is clear in the nineteenth century, but there are exceptions. Islamic manuscript images suggest that Khalijis were at least aware of metal fastening from the fifteenth century, supporting archaeological evidence of fourteenth- or fifteenth-century metal fastened planks from al-Balīd in Oman (Staples 2019:315). Strengthening members like frames, beams and wales were also evident in visual sources, while clamps were preferred over knees. The crudity of construction referenced in some documentary and visual sources tends to suggest a shell-based method where the distribution and structure of the internal framing was not so important. In the 1830s, Edye observed that the *baghla* was ‘nail and treenail fastened, in the most rude and unsafe manner possible’ (Edye 1834:12). Such methods offered distinct advantages in Khaliji shipbuilding, in that vessels could be constructed from mental templates and the size and shape adjusted to the timber resources available. The Khaliji use of seagoing and coastal versions scaled from the same design of watercraft constructed to the same proportions is evident throughout the corpus. This shell-based method was also more economical in its use of timber and more accepting of lower-quality timbers for internal construction. Visual sources demonstrate that dhow-building conventions and construction methods were far more dynamic than is often presumed, more in line with counter-narratives to the stasis arguments (Chaudhuri 1985:149–151; Staples 2018:204–205). Designs and templates for constructing or adapting watercraft for organised violence were developed within these conventions using a range of influences—of which the detail is not entirely clear—that left traces in modern era ethnographic contexts.

8.2.2 Technical, social and environmental constraints

8.2.2.1 Technical constraints

The materials from which to build watercraft, the facilities in which to build and maintain them, and the nature of the environment constrained the development and production of vernacular fighting craft. Technical constraints are imposed by physical and engineering limitations (Schiffer 2011:110). The size and shape of vernacular and exogenous watercraft that formed the inputs to this process acted as technical constraints, as did the 'technological envelope' of Khaliji building methods (Adams 2013:24), but the Khaliji experience in this regard was not unique. Broadside fire proved impractical in many European gunboat designs, as 'such small vessels almost capsized from the recoil of the heavy gun and it was very difficult to aim such a gun accurately in any other direction than forward or aft' (Glete 1992:103). Many of the problems of combining 'firepower, manoeuvrability, protection, habitability and amphibious capacity in oared warships' faced in the Arabian Seas were similar to those in the Baltic, and the Swedish fleet in particular experimented widely in attempts to address them (Glete 1992:100–101). The Swedish naval architect af Chapman undertook 'a systematic study of how the stress from gunfire could be absorbed in a wooden structure' and designed vessels with novel diagonal strengthening members and guns mounted on rails that allowed them to be moved amidships when in transit, thereby minimising longitudinal strain (Glete 1992:100–101). The *kanonjolle* gunboat design sought to diffuse the strain of firing a large piece by longitudinally extending thick planks of timber from the gun mount at the stern to the stem, transforming almost the entire length of the vessel into a 'shock absorber' (Glete 1992:102). By the end of the eighteenth century, the Swedish were moving away from broadside armed vessels to concentrate on gunboats firing from their ends, as these craft required 'little tactical sophistication' and the crews little training, while still being able to maintain mobility and concentration of fire when acting in groups (Glete 1992:102). They could operate in shallow water, were small targets, could escape easily and were inexpensive to build and maintain (Glete 1992:102), attributes that may as easily be applied to the fighting fleets of the Persian Gulf. The Swedish experience demonstrates what may have been achievable with new design methods and the financial and material capacity to experiment, while technical constraints specific to Khaliji fighting craft are discussed in Section 8.3.

8.2.2.2 Social constraints

According to Schiffer, social constraints are imposed by differing levels of power wielded by interest groups that influence the technical choices of shipbuilders (Schiffer 2011:111). In the Khaliji case, the requirement for watercraft to perform several roles throughout their life as utility craft must have imposed constraints on the ways they were built (Fawcett and Burn 1947:103). The small double-ended watercraft prominent throughout the corpus show little variation according to

the roles in which they are depicted, with the exception of small fighting craft that sometimes have embrasures or facilities for weapons. The more specialised fighting craft, like the *kalbā* and *dāw*, were rare and appear infrequently in visual sources. A British officer described Khalijis in Oman who had salvaged cargo from a wreck as

> people whose country afforded nothing but fish, and a few dates, and who existed by carrying freight for others, and whose Shaikh was not more than the other heads of families, who obeyed him or not as they pleased, that if the war was continued we would certainly distress them much, but they would draw their boats on shore where we could not hurt them, and they would wait patiently while the expense of the [blockading] vessels was more than the values of the cargoes [to be recovered] (Al-Qasimi 1995:61).

In such a social environment, the specialisation of watercraft for a single role would be an expensive undertaking only afforded by the most powerful sheikhs. It is not surprising that watercraft that could be easily adapted to new roles, or that could perform several roles equally well, such as the ubiquitous *trankī* types, are reflected in visual sources.

8.2.2.3 Environmental constraints

The environment influenced Khaliji nautical traditions by restricting the ways that watercraft could efficiently operate and fight, and by constraining the materials from which watercraft could be produced. The Persian Gulf presents an ideal environment for pre-modern organised maritime violence, where geographical features like narrow straits or island groups acted to concentrate shipping into target rich environments and simultaneously provided secure refuges where raiding vessels were ‘protected from retaliation’ (Campbell 2014:784–785; Pennell 2001:55–56). Poverty, religion and politics provided motivation for this form of organised violence and its reappearance at different historical junctures, while geography influenced opportunity, tactics and targeting (Al-Qasimi 1995:61; Pennell 2001:56). Natural barriers are exploited in landscapes of defence or violence (Lasswell 2017:7), leading to the apparent preference for islands like Hormuz and Bahrain and small peninsulas like Bushehr and Ras al Khaimah as positions of political power in the Gulf. The nature of this environment influenced the cultural effort that otherwise impoverished people put into organised maritime violence (Campbell 2014:780–783; Pennell 2001:58–60). The precipitous rocky coasts in Musandam, Oman and parts of Iran, the shallow reef-strewn southern Gulf shore, and the barren and hot northern shore, created conditions that were simultaneously difficult for agriculture, offered defensible refuges and encouraged a reliance on fishing and coastal trade (Potter 2009:10). The meagre local agricultural produce encouraged the profusion of small watercraft and able mariners, and the narrowing of maritime traffic arteries at the head of the Gulf and at the Strait of Hormuz brought rich pickings closer to the shore where merchant vessels were occasionally

becalmed and easily outsailed by nimbler Khaliji craft. Such correlates of violence are frequently demonstrated in visual and documentary sources.

The impoverished nature of the Persian Gulf environment and its lack of shipbuilding materials is not so clearly depicted in visual sources, rather it is indicated by what has been omitted. There are only two shipbuilding scenes and no other apparent scenes of yards or timber stockpiles. The majority of materials required to sustain vernacular watercraft were imported, captured or salvaged, along with the majority of weapons and ammunition (Buckingham 1829:484). A British officer observed in the early nineteenth century

> that ships wishing to refit here, ought to be furnished with all the necessary materials on board: as naval stores of every description are scarce and dear, from their being altogether foreign produce. Ship-timber is brought to this port from Malabar; canvass from Bengal; coir from Africa and the Laccadive islands, and made into rope here; and anchors and all smaller stores, as well as guns and ammunition from Bombay. (Buckingham 1829:525)

Economical use of such resources was important in this environment and must have had an influence on technical choices made by shipbuilders (Staples 2013:192). Vessel types that used less timber for the same performance would generally be preferred and this was a known factor in the replacement of the square-sterned *baghla* with the double-ended *būm* in the late nineteenth and early twentieth centuries, after the performance requirements of broadside weapons lapsed (Al-Hijji 2001:4; Al Salimi and Staples 2019:47; Burningham 2007:93–95).

8.2.3 Performance preferences

The introduction of heavy gunpowder weapons into vernacular watercraft in the Gulf is a case of technological disequilibrium (Schiffer 2011:63), as it resulted in changes to the form of watercraft to accommodate larger weapons in different modes. In vernacular craft like dhows, the larger the weapons and the higher the number mounted, the lower the likelihood that the watercraft in which they were embarked was adapted to the role rather than purposefully designed. The operation of gunpowder weapons demands minimum standards of those design objectives that contribute to gun-power—stability, seaworthiness, resilience, strength, manoeuvrability, weatherliness and speed (Nowacki 2006:4, fig.3) (Fig. 3.2). At the very least, the strength and facilities required to accommodate heavy weapons, like decks and gunports, represent performance preferences in the design phase of a watercraft, considerations demanded by the simple mechanics of operating carriage guns on wooden decks.

Cannon mounted on carriages require room to work and recoil. The recoil motion of the gun has ‘random’ attributes associated with the motion of the platform and ‘inequalities of the deck’ (Congreve 1811:15). The breeching and tackles are also ‘overhauled and hung loose about the

deck', requiring room so as not to entangle the crew on recoil (Congreve 1811:15). A typical weapon mounted on a gun carriage will also exhibit a 'jumping motion in the recoil' when the gun is fired, in proportion to the height of the carriage (Congreve 1811:5–7). This jump inevitably causes an impact on the deck and its supports on each occasion that it is fired. The 'strain' on the carriage increases in proportion to the elevation of the weapon at the moment of discharge (Douglas 1855:119). When operating the windward guns of a broadside battery, the weight of the gun will be added to the weight of the carriage, producing a significant strain on the breeching (Congreve 1811:7). The breeching is usually connected to two points on the structure of the ship and must be adjusted with 'much nicety' for every angle of traverse in order that the strain of recoil is taken evenly (Congreve 1811:10). If this adjustment is imperfectly executed, the muzzle of the gun will be thrown sideways on recoil and the majority of the strain will be taken by the tautest side of the breeching (Congreve 1811:10). Carriage guns cannot simply be embarked and operated without the appropriate architectural strength and features to support them.

This performance preference for watercraft able to accommodate heavier weapons was an explicit aim of Omani attempts to acquire ships from Indian yards in the seventeenth century (Casey-Vine 1995:343–347; Rawlinson 1929:125–126; Staples 2013:192–194), at the same time that European designs were being copied and adapted in India (Chaudhuri 1985:139–141). The extent of European influence over this process has not been established, and designs or 'styles' were generally adapted rather than imposed (Gilbert 2014:103–104). It is only from the seventeenth century that square-sterned watercraft become prevalent in visual sources of Khaliji contexts, supporting the conclusion that such a feature was originally an exogenous concept. The distinction between willing adaptation and coercive imposition demonstrates the embodiment of performance preferences in shipbuilding, which is evidenced by the wide use of square sterns in Khaliji watercraft designs in the nineteenth and twentieth centuries.

8.3 Outputs: activities and performance

The outputs of the process of creating vernacular forms are the activity contexts in which the watercraft operates, its formal observable properties and its performance characteristics (Schiffer 2011:99–100). Inputs and filters that generate technical choices affect a watercraft's formal properties, which in turn affect its performance characteristics (Schiffer 2011:99). The contexts in which the watercraft is used also influences its performance characteristics (Schiffer 2011:100) in such a way that fighting will emphasise certain performance characteristics more than pearling.

8.3.1 Changing activity contexts

The activity contexts that constituted organised maritime violence in the Gulf changed over time and space, such that the initial intrusion by Portuguese forces (Fig. 8.3) was different in form and impact to the violence perpetrated by the British more than two centuries later, which was different again to the inter-tribal and internecine conflicts the Khalijis engaged in amongst themselves. The forms of vernacular fighting craft involved in these conflicts changed as well, from the *tarārīd* that faced the Portuguese in the first instance to the superbly adapted *kalbā* and *dāw* of the later period. Similarly, the activity contexts experienced in the Gulf were different to those experienced by users of *dāwāt* elsewhere, principally in Southern Arabia and the Red Sea, where fighting versions were rare. Only some *dāwāt* shown in Muscat were adapted for violence, whereas all except one of those associated with the Qasimi confederacy were adapted in some way to this end. The Qasimi activity context, at least for the period of British interest in 'piracy' from around 1800 to 1820, therefore appears in visual sources as more violent. It follows that prospection for vernacular fighting craft in archaeological contexts would be more rewarding in areas of Qasimi activity. Omani and Qasimi raids on British, Indian and Portuguese territories in the wider Indian Ocean also constitute different contexts than coastal operations in the more sheltered waters of the Persian Gulf. In each of these cases, different attributes of gun-power (Nowacki 2006:4, fig.3) (Fig. 3.2) were emphasised, such that speed and manoeuvrability were more important for inshore craft, while seagoing vessels on longer voyages required stability, seaworthiness and resilience to a greater degree. These changing activity contexts are observable in the visual sources analysed in this thesis.

Figure 8.3 An early-twentieth-century Portuguese artist's impression of the battle at Hormuz in 1507 (Colaço 1933 [artwork]).

8.3.2 Physical attributes of fighting craft

8.3.2.1 Strength and plank fastening in fighting craft

Some historians of warfare in the Arabian Seas have asserted that European ships outclassed Indian Ocean vessels of sewn plank construction as the former were able to bear heavier loads of ordnance while the latter would literally fall apart from the shock (Casey-Vine 1995:343–347; Chaudhuri 1985:139–141). While the sources for these assertions are ambiguous, they appear to derive from Portuguese experience at the beginning of the sixteenth century. European observers maintained a generally poor opinion of sewn-plank vessels and considered them weak or frail, although these criticisms may not have been entirely objective or well informed (Burningham 2019a:335; McGrail 2015:35). A mid-eighteenth-century Dutch source dismisses the many vessels available to Khaliji sheikhs as merely ‘sewn vessels, [which] even an unarmed European vessel could sink […] with their bow’ (Floor 2007:325). Nevertheless if metal fastening was preferred for fighting vessels, such observations warrant further scrutiny, as they may provide a major piece of the puzzle of the transition from organic to metal fastenings in Arabian Sea watercraft traditions. This transition may have been initiated, or more likely expedited, because of the requirement for structures more resilient to the loads induced by the operation of heavy ordnance—the attributes of gun-power (Nowacki 2006:4, fig.3).

Seemingly opposing the view that sewn-plank craft were too weak to carry big guns, Burningham has posited that sound sewn-plank construction can potentially withstand loads imposed by grounding better than metal-fastened craft (Burningham 2019a:341). The dynamic internal loads imposed by embarked people and animals approximate to a limited extent those imposed by four-truck gun carriages. This situation establishes an apparent dichotomy between somehow frail sewn-plank fighting vessels and resilient sewn-plank surfboats. Of these two scenarios for potential structural failure, the archaeological record of grounding should be biased in favour of metal fastened vessels, as organically fastened watercraft would tend to survive and retain their watertight integrity. The source of structural failure of an organically fastened vessel lost in combat, whether internal or external impact loading, or even loss of stability, would also be difficult to establish from partial hull remains. So, the metal-fastened victim of grounding may not be a representative sample and the organically fastened fighting vessel may have been lost through enemy action or its own structural incompetence, or possibly even both. Given the current state of shipwreck knowledge, this conundrum is unlikely to be resolved soon by archaeological evidence alone.

8.3.2.2 Risks and benefits of laced planking

It appears that there are benefits of sewn-plank or laced construction relevant to this scenario. Sewn-plank hulls are potentially more flexible (Turfa and Steinmayer 2001:124); they are cheap

relative to other fastening methods, such as mortise and tenon joinery or metal fastening (Turfa and Steinmayer 2001:122); and they are relatively easy to repair underway if the failure is above the waterline, or beached when away from formal port facilities (Hourani 1995 [1951]:95–97). The ready availability of the expertise required to repair a sewn-plank hull amongst the seafaring community and the abundance of coir or similar cordage (usually embarked at insignificant cost in weight), must also have been attractive benefits.

The risks inherent in laced construction are that the ligatures will part or break under stress or stretch under strain and allow water ingress between planks. The holes bored in each plank to admit the ligatures weaken the timber in much the same way as the tunnelling of shipworms, and lacing requires more holes in each plank than metal fastening. Agius observed that Arab boat builders in the late twentieth century continued to stitch the hood ends of planks to the stem and sternposts of the *battīl*, as they frequently suffered damage when being hauled ashore. The stitching allowed an easier repair than if the same pieces were nailed and was ‘more practical and economical’ overall (Agius 2002:112). Burningham suggests that ‘closely spaced stitches spread the loads [of grounding] more effectively and make the plank shell a monocoque, whereas the more widely spaced iron fastenings are potentially the sites of point loads’ (Burningham 2019a:341). The problem in this instance is that the dynamic and explosive loads imposed by ordnance inside the hull are quite different to those of grounding, even in a seaway. While experimental archaeology has furnished a number of organically fastened vessels in recent decades that have been subjected to testing in a variety of conditions, none of these tests have involved the use of ordnance.

8.3.2.3 A spectrum of rigidity

In 1689 Omanis were reported to be fitting out ‘ships both of burthen and strength’ to contest the Arabian seas with the Portuguese, as well as building other ships at Surat, including a ‘very comely stout ship’ of 100 guns (Rawlinson 1929:125–126; see also Floor 2006:418–419; Staples 2013:192–194). The Surat-built ship *Quedagh Merchant* captured in the Indian Ocean in 1699 and later wrecked in the Caribbean was metal fastened, had all rabbeted planks and a dense framing pattern that conferred significant strength (Hanselmann 2019:127–133; see also Qaisar 1968:149–152). While the rabbeting technique has not been observed in ethnographic studies of Khaliji shipbuilding, metal fastening and framing density is inconclusively depicted in historical visual sources. Closely spaced internal framing of solid timbers, properly fitted so as to spread the internal loads of gunpowder ordnance, was probably more important in smaller fighting craft than the hull fastening method. The differences were of economy of effort and resources, where joining dense framing is quicker with metal-fastened than laced planks and where density of framing might make up for lower quality timbers. Nevertheless, laced planking can be easier to repair in smaller, simpler

vessels without disassembling a major portion of the hull, and metal fastenings can make repair difficult away from a properly equipped shipyard, or without having to carry more planks and fastenings. However, larger or more heavily framed sewn-plank hulls may be more difficult to repair and potentially encouraged the transition to metal fasteners.

Rather than being dichotomised into either organic- or metal-fastened structures, Khaliji fighting craft more properly occupied a spectrum of rigidity that incorporated all manner of strengthening devices and hybrid fastening methods that are challenging to detect in visual sources. Trends that are observable in visual sources demonstrate that only smaller craft were laced in the later part of the period, while there is no specific evidence of lacing in any Khaliji fighting craft. Where framing can be observed, particularly in photographs, it does not appear as densely spaced as in *Quedagh Merchant,* but none of these cases are identifiable as fighting craft with a gunpowder armament. The strength and resilience required for gun-power (Nowacki 2006:4, fig.3) (Fig. 3.2) was therefore provided by a range of solutions that served to distribute the loads imposed by guns.

8.3.3 Performance characteristics

8.3.3.1 Speed, manoeuvrability and weatherliness

While the speediness and manoeuvrability of Khaliji fighting craft was regularly attested in documentary sources (e.g. Loane 1805:6–7; Welch 2007:139) and Europeans observed Khaliji craft to ‘sail three feet for our one’ (Al-Qasimi 1995:42–43), although these characteristics are not initially clear from visual sources. However, evidence of the physical attributes that contribute to these characteristics is abundant. The sharply raked bow and fine lines of many types of Khaliji craft are clearly depicted, especially when contrasted with European ships in the same sources. Similarly, the large sail size in proportion to the hull is frequently emphasised, creating the impression of the high installed power ratios of warships. The ability of Khaliji craft to manoeuvre closer to the wind than square-rigged craft—weatherliness—is also apparent in some European sources. The shallow draft of many Khaliji designs also allowed them to approach the shore more closely for both defence and attack (e.g. Buckingham 1829:496). These attributes allowed well-handled craft to avoid the broadsides of larger ships and to swiftly close the range gap of their guns in attack, as well as to disperse and escape when they themselves were attacked. While these attributes are present in Khaliji watercraft used for roles other than fighting, they were certainly selected for in the sense that they enabled performance characteristics beneficial to fighting.

8.3.3.2 Seaworthiness and stability

Increased stability and seaworthiness enable watercraft to embark a heavier armament and to keep to the sea longer and in more marginal conditions. Khaliji watercraft occasionally surprised

European observers with their seaworthiness and stability (e.g. Capper 1785:247; Plaisted 1758:18). Palisted's mid-eighteenth-century passage in a *trankī* gives a general impression:

> we met with an excessive hard squall of wind from the North-west, which obliged us to try under our bear poles. As we were a vessel without a deck, and whose planks were only fastened or sewed together with strings, I thought myself to be in more danger than ever I was since I used the sea. However, she behaved exceedingly well and rose to the sea like an empty barrel, never shipping the least spray of sea-water, though she was deeply loaded. (Paisted 1758:18)

Stability and seaworthiness generally increase in proportion to the size of the watercraft. Small craft are less capable of venturing offshore, both because of their inability to keep to high seas and because of the lack of facilities to maintain the crew. Niebuhr dismissively ventured that a fleet made up of small fishing boats that occasionally fight 'must stop to take fish for food, when they should pursue the enemy, [and] can never perform any great exploits' (Niebuhr 1792:138). Khaliji small craft were therefore more effective in numbers, close to the shore or when deployed in a fleet with several larger craft that could make up for their deficiencies in carrying capacity but make use of their other advantages.

8.3.3.3 Gun-power

While the characteristics so far described contributed to the ability of a watercraft to bear a gunpowder armament, all other things being equal 'a flat surface, a platform, was really the only functional part of a wooden warship' (Steffy 1994:11). In the case of Khaliji fighting craft the platform served to host many, often hundreds, of warriors and sailors as well as weapons, and people with handheld weapons were the 'main armament' in actions designed to board and seize other vessels. It follows then that, as long as the other characteristics are met, watercraft that could furnish a larger platform area were more effective fighting craft. Guns need room behind them to recoil and beside them for efficient operation, so that Chapman recommended no less than 7½ feet from centre to centre of guns in broadside (Chapman 1820:138). To allow sufficient room to recoil, guns were not mounted broadside at the narrow ends of double-ended vessels, or in narrow craft in general. The overall area of deck space available influences the number of guns that may be mounted broadside—the broadside length.

This condition is illustrated by comparing the available platform area of the three forms of fighting craft, scaled to the same waterline length (Fig. 8.4). In this case the double-ended *battīl* (top) has the shortest and narrowest platform, the counter-sterned *dāw* (middle) has the longest main deck, but the platform of the square-sterned *baghla* (bottom) is broader for longer. This crude comparison demonstrates the advantage that counter-sterned craft offer in terms of platform area per unit of waterline length and the advantage of square-sterned vessels in terms of potential broadside length.

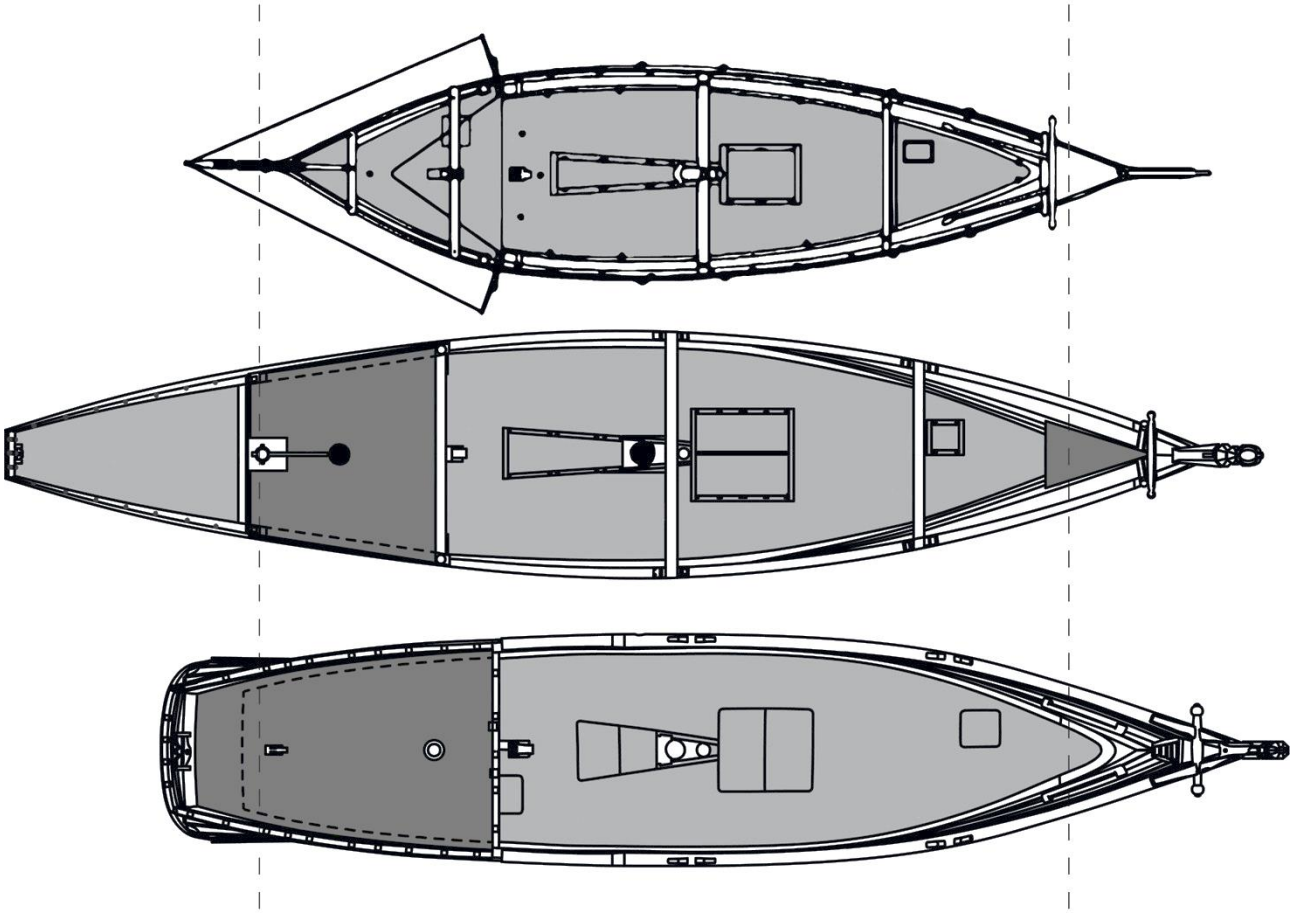


Figure 8.4 A comparison of platform area by watercraft form where the waterline length is the same (at the dashed lines), with superimposed decks in darker shade: top, a double-ended *battīl*; middle, a counter-sterned *dāw*; and bottom, a square-sterned *baghla* (M. de Ruyter 2020).

8.4 Responses: making new vernacular forms

8.4.1 Adaptation

Watercraft may be adapted to fighting by the addition or, less commonly, deletion of features or fittings. It is difficult to know from disparate visual sources which vessels were adapted to fighting roles, but a number of scenarios are possible. Watercraft built with the requisite strength and deck capacity may be easily repurposed from other utility roles. Vessels that only mount forward firing guns, like the *baqqāra* in Figure 7.33, or light swivels require little or no modification. If the vessel is sufficiently broad and sturdy, guns may be mounted broadside with bulwarks built up around them. The easy adaptability of a *battīl* in such a case can be demonstrated by fitting stanchions to which guns are lashed and using wash strakes as bulwarks. A clear photograph of three *batātīl* in Kuwait harbour in 1911 shows them with full decks flush with the caprails or gunwales (Fig. 8.5). If the *batātīl* with embrasures in Temple's painting were similarly constructed [B1.139] (Fig. 7.30), then they could be relatively easily fitted out with guns, stanchions and wash strakes to turn a standard *battīl* into a broadside armed version (Fig. 8.6). If the framework supporting the stanchions

is sufficiently robust, and the supports for the deck well connected to the frame, then a *battīl* so fitted could support a broadside armament of light guns (Fig. 7.31).

Figure 8.5 Three *batātīl* in Kuwait harbour in 1911 (highlighted), some of the last of their kind, clearly metal fastened, with full decks but without wash strakes (after Royal Geographic Society S0016531).

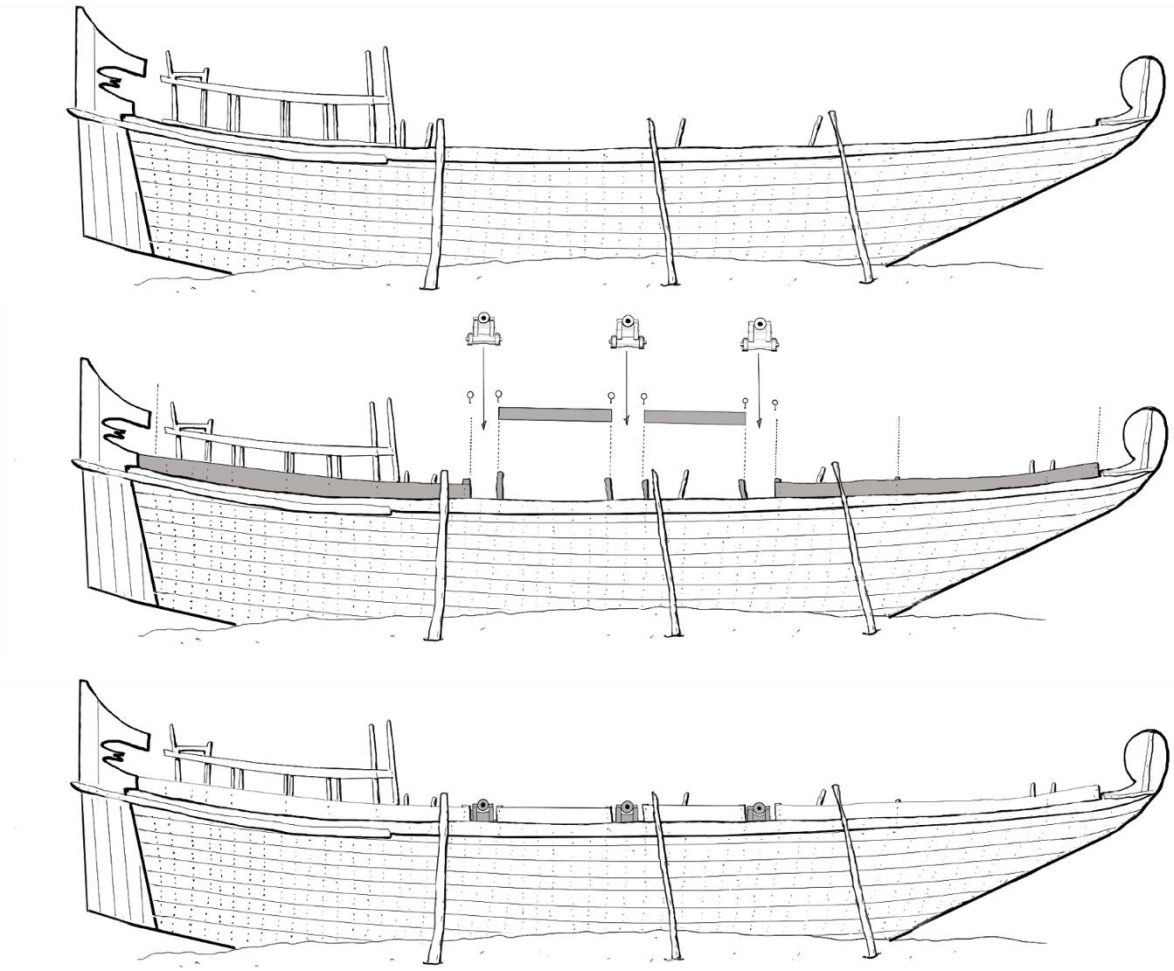


Figure 8.6 A conjectural conversion of a *battīl* with the addition of wash strakes, stanchions as frame extensions and eye bolts, to create embrasures for mounting carriage guns on the broadside (M. de Ruyter 2020).

Adaptation is potentially the simplest and least expensive response to organised maritime violence, in terms of materials and labour. As long as the existing vernacular forms possess the requisite

formal properties and performance characteristics for strength, resilience and platform area, watercraft can be modified with minimal alterations to building conventions. The more properties that require modification to achieve the desired performance, the more complex the adaptation becomes. Such adaptations account for evolving vernacular forms, where previously stabilised inputs like *batātīl* are modified to increase their gun-power. *Baghāla* could be readily adapted by cutting ports and fitting guns, but the greater the weight of the broadside the more structural support was required. Adaptation was probably the most common response when measured by the number of watercraft involved, but the least effective in terms of generating overall gun-power.

8.4.2 Replication and adoption

New exogenous forms of watercraft could be imported to the vernacular tradition by a range of mechanisms, including building by commission, purchase or other transfer, capture, misadventure or stranding. The ability to replicate or copy a new type may be imported in the minds of shipwrights and Indian shipwrights were known to work in Gulf ports (Miles 1919:412), while Khaliji shipwrights changed allegiances and moved around the Gulf (Al-Hijji 2010:13, 19). Hornell suggests that it was Indian shipwrights radiating from western Indian ports that brought metal-fastening methods, substantial framing and square sterns, all learnt from Europeans, to other Arabian sea traditions (Hormell 1942:37–39). The actual pathways of technology transfer were in all likelihood more complex and varied than this, as well as context dependent, as the diversity and interconnectedness of the pre-modern Indian Ocean nautical traditions suggest (Burningham 2019b; Margariti 2008; Staples 2013:194, 2018). Some watercraft types are more readily replicated in traditions that already have close approximates of the target form, such that counter-sterned craft like the *kalbā* or *dāw* would be more easily imported where there is already experience with similar forms.

Historical sources suggest that all of the potentially imported types of fighting dhows were built in the Persian Gulf during the early modern period. The Persians and Omanis built *kalbāt* in the eighteenth century (Parsons 1808:195, 206) and the Dutch proposed building *kalbāt* in the Gulf with the assistance of ‘native carpenters’ as these vessels easily outclassed European sloops (Floor 2007:328). *Dāwāt* were probably built in Oman (Parsons 1808:206), as were *aghriba* (Al Salimi and Staples 2019:97). *Baghāla* were built in Oman and on the Persian coast (Al Salimi and Staples 2019:45; Miles 1919:412). Warships of other types were built in Bushehr (Floor 2007:246). What is usually missing from these sources is information on who the builders were, where the designs came from or what the vessels actually looked like, leaving open the possibility of misidentification (Staples 2013:194). Nevertheless, the general impression from these sources is that designs for fighting craft were built in the Persian Gulf with at least some Khaliji input.

The introduction of warship types operated or captured by the Ottomans cannot be discounted, as they were known to employ Khalijis in their crews and sailed from Gulf ports (Floor 2007:274, 297; Serjeant 1963:51, 58, 73). The ruler of Bahrain allegedly returned from his pilgrimage to Mecca with shipwrights and the intention to build and equip a fighting fleet (Floor 2006:42). Oman and Persia had warships built in Surat (Axworthy 2011:37; Floor 2006:418–419; Rawlinson 1929:125–126), and captured or impressed vessels from Surat and even Siam (Floor 2006:384–385, 418). East India Company vessels, including warships, and other India-based English and French traders were captured or purchased by Khalijis (Floor 2007:19, 289) (Fig. 8.7). The Portuguese disposed of captured prizes by selling them to pass-holding ship owners in Gulf ports (Fawcett and Burn 1947:123–124). Warships were frequently passed between Khaliji groups by capture and transfer (e.g. Parsons 1808:189). Each of these cases includes the inherent potential for technological transfer by replication and adoption.

Figure 8.7 An artist's impression of the Qasimi capture of the India-based country ship *Minerva* in 1809 (J.M. Groves 1988 *Capture of the Minerva*, used with permission).

The types of vessels acquired may have been related to the local repair capacity, as there were no docks and only basic slips in shallow basins, so size and draught were limiting factors (Buckingham 1829:525; Fawcett and Burn 1947:109). The European style vessels acquired for Nadir Shah's fleet were ill-maintained through a lack of appropriate facilities (Axworthy 2011:37; Floor 1987:52). The country ship *Minerva*, reimagined in Figure 8.7, was recaptured and burnt by British forces during the raid on Ras al Khaimah in 1809, as the ship's Qasimi captors could neither escape in time nor

withdraw it into the shallow creek (Samuel 1811:164; TNA ADM 54/335:f.105) [B1.16]. Many elements of the operating environment imposed constraints on the types of vessels that Khalijis could replicate or adopt as fighting craft, or that could reasonably act as exogenous inputs to the Khaliji shipbuilding traditions.

8.4.3 Innovation

Innovation, or 'technology-stimulated invention' in Schiffer's phrasing, is really a 'set of processes' with a range of motivations, stimuli and potential outcomes (Schiffer 2011:73). Peer competitions, status, perceived performance deficiencies in existing technology, comparisons with similar technologies and, importantly in this instance, 'contact situations between societies possessing unequal technological […] resources' are all stimulants for innovation (Schiffer 2011:73–74). This sort of technology-stimulated innovation does not necessarily imply that forms of vernacular fighting craft were invented by Khalijis, as adaptation is also a form of innovation. None of the fighting dhows reconstructed in Chapter 7 could be considered as invented in the Gulf, as they all appear adapted from existing vernacular forms or from exogenous forms of the western Indian Ocean. Innovation and change probably happened quicker and easier in India because of the abundance and proximity of shipbuilding materials like timber, coir and iron. Such innovation and change would be much more expensive and riskier on the Persian Gulf littoral and it potentially took much longer to absorb these changes into the Khaliji traditions because of the unwillingness or inability to experiment with resources either scarce or expensively obtained. Despite conditions that encouraged conservatism, Khalijis did innovate in shipbuilding, as the increasing prominence of unique vernacular types like the *būm*, *shū'ī* and *jālbūt* in the nineteenth and twentieth centuries shows.

The *battīl* was certainly unique to the Persian Gulf and fighting versions were common in the eighteenth and nineteenth centuries. Indeed, these fighting craft were much admired by their East India Company opponents whose cruisers were unable to match their performance (Davies 1997:160). In order to have craft that could compete on equal terms, one EIC observer suggested that the British replicate the Khaliji design as exactly as possible, as any modifications 'would probably defeat the object sought for' (quoted in Davies 1997:160). Similarly, fighting adaptations of the *dāw* appear to be contained to the Gulf societies, representing a unique form of vernacular fighting craft, although visual sources of the *kalbā* are too few to establish the extent of divergence from similar Indian craft. It is clear, though, that Khaliji societies innovated to produce competent vernacular fighting craft designs rather than simply adopting Indian, European or Ottoman warships. The sets of processes involved in these innovations must have had implications for the societies involved.

8.4.4 Social change

Broad social change is observable in Khaliji societies that adapted to the needs of organised maritime violence. While discussing the architectural signatures of power, Lasswell argues that the act of building a martial structure, 'or of being passively exposed' to it, influences perspectives in society, as a 'completed structure influences both the symbolic outlook and the behavioural activities of the people who adapt to its existence' (Lasswell 2017:viii). Similar influence can be observed in Khaliji societies with vernacular fighting craft, where possession of even a minimally adapted *baqqāra* gave groups the confidence to take 'any vessel she was able to master' (BL IOR/R/15/1/19:f.77v). Ownership of one or more *kalbāt* conferred power on Khaliji groups and emboldened their activities (Fawcett and Burn 1947:115; Floor 2007:29). Indeed, the entire enterprise to build Nadir Shah's navy was intended to confer power and influence (Axworthy 2011:33). Here are the peer competitions in which 'competitors strive to create technologies having performance characteristics that surpass those of their peers' (Schiffer 2011:43–44). Possession of superior technology like fighting craft allows competitors and aggrandizers to alter the power structures of societies, influence territorial boundaries and trade, and eventually encourage others to adopt similar competitive technologies (Schiffer 2011:44).

The social effects of such technological change in minor fighting craft have been noted previously. 'At sea, the pirate's craft has been a dynamic factor in the evolution of ships of trade and in defense of trade [and] pirate ships have innovated (and provoked) important changes in sea vehicles and harbour arrangements' (Lasswell 2017:8). Guilmartin advanced the thesis that the revolutionary economic changes in the early modern Mediterranean were inextricably linked to changes in maritime fighting technology, particularly the replacement of heavily-crewed oared galleys with more lightly crewed but heavily armed northern European merchantmen (1974:1–6). He saw in this the decline of smaller ports and the replacement of minor galley-based sea powers with systems of commerce and warfare based on sailing fleets that more successfully monopolised defensive and offensive violence (1974:1–6). While the details of social change in the Gulf were different, the influential role of maritime fighting technology is apparent. Where elsewhere by the end of the sixteenth century seapower had become firmly associated with state power (Palmer 2005:29), this has certainly become the case in the Gulf by the eighteenth century, by when Oman rose as a naval power and Nadir Shah was building his navy. Even relatively small Khaliji tribes appeared to recognise this connection (Floor 2007:29).

Technological and social changes wrought by organised maritime violence in the early modern period were certainly not limited to the Persian Gulf, but the Khalijis may stand as an example worthy of comparison. At around the same time as Niebuhr was observing the Khaliji fighting craft

he recorded as ‘kalbet’ [*kalbā*] in Iraq in 1765 (Niebuhr 1776:186), the French were introducing a class of *xebec*, a fighting ship in many ways the equivalent in form and function, yet in circumstances far more conducive to the construction of watercraft from wood and iron (Boudriot and Berti 1991:42–43). Simultaneously, Scandinavian naval forces were introducing entire ‘archipelago fleets’ of oared fighting craft and specialised assault vessels to replace earlier galleys for use in the narrow seas of the Baltic (Harris 1989; Huhtamies 2013, 2014; Johannessen 2013), unconsciously reprising in a more professional sense the forms of vernacular fighting craft of the Arabian seas. Yet while the inhabitants of the Gulf are famed for their passive cooling wind-towers and irrigation technologies, finely adapted to severe arid conditions (Hawker et al. 2015:631–634; Heard-Bey 2007:177–180), their development of fighting craft, the functional equivalents to European technology, in a space devoid of native timber and iron sources has received much less attention. The process of de-colonising the dhow cultures requires realistic acknowledgements of the erasures and borrowings of and from dhows, both in Western maritime cultures and in those Indigenous to the dhowscape.

8.5 Conclusions

8.5.1 Key findings

This thesis addresses the question of how changes made to vernacular watercraft in response to organised maritime violence in the early modern Persian Gulf affected Indigenous nautical traditions. The conclusions of this research—and the answers to this question—were developed through the subsidiary aims of the principal enquiry and are addressed in that sequence below.

a) *Identify vernacular fighting craft and the correlates of organised maritime violence in the archaeological and historical record.*

Documentary and visual evidence of vernacular fighting craft broadly agree, allowing the principal types to be identified with a high degree of confidence. Khalijis used a range of double-ended craft referred to by outsiders as *tarārīd* and *trankīs*, the main types of which included the *battīl* and *baqqāra* that survived into the twentieth century. The main counter-sterned types, the *kalbā* and *dāw*, were less common but generally more specialised for violence and were extinct by the end of the nineteenth century. The major square-sterned type, the *baghla*, was relatively easily adapted for violence and continued in merchant service into the twentieth century.

b) *Identify potential archaeological signatures of organised maritime violence.*

Archaeological signatures of organised maritime violence should be identifiable at battlefield sites and ports throughout the Persian Gulf. Documentary sources refer to the loss of at least 2,600 watercraft in violent circumstances between the years 1500 and 1900, and this is probably a

significant underestimate. Shipwrecks, weapons and the detritus of combat should be identifiable prominently at Hormuz, Bandar Abbas, Laft, Bandar e-Kong and Lengeh in Iran; Manamah in Bahrain; Qatif and Dammam in Saudi Arabia; Ras al Khaimah in the UAE; and at al-Zubārah and off the north coast of Qatar. Several watercraft of different types were wrecked or lost at each of these locations, potentially allowing direct contemporary comparisons. Sites ashore also contain fortifications and shipyards associated with, or that display correlates of, organised maritime violence.

c) *Reconstruct the forms of vernacular fighting craft of the Persian Gulf dhow traditions.*

Graphic reconstructions of the principal forms of early modern Khaliji fighting craft were developed from the evidence described in this thesis. Reconstructions of the *dāw*, the *kalbā*, the *baghla*, the *battīl* and the *baqqāra*, fitted out or arranged as fighting craft, were presented in Chapter 7. While documentary and visual evidence for most types is relatively abundant, that for the *kalbā* was limited to a few sources. This latter reconstruction required comparisons with other similar craft, including the larger *dāw* and Indian gallivats. The graphic reconstructions provide the basis for further three-dimensional and experimental reconstruction projects, and they will aid in the identification of these types when other historical visual sources come to light.

d) *Demonstrate how vernacular and imported watercraft were created, acquired and adapted to meet the needs of organised maritime violence.*

The Indigenous people of the Persian Gulf used a combination of ways to acquire fighting craft technology—by adapting, replicating, adopting and innovating. Environmental, social and functional limitations shaped this effort to acquire fighting craft. Square-sterned craft appear in visual sources around the same time that Omanis began searching for solid and robust vessels in which to put broadside armaments. Many of these bigger fighting craft were probably built in India, notably Surat, and their designs originated from the west coast of India at least. The widespread use of counter-sterned vessels in the Persian Gulf, Red Sea and Arabian Sea coast of India suggest that this type may have originated from India, where the majority of these vessels were built and from where the majority of materials were sourced. Designs like the *battīl* and *baqqāra* are only found in the Persian Gulf cultural world, suggesting that it was here that their designs originated. Although its origin remains obscure, the *dāw* was adapted as a fighting craft most successfully in the Persian Gulf. Versions of this craft in the Red Sea and on the west coast of India do not appear to have been so adapted.

e) *Show how responses to organised maritime violence cause change in nautical traditions.*

New weapons and fighting methods required changes in vernacular watercraft technology. The growing requirement to bear a gunpowder armament meant watercraft platforms had to be supported by a stronger structure that could withstand the dynamic loads imposed. Specialised fighting craft offered advantages over common vernacular craft adapted to the task and conferred power on their users, although mass was also achieved by using adapted fighting craft in numbers. Technologies used in specialised fighting craft, such as metal fasteners, dense framing and square sterns, also appeared in common vernacular craft, although direct causation is still obscure. Khaliji shipbuilders took advantage of existing features, like the counter stern, to develop efficient fighting craft. The visual record suggests a diversification of types over the early modern period as influences and performance preferences changed.

8.5.2 Applications and further research opportunities

8.5.2.1 Archaeological prospecting

One of the major intended outcomes of this thesis was to identify the potential archaeological signatures of organised maritime violence in the Persian Gulf. Archaeological prospecting for sites that potentially contain the remains of vernacular fighting craft is a clear next step. Battlefields or sites of broad international interest with the potential for collaboration of regional partners, and that likely contain remains of numerous craft, are the most significant in this regard. The development of a regional program of cooperation by a UNESCO-affiliated body to identify sites with the remains of vernacular watercraft of the shared Khaliji traditions would be an excellent outcome. Sadly, this is unlikely to be the case soon in a region riven with contemporary political disagreement and conflict. Nevertheless, given the dearth of archaeological evidence in this area, smaller national-scale projects focussed on particular sites and shipwrecks will have significance far beyond their national boundaries, and are more achievable in the short term. Further desk-based research is required for focussed assessments of potential archaeological sites.

8.5.2.2 Experiments

This thesis has proposed two-dimensional graphic reconstructions of the main types of fighting dhow, prominent amongst which is the *dāw* (Fig. 8.8). Three-dimensional modelling of the major types of vernacular fighting craft would also provide a basis for comparison of their performance characteristics. A full-scale physical reconstruction of a *dāw* would be an impressive project, but it would have to be supported by robust research aims or a philanthropic budget. Most questions relating to performance characteristics could be answered by digital models, and an expensive project to reconstruct an extinct fighting vessel would be uniquely vulnerable to nationalistic and political propaganda. Nevertheless, questions about the operation of such a craft, with the large

crews they often carried, and the physical requirements to load and arm the vessel ‘over the beach’ in the primitive harbour infrastructures that prevailed for much of this period, may better be answered by a full-scale reconstruction.

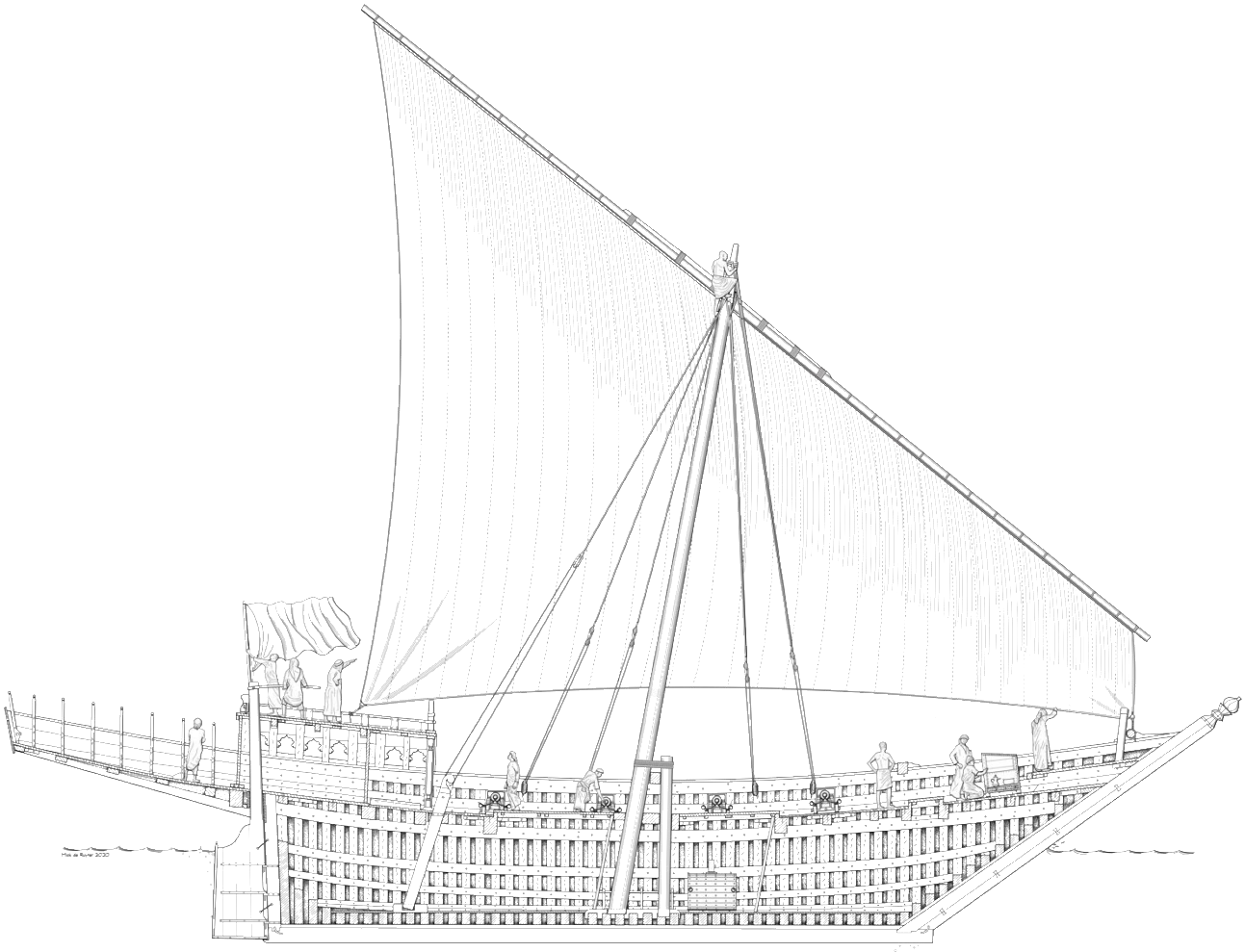


Figure 8.8 A longitudinal section of an early nineteenth-century 8-gun *dāw*, reconstructed from contemporary visual and documentary sources, primarily the model in the Science Museum, London (M. de Ruyter 2020, adapted from N. Weismann 2002 with permission).

The question of whether the transition from laced construction to metal-fastened construction was undertaken in part to provide stronger structures upon which to mount weapons may be informed by experimental archaeology, and also offers an opportunity to make inferences about some vessels that appear in historical and visual records. Comparisons of finite element analyses of structures built and strengthened in a range of manners historically observed—various fastening methods; frame intervals and sizes; and knee, beam and clamp supports for decks—could provide experimental evidence for what largely remains conjectural inference. Three-dimensional models of vessels constructed in various fashions could be repeatedly tested under increasing degrees of stress until failure is observed. The persistent failure of laced constructions under the unique stresses imposed by embarked ordnance would not prove that the transition of building methods took place for this reason, but it would enhance the analogical basis of such claims. If it can be established

with some assurance that organically fastened vessels cannot suffer a broadside-mounted battery above a certain weight, or that a vessel of a particular size could not mount its reported battery if it was organically fastened, then ordnance load can be used as an indirect method of identifying fastenings in historical and visual records.

8.5.2.3 Interdisciplinary approaches

The question of the origin of several types of craft discussed here—most prominently the *dāw*—lingers. Given that most of the materials for their construction were sourced from India, it will be difficult to determine where a vessel found in an archaeological context was built, even if several such wrecks are known. Approaches that incorporate network analysis, linguistics and more thorough archival research appear the most likely ways to illuminate this question. This is even more so the case with the more obscure types like the *kalbā*. Visual sources provide relatively weak evidence for origins by themselves, as there are many reasons why depictions are made or survive, but when combined with interdisciplinary approaches they can strengthen arguments. Enquiries of the origins of these craft and others have the potential to inform the transfer of technology, networks and influence that formed the maritime vernacular architecture of the Indian Ocean world.

8.5.2.4 Correlates of maritime violence

The correlates of maritime violence identified in this thesis could be applied to and tested in other vernacular watercraft traditions and contexts where there is more robust archaeological and ethnographic evidence. The types of applicable correlates might also be expanded or refined by investigation of other watercraft traditions, and conclusions regarding the effects of organised violence on watercraft traditions might therefore be rendered more reliable by the expanded evidentiary basis. This will enable better comparative studies based on databases of relevant examples from other archaeological and historical contexts, improving knowledge of the impact of organised violence on watercraft traditions and maritime societies.

8.5.3 The cultural legacy of the fighting dhow

‘Command of the sea is the prerequisite of power in the Persian Gulf’ (Kelly 1968:1).

Although Kelly’s vast history of British involvement in the Persian Gulf has been savaged for its obvious bias (Al-Qasimi 1986:xii–xiv), the assertion of the role of seapower contained in the first line has never been in doubt. In a region where people inhabit mostly the fringes of a land backed by inhospitable deserts, marshes and mountains, the sea is the dominant geographic reality, and the ability of marginal societies to use the sea has been integral to their culture. The Khalijis, a term itself derived from the shared Arabic and Persian word *khalij* for gulf, have used the sea for millennia, and since the early part of the second millennium at least in an environment

impoverished of most of the organic and industrial materials required for sustained seagoing. When the Portuguese entered the Gulf in force in 1507, the importance of technology and organisation to the exercise of seapower was driven home to the Khalijis with murderous efficiency. A relatively small Portuguese force of experienced sea fighters with heavy gunpowder weapons and robust ships destroyed up to 400 Khaliji and Indian ships and boats in the first battle (Birch 1875:105; Floor 2006:92–93). Three hundred years later the Khalijis could boast of the Omanis, a regional seapower state of their own, having routed the Portuguese, as well as the stand of the Qasimi confederacy of maritime tribes that required two combined expeditions of British Royal Navy and East India Company forces to subdue it. Khaliji seapowers were no longer the pushovers of the sixteenth century and only waned under colonial pressure from British truces and protectorates, and the enduring inadequacy of Persian naval forces. By the time ethnographers and anthropologists came to study the maritime societies of the Gulf from the mid-nineteenth century onwards, organised violence at sea had atrophied to the status of crime involving robbery, slave running and gun smuggling. The tribes of the Qasimi confederacy were rendered 'pirates' in colonial historiography and Omani seapower was suppressed by association with slavery (Nicolini 2016; Risso 2001; Suzuki 2018). In European and colonial histories like Kelly's, the dhow became a generic symbol of an antiquated and often decrepit Indian Ocean watercraft representing the backwardness and technological impoverishment of Khaliji societies, ensuring that the contemporary 'command of the sea' was presented as steadfastly British.

In scholarly and cultural rebuke of the sort of colonial views represented by Kelly, historians, including prominent Khalijis, have shone an ever-brightening light on the period in Gulf history from the first violent contact with the Portuguese (e.g. Agius 2005, 2008, 2010, 2012; Al-Qasimi 1986, 2015; Carter 2012; Risso 2001; Sweet 1964). In his definitive work *Seapower* (2018), revised over four editions since 2004, Till even gives the Omanis the credit of having pulled off an 'instantaneous' revolution in military affairs by assembling the technology and organisation to best the Portuguese at sea (Till 2018:16, 171). These 'new' histories are based on a broadening scope of documentary sources, including many Arabic and Persian sources, that nevertheless display a maddening imprecision on the specifics of the nautical technology of this instantaneous revolution (Staples 2013:194). With ethnographic analogy limited by its recency and inadequate documentary sources, here opens the gap for archaeological approaches to the material culture of Khaliji fighting craft. This thesis has sought to answer the question of how changes made to vernacular watercraft in response to organised violence affected Khaliji nautical traditions, how they executed this instantaneous revolution and what it meant for dhow-building traditions. The greatest limitation of an archaeological approach to this question is the complete lack of any surveyed or excavated remains of a Khaliji fighting craft from this period. Between 1500 and 1900, Khaliji societies may

have produced between 100,000 and 200,000 individual watercraft, and at least 2,600 of these were documented to have been destroyed in violent circumstances, but there were probably many more lost this way. The only known example of a vessel that *might* have been a fighting craft is buried under a concrete Coast Guard pier in Bahrain (Pedersen 2015b:165–166), and despite attempts to survey submerged battlefield sites, no substantial remains more than a century old have been uncovered. In the absence of significant remains of submerged battlefields or vernacular fighting craft, this thesis has relied primarily on an extensive corpus of previously underutilised visual sources ranging from petroglyphs to early photographs that show Khaliji watercraft.

The technological transition of vernacular fighting craft from the thirteenth to the nineteenth centuries, and prominently from the beginning of the sixteenth century, is demonstrated in this corpus of 405 visual sources that together depict at least 1,252 individual watercraft. By comparing these sources to each other, and to other documentary, ethnographic and archaeological sources over the temporal and spatial scope of the early modern Persian Gulf, this research has identified indications or correlates of violence. These correlates demonstrate how Khaliji societies prepared for, organised, adapted to and responded to organised maritime violence. Analysis of these sources provided sufficient evidence from which to propose graphical reconstructions of the principal types of fighting craft—the *dāw*, the *kalbā*, the *baghla*, the *battīl* and the *baqqāra*. These reconstructions stand as hypotheses to be challenged or revised by new evidence, possibly through the exploration of the archaeological signatures of organised violence identified throughout this research project. These types of watercraft were developed, adapted or imported by Khalijis to bolster the existing technological repertoire with more solid craft better able to incorporate the structures required to support heavier gunpowder weapons. Traditional attributes of speed, ruggedness, shallow draft and simplicity of operation were maintained for the most part as Khaliji mariners sought to exercise what advantages their craft offered in fighting at sea. Mass, both of fighting craft and people, was employed as a substitute for the limited firepower afforded by these designs. Efficiency, economy, fashion and available expertise drove modifications in designs alongside the requirements for violence, and counter-sterned craft were extinct by the end of the nineteenth century. Metal fastenings, square ends and strengthened internal structures were common features of Khaliji dhow traditions by the twentieth century, while the prominence of particular designs changed from craft associated with violence, like the *dāw* and the *battīl*, to commercial stalwarts like the *būm* and the *jālbūt*. The view of Khaliji watercraft from the twentieth century has suppressed the former fighting craft types and promoted commercial and pearling types in their stead. This is clearly demonstrated by the fact that none of the craft preserved in museums or collections, or reconstructed for experiment or display, are fitted out or armed as a fighting dhow. While the fault of this omission may lie with the evidence as currently accepted, visual sources offer a rich counter-narrative to this

limited interpretation, and the potential archaeological signature of organised maritime violence in the Gulf is vast.

Martial heritage like the fighting craft of this thesis is contested and controversial, particularly in a heavily politicised environment like the Persian Gulf, the very name of which is disputed. Research into the effects of violence on any society is also liable to impassioned response. Nevertheless, the fighting dhow as presented here is intended as a conceptual tool rather than a reconstruction of a specific weapons system, and the hope is that it may help to reclaim an historical truth rather than provoke controversy or offence. Fighting is an unavoidable and significant part of Khaliji maritime history that has had prominent material effects on nautical traditions beyond the confines of modern political boundaries, such that no single nation can claim the fighting dhow as their exclusive heritage. The fighting dhow expresses the seapower of those people who lived on the shores of the Gulf and contested its waters, both among themselves and with intruders, and who have since lived with the legacy of organised maritime violence and of its erasure by various historical powers.

APPENDIX A: ILLUSTRATED GLOSSARY

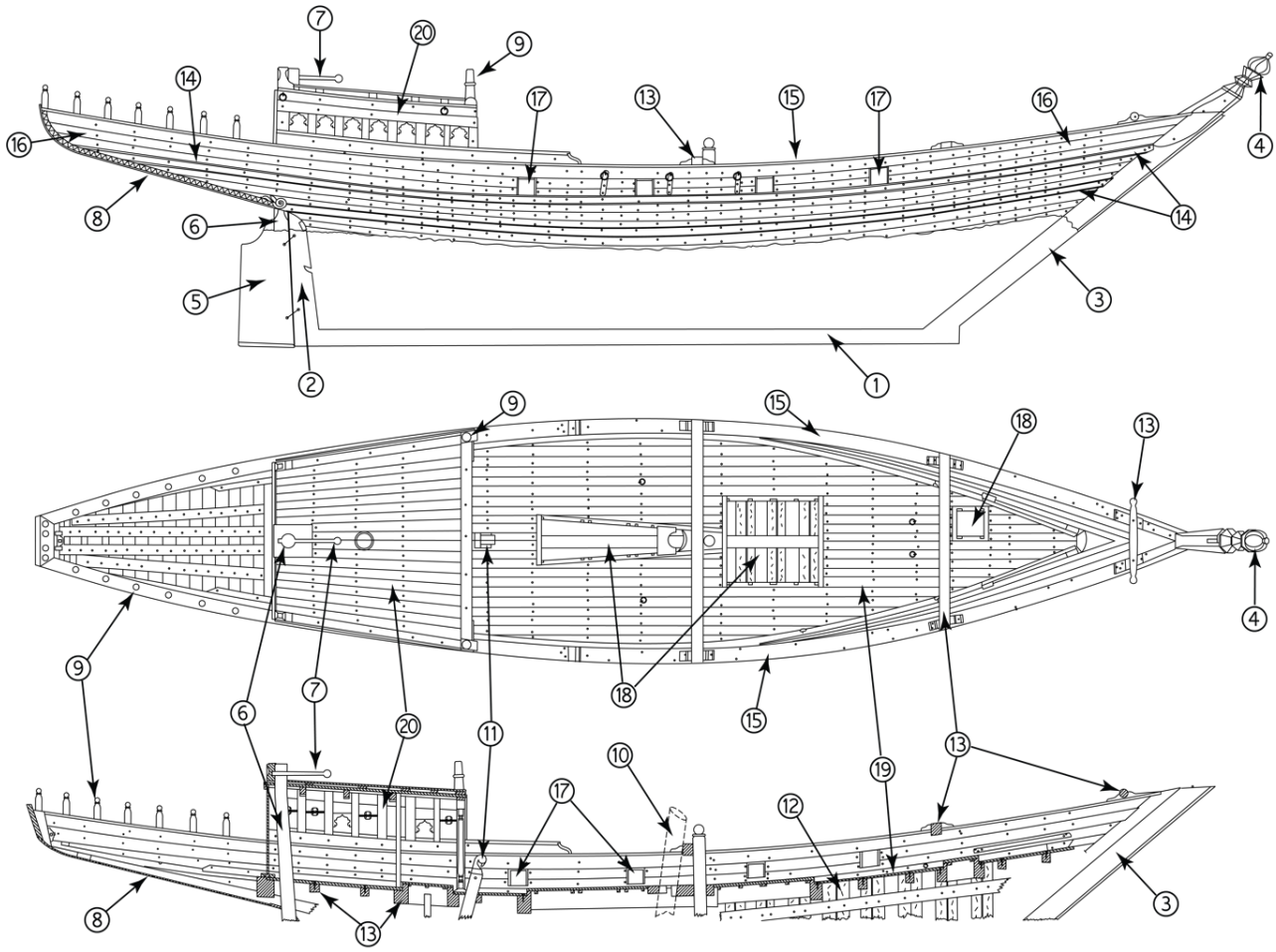
This Appendix defines the terms, forms and shapes used to describe vernacular watercraft of the early modern Persian Gulf throughout this study. The first section, A1, describes the general terms used in the text and in sources to describe the features of dhows. Section A2 describes the main types of dhows to which this study refers. Neither of these sections constitutes an exhaustive list as they are intended for relevance and internal consistency in this study only.

The Indigenous terms used vary with region and language inside the Gulf, so variants and anomalies are to be expected. The Arabic terms included here have been derived from the sources cited in each instance and should be considered generally applicable to the Persian Gulf cultural area. Other sources for alternate nautical terms or variants not cited here are Johnson and Muir (1964), Parviz (1996), and Yule and Burnell (1903).

The entries in section A2 describe the main types of pre-modern Arabian and Indo-Arabian watercraft referred to within this study. This is not a complete list of dhows, as many Indian and most African types of pre-modern watercraft are excluded. The name in bold italics is the name used throughout this study, followed by its plural (pl.) and the names following in brackets are variant spellings that appear in historical records. The silhouette images were those used as aids to identification in iconography and have been adapted only from measured drawings of actual vessels or models. The general size range in metres refers to an approximate length overall, as observers used a range of definitions of length of watercraft. No scale is given in the silhouettes as the actual sizes of vessels of each type varied greatly, such that a large *battīl* might be longer than small *dāw*. Descriptions used for the shape of wooden vessels follow McKee's 'Conventions used to describe boatshape' (1983:78–79).

A1 Terms used to describe features of dhows

A1.1 General arrangement of seagoing craft



① Keel
② Sternpost
③ Stem
④ Stemhead or finial
⑤ Rudder
⑥ Rudderpost
⑦ Tiller
⑧ Counter
⑨ Stanchion
⑩ Mainmast
⑪ Main halyard block
⑫ Frame
⑬ Beam
⑭ Wale
⑮ Gunwale
⑯ Strake
⑰ Gunport
⑱ Hatch
⑲ Deck
⑳ Superstructure or deckhouse

Figure A1.1 General arrangement of seagoing craft (after N. Weismann 2004, with permission).

A1.2 General arrangement of small craft

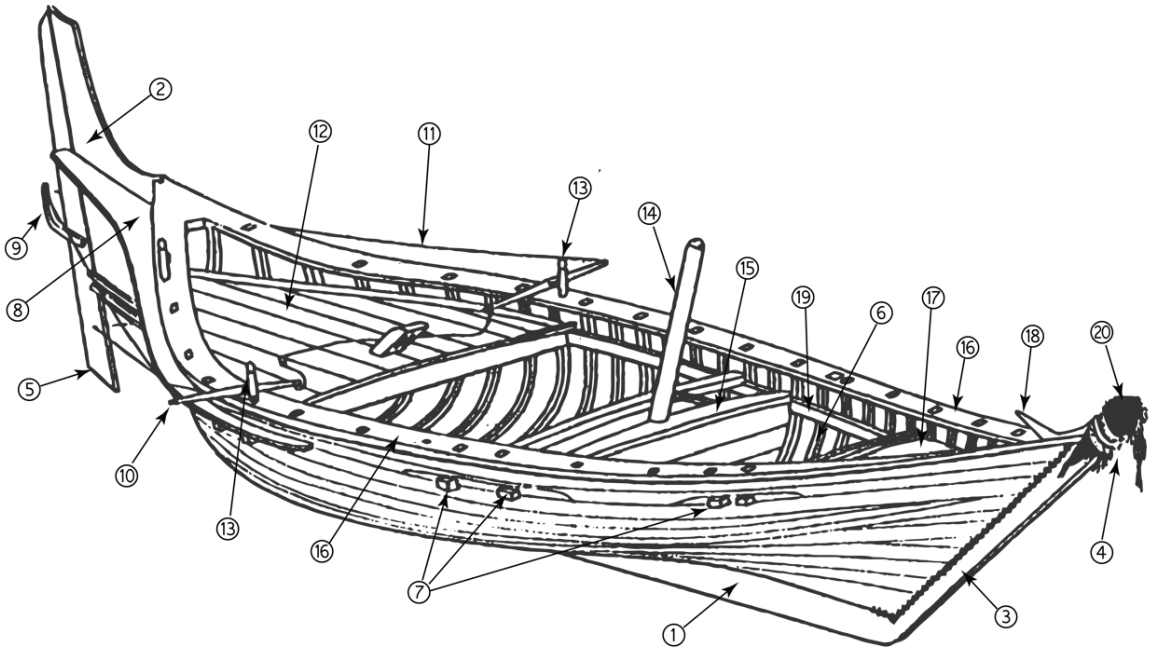


Figure A1.2 General arrangement of small craft (redrawn after T. Vosmer 1995 in Weismann 1998:250, fig.18).

A1.3 Principal dimensions

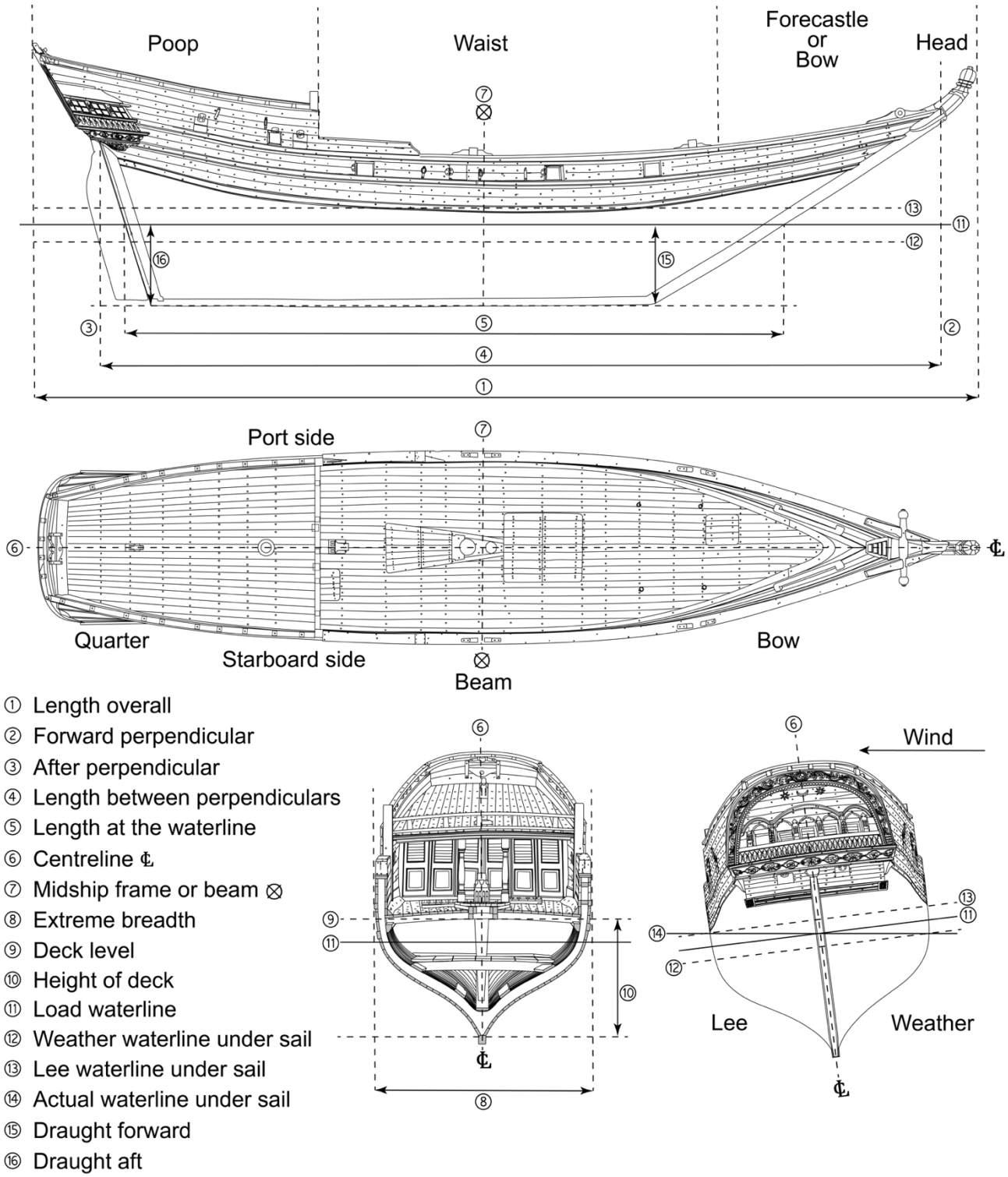


Figure A1.3 The principal dimension used for coefficients of form and description (M. de Ruyter 2020; *baghla* drawing after N. Weismann 2014, used with permission; original concept after Mondfeld 1985:65).

A1.4 Appearance of sails and masts

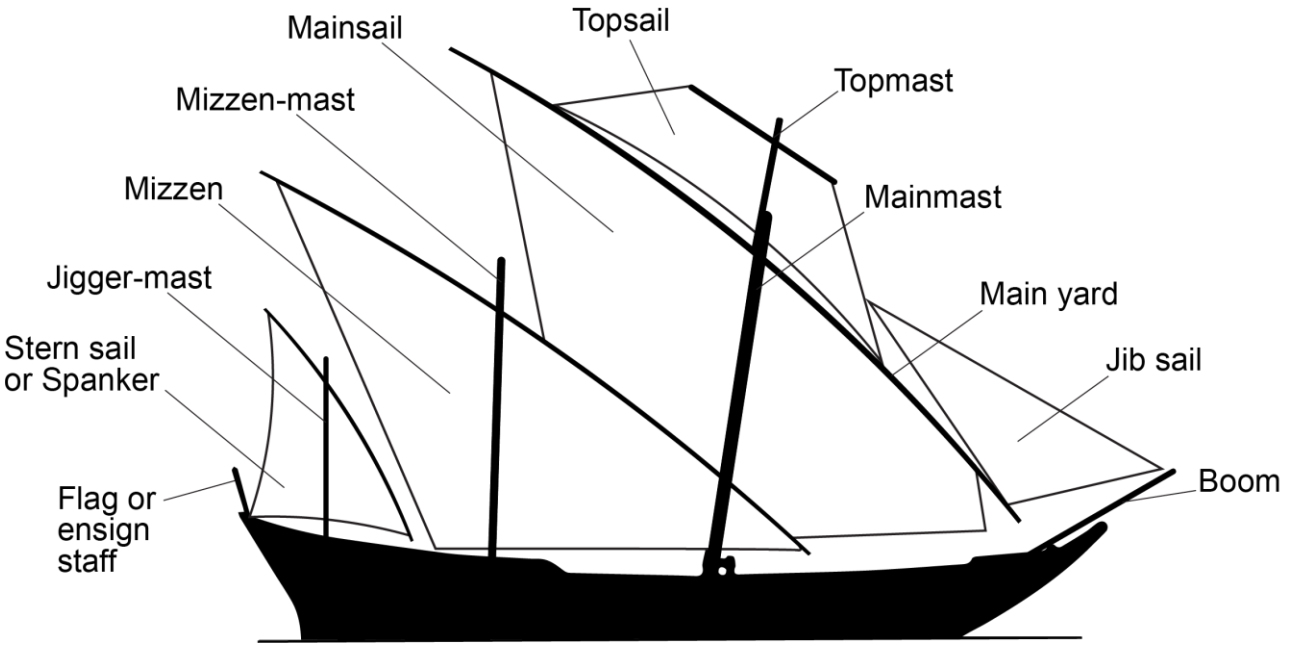


Figure A1.4 The principal sails and masts used in early modern dhows of the Arabian seas (after Agius 2005:184–187; Al-Hijji 2001:86; Burningham 2007:94).

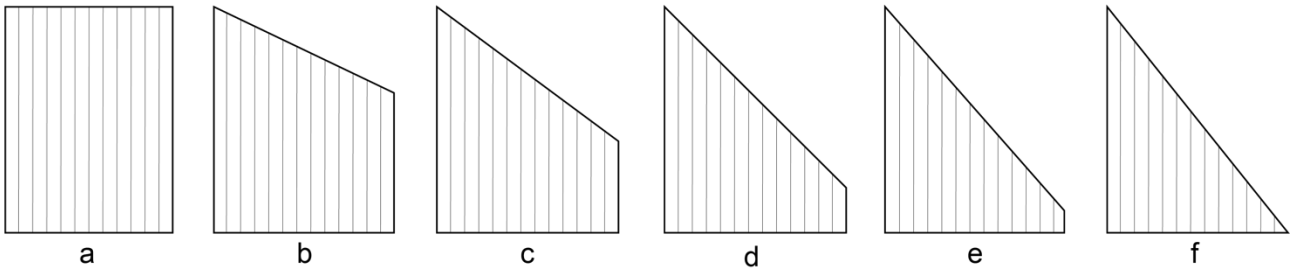


Figure A1.5 Sail shapes in the Arabian seas: a) square, b) dipping lug, c) modern Omani settee, d) modern Persian Gulf settee, e) modern Southern Arabian settee, and f) lateen (redrawn after Whitewright 2015:576).

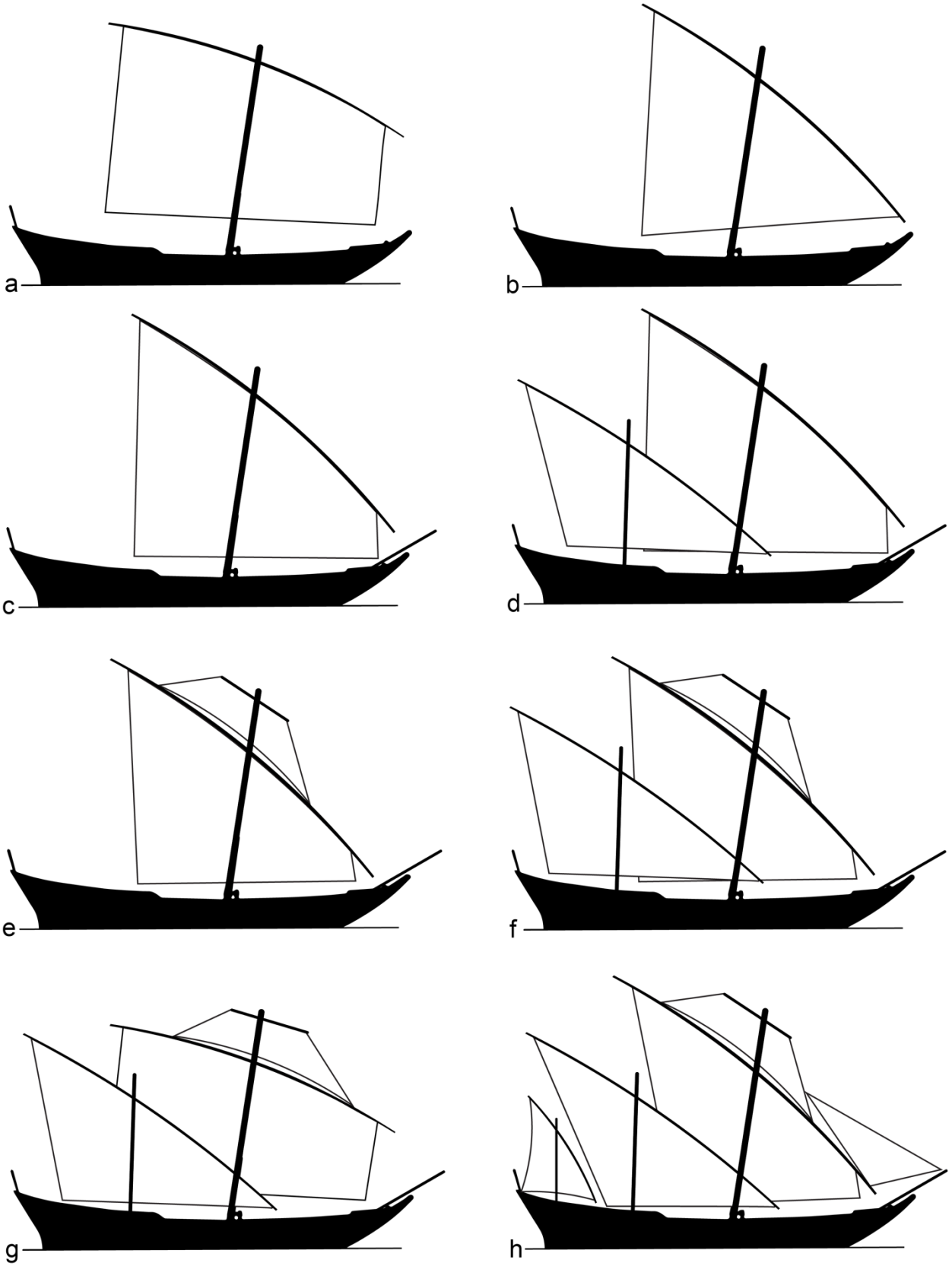


Figure A1.6 Typical sail plans used in early modern dhows of the Arabian seas: a) single mast with square or lug sail, b) single mast with lateen sail, c) single mast with settee sail, d) two masts with lateen or settee sails, e) single mast with settee main and a topsail, f) two masts with lateen or settee sails and a topsail on the mainmast, g) two masts with a square sail and topsail on the mainmast (ketch rig), and h) three masts with lateen or settee sails, a topsail and a jib (after Agius 2005:184–187; Al-Hijji 2001:86).

A2 Types of dhows

A2.1 ***Badan*** pl. *badana (bedan, 'uwaisiyyah*) 10–30 m LOA: a double-ended vessel with a 'false clipper' stem and tall sternpost terminating in a square top, commonly associated with Oman. The larger badan safar is a seagoing craft, while the smaller *badan sayyād* is generally used for fishing, often without a mast, but in other respects similar to the seagoing *badan safar*. The rudder blade is often seen partially unshipped, as in the right-hand image below, to avoid damage when taking the ground or in shallow water. The *badan* often had a double keel to allow it to remain upright when beached, and was rarely decked (Al Bastaki n.d.:37; Al Salimi and Staples 2019:39–42; Agius 2002:98–105; Facey and Martin 1979:135–140; Hawkins 1977:82, 135, 138; Hornell 1942:29–30; Weismann 1998; Weismann et al. 2015:415–416; Rowand 1915:2325).

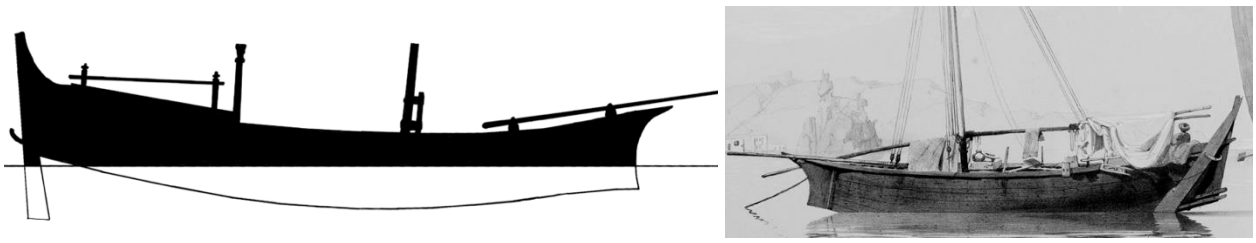


Figure A2.1 (Left) *badan safar* (after Pâris 1841:pl. 3); (right) detail from Pâris 1841:pl. 7.

A2.2 ***Baghla*** pl. *baghāla (baggala, buggalow, budgerow, bugle, bachaloe, shuwai'i)* 20–50 m LOA: a large vessel distinguished by a high, carved transom stern, and sharply raked straight or slightly convex stem. The Arabian baghla is very similar to the Omani *ghanja* and Indian *kūtiyya*. The type usually carries settee sails on one, two, or rarely three, masts, although sometimes appears square-rigged. It is generally too large to row for any distance other than for manoeuvring in harbour. The stemhead finial is a mace-like shape (Al Bastaki n.d.:22; Al Salimi and Staples 2019:45; Agius 2002:49–52; Burningham 2007; Facey and Martin 1979:118–121; Hawkins 1977:135, 141; Hornell 1920:10–11, 1942:15–16; Howarth 1977:33–34; Rowand 1915:2321–2322).

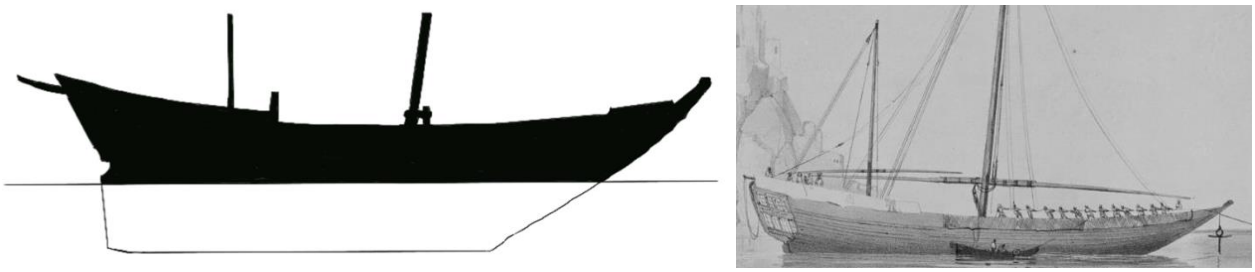


Figure A2.2 (Left) *baghla* (after Burningham 2007: fig. 1); (right) detail from Pâris 1841:pl. 3.

A2.3 ***Baqqāra*** pl. *baqāqīr (buggerah, garookuh)* 10–30 m LOA: a double-ended vessel similar to a battīl l with a very sharply raked stem with a square finial and sternpost almost perpendicular with detached rudder, usually fitted with two masts. The keel consisted of a flat timber and an aft member sloped upwards. The larger *baqāqīr* were usually fully decked and were considered fast vessels. The smaller versions were used for pearling into the 1940s and were probably sewn, and large coasting versions were from 150 to 300 tons (Al Bastaki n.d.:17; Al-Hijji 2001:11; Al Salimi and Staples 20919:48–49; Agius 2002:105–107; Copper et al. 2020; Facey and Martin 1979:143–145; Hawkins 1977:135, 141; Rowand 1915:2323).

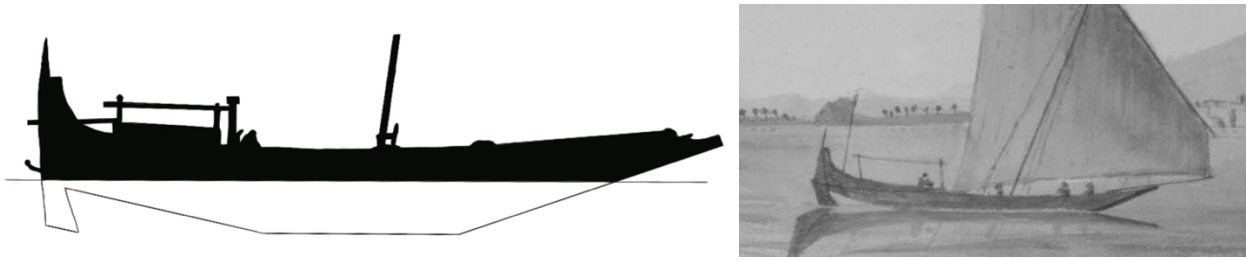


Figure A2.3 (Left) *baqqāra* (after Pâris 1841:plate 5.1); (right) a 'buggerah', detail from Loch c.1819c [artwork].

A2.4 ***Battīl*** pl. *batātīl (batil, battile)* 10–30 m LOA: a distinctive double-ended vessel with prominent oval or circular stem finial and 'dog's head' sternpost finial. These vessels were renowned for their speed, were quite narrow and the stern appeared out of the water when underway because of the upward rake of the keel towards the stern. The *battīl*, in common with the *baqqāra*, used a rope steering system and detachable rudder that was unshipped in shallow water (Al Bastaki n.d.:17; Al Salimi and Staples 2019:33–34; Agius 2002:63–66; Facey and Martin 1979:141–142 Hawkins 1977:82, 135, 141; Hornell 1942:33–34; Rowand 1915:2322).

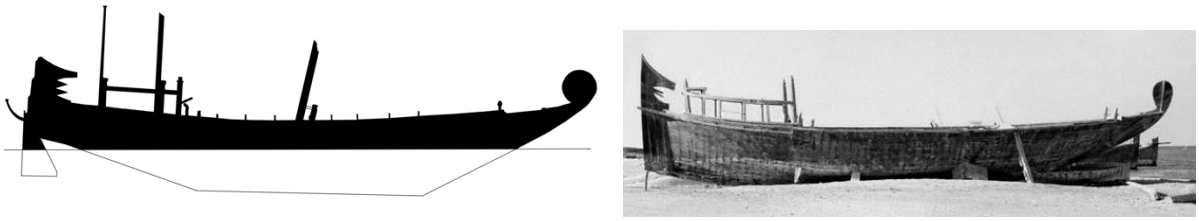


Figure A2.4 (Left) *battīl* (after Weismann et al. 2014:424, fig. 9); (right) *battīl* photographed by Alan Villiers, 1939 (© National Maritime Museum, Greenwich, London: PM5381-30).

A2.5 ***Battīl qarib*** pl. *batātīl* (*battīl salaq*, *selq*) 5–15 m LOA: a double-ended vessel with a slightly forward raking sternpost, small decks fore and aft, and prominent throughbeams with the ends sewn. The stemhead, and sometimes the sternpost, is often decorated with goatskin, ribbons and shells. The rudder is operated by steering ropes similar to the *battīl* [A.5]. The very similar but slightly smaller *battīl bahwy* is distinguishable by the sternpost head which is similar to the *battīl* [A.5]. (Al Salimi and Staples 2019:36; Vosmer 1997:219–226).

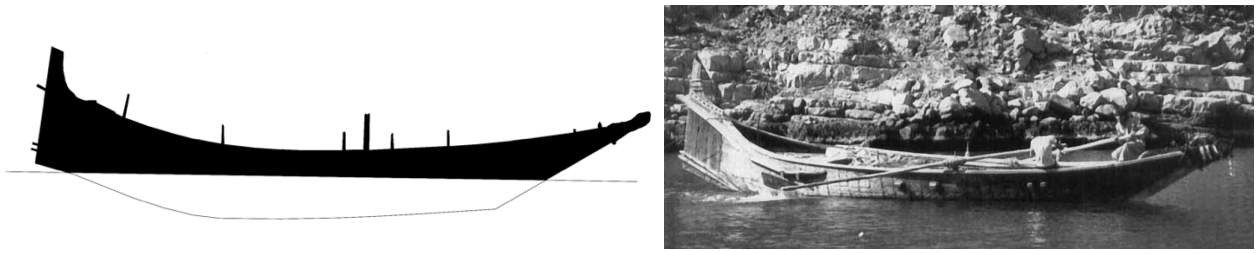


Figure A2.5 (Left) *battīl qarib* (after Weismann et al. 2014:428, fig. 13); (right) *battīl qarib* (from Vosmer 1997: 224, fig. 10).

A2.6 ***Būm*** pl. *abwām (boom, boum)* 10–40 m LOA: a double-ended vessel developed in Kuwait around the beginning of the nineteenth century, but often considered the 'traditional' Arab sailing vessel. This vessel has a long straight stem, rounded at the head and often painted in black and white. The *būm* is commonly fully decked and the rudderhead usually projects above the poop. The *būm* is apparently cheaper to build than transom-sterned equivalents (Al Bastaki n.d.:18–21; Al Salimi and Staples 2019:51–52; Agius 2002:66–70; Facey and Martin 1979:126–128; Hornell 1942:23–24; Howarth 1977:23–33; Rowand 1915:2323).

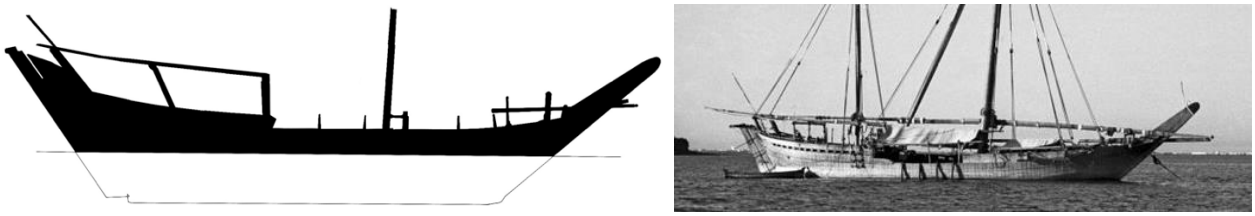


Figure A2.6 (Left) *būm* (after Cooper et al. 2018: fig. 12); (right) *būm* photographed by Alan Villiers, 1939 (© National Maritime Museum, Greenwich, London: PM5119-15).

A2.7 ***Dāw*** pl. *dāwāt (daww, dhow, dow, dao)* 20–50 m LOA: a distinctive vessel with a prominent projecting stern gallery and sharply raked straight or slightly convex stem, similar to but larger than the *kalbā*. The type usually carries settee sails on one, two, or rarely three, masts, although is sometimes appears rigged as a ketch on two masts, and can be rowed. It is commonly fitted with a superstructure aft that serves to protect the tiller of the rudder. The stemhead device, if fitted, is a spherical or acorn shape (Al Salimi and Staples 2019:67–68; Agius 2002:58–61; Cooper et al. 2015:43–45; de Ruyter 2020).

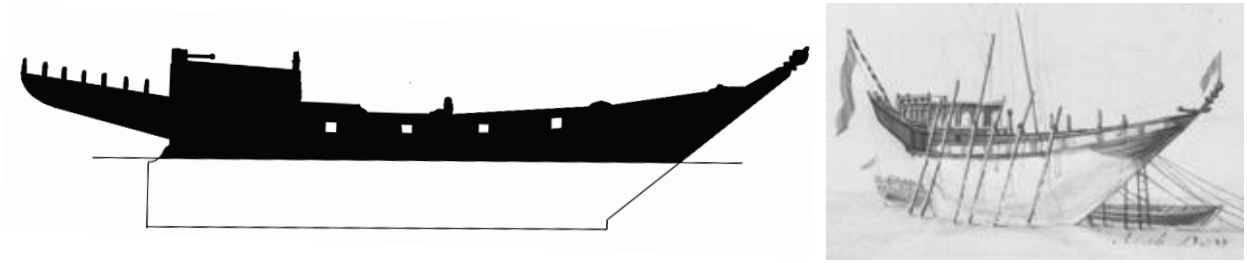


Figure A2.7 (Left) *dāw* (after N. Weismann 2004, used with permission); (right) an 'Arab Dow', detail from Moresby, c.1829–1834a.

A2.8 ***Dangiyya*** pl. *dangiyyāt (danjiyya, dungiyah, dangī, danjī, dinghy, dhangi)* 10–30 m LOA: a distinctive double-ended or round sterned vessel usually employed carrying cargo from the Gulf of Kutch, very broad in proportion to length, with a straight stem raking a little more than the sternpost. In the nineteenth century, they were often armed with two guns in the high after castle or poop deck. The *dangiyya* was said to be crudely fastened with nails and treenails, and is often observed with mats on the outside of the hull when loaded with cargo, but were said to be fast sailers. The *nauri* is similar but with a parrot's head stemhead finial (Al Salimi and Staples 2019:66; Agius 2002:70–72; Edye 1834:12–13 [misidentified]; Facey and Martin 1979:128–129; Hornell 1920:12; Rowand 1915:2324).

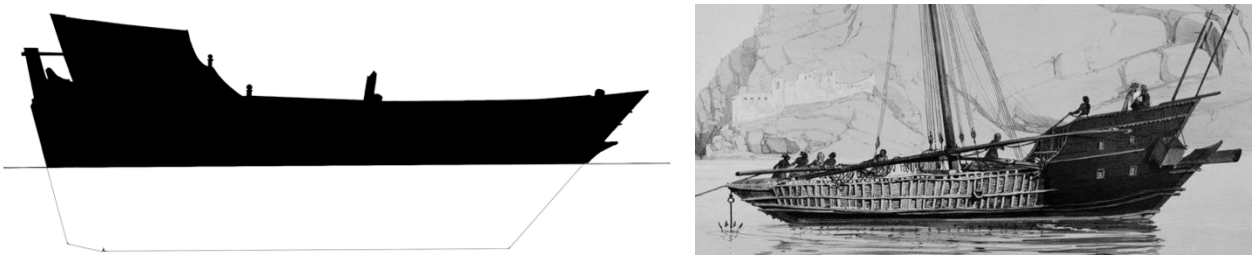


Figure A2.8 (Left) *dangiyya* (after Pâris 1841:plate 2); (right) detail from Pâris 1841:plate 4.

A2.9 ***Ghanja*** pl. *ghanjāt (ghanjah, gunjo, ghancha, khansha, ghunchah)* 20–50 m LOA: a large vessel distinguished by a high, carved transom stern, and sharply raked straight or slightly convex stem. The Omani *ghanja*, generally built in Sur, is very similar to the Arabian *baghla* and the Indian *kūtiyya*. The type usually carries settee sails on one, two, or rarely three, masts, although sometimes appears square-rigged. The stemhead finial is a fiddlehead or cockerel, often surmounted by a crown shape (Al Bastaki n.d.:29; Al Salimi and Staples 2019:98; Agius 2002:53–55; Burningham 2007; Facey and Martin 1979:122–125; Hawkins 1977:135, 139; Howarth 1977:43–44; Rowand 1915:2322).

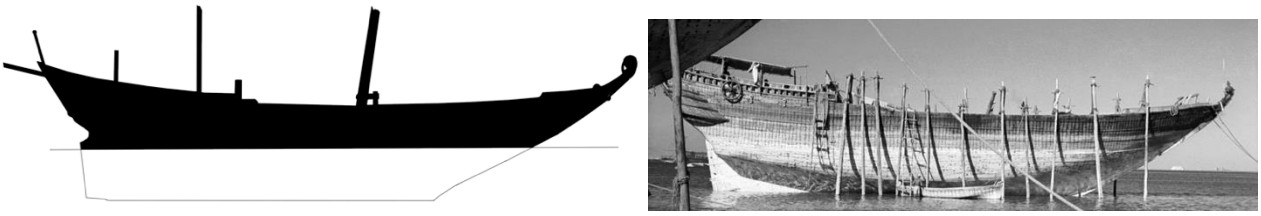


Figure A2.9 (Left) *ghanja* (after Burningham 2007: fig. 2); (right) *ghanja* photographed by Alan Villiers, 1939 (© National Maritime Museum, Greenwich, London: PM5052-31).

A2.10 ***Jālbūt*** pl. *jālabīt (jali, jalboot, jalbut, jaliboot, jalibut)* 10–30 m LOA: a small craft with a transom stern, a distinctive upright stem and often a ‘flying poop’. Typically used in the Gulf for pearling in later nineteenth and early twentieth centuries. The *jālbūt* is similar in appearance to the East African *jehazi* (Al Bastaki n.d.:14; Al Salimi and Staples 2019:55–56; Agius 2002:92–93; Facey and Martin 1979:133; Hawkins 1977: 89, 135, 139; Howarth 1977:48; Rowand 1915:2325–2326).

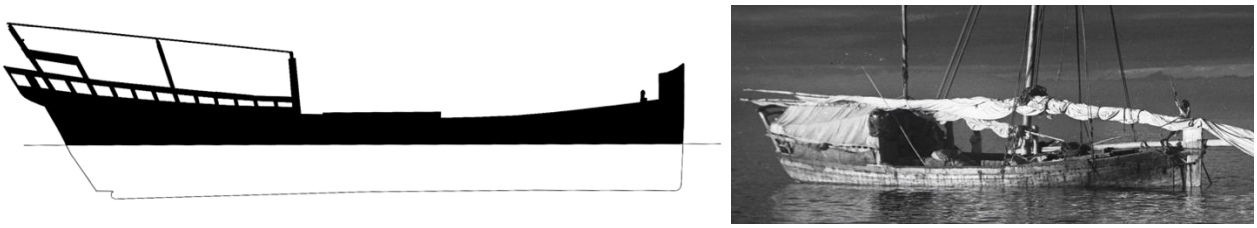


Figure A2.10 (Left) *jālbūt* (after Cooper et al. 2018:fig. 2); (right) detail from photograph by Joseph Mountain, 1934 (National Air and Space Museum NASM-SI-92-15952).

A2.11 ***Kūtiyya*** pl. *kutiyyāt (kotia, cotia, kooteh, kutiyah)* 20–50 m LOA: a large vessel distinguished by a high, carved transom stern, and sharply raked straight or slightly convex stem. The Indian *kūtiyya* is very similar to the Arabian *baghla* and Omani *ghanja*. The type usually carries settee sails on one, two, or rarely three, masts, although sometimes appears square-rigged. It is generally too large to row for any distance other than for manoeuvring in harbour. The stemhead finial is a parrot's head. It was generally considered smaller than the baghla (Al Bastaki n.d.:33; Al Salimi and Staples 2019:111–112; Agius 2002:55–57; Burningham 2007; Hornell 1920:10–11, 1942:16–17; Rowand 1915:2324).

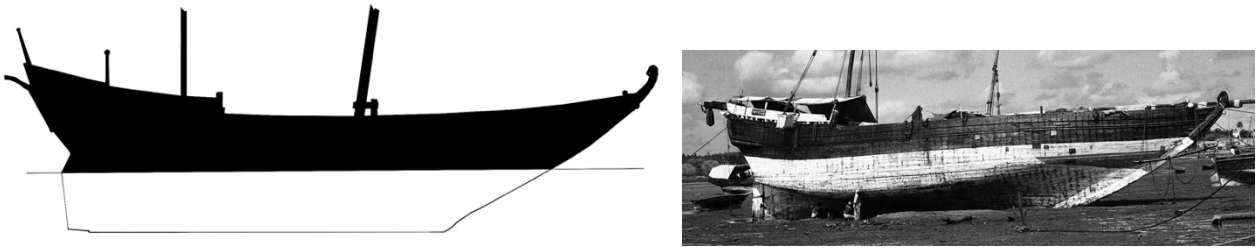


Figure A2.11 (Left) *kūtiyya* (after Burningham 2007: fig. 1); (right) a *kūtiyya* photographed by Wilfred Thesiger, 1963 (Pitt Rivers Museum, University of Oxford: 2004.130.2168.1).

A2.12 ***Patamar*** *(phatamar, pattamar)* 10–30 m LOA: an Indian double-ended vessel with a distinctive concave keel and stem as long as the keel. Smaller vessels were still sewn in the 1830s, and fitted with one mast, while the larger versions were metal fastened plank on frame with two masts. In the nineteenth century, they commonly operated from Bombay with Muslim crews, were considered fair-weather coasters and were occasionally operated in the Gulf. Larger versions in the early twentieth century had transom sterns (Agius 2002:57; Edye 1834:10-11; Hornell 1920:16).

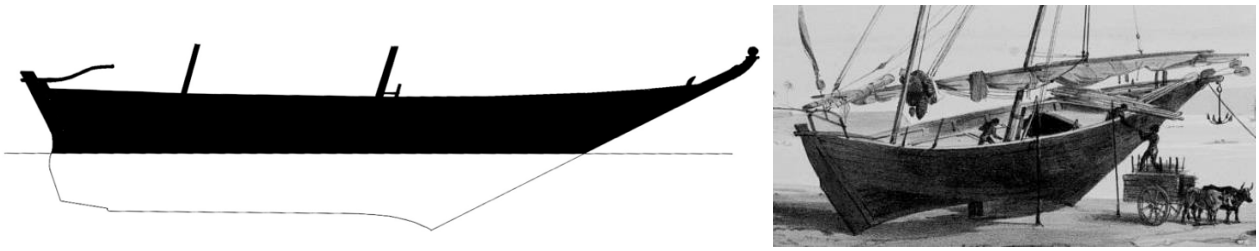


Figure A2.12 (Left) *patamar* (after Pâris 1841:pl. 10); (right) detail from Pâris 1841:plate 11.

A2.13 ***Sanbūq*** pl. *sanabīq (sanbūk, sanbook, sambuk, sanabiq)* 10–30 m LOA: a 'roughly built two-masted decked coaster with low poop and plain stem-head' (Hornell 1920:11). They range up to 200 tons and are built in Arabia of a variety of styles, usually transom-sterned. The *qatīra* is very similar but slightly smaller with a less prominent poop (see Pâris 1879:plate 56). A small, modern variation with a 'winged' transom known as a *shū'ī* is common in the Gulf. A small double-ended open version was sewn and known as a *kambari* (Al Bastaki n.d.:15; Al Salimi and Staples 2019:78–81; 110–111; Agius 2002:77–86; Facey and Martin 1979:130–132, 146; Hornell 1920:11, 1942:17–20; Howarth 1977:35–37; Prados 1997:187–192; Rowand 1915:2323).

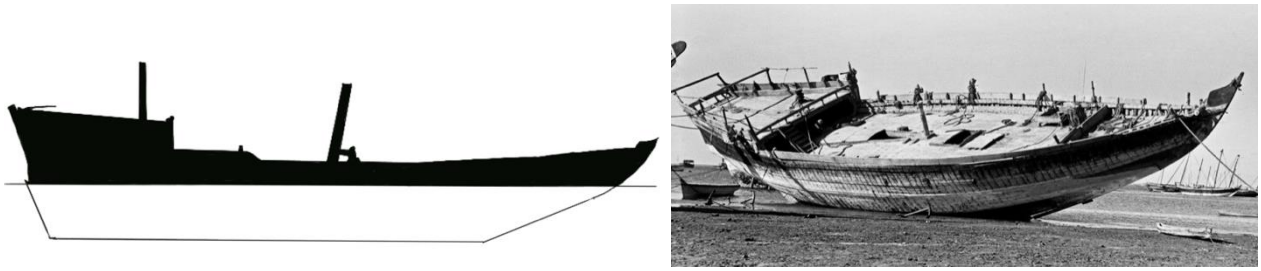


Figure A2.13 (Left) *sanbūq* (after Pâris 1879: plate 57); (right) *sanbūq* photographed by Alan Villiers, 1939 (© National Maritime Museum, Greenwich, London: PM5353-08).

A2.14 ***Shāhūf*** pl. *shawāhīf* (*baqqāra, zārūqa*) 4–10 m LOA: a double-ended vessel similar to the *baqqāra* is all respects except the stem and stemhead, which curves upwards and ends in a point. These craft are commonly used for fishing on the eastern Arabian coast, and are called *baqqāra* in northern Oman (Al Salimi and Staples 2019:82; Agius 2002:107; Facey and Martin 1979:143-145; Vosmer 1997:219, 230–231; Weismann et al. 2014:418, 422).

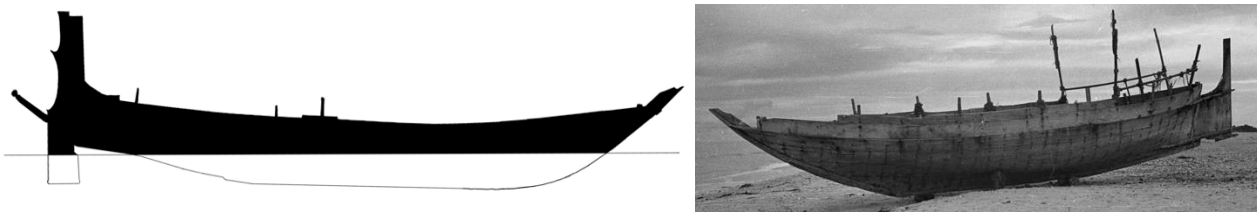


Figure A2.14 (Left) *shāhūf* (after Weismann et al. 2014:422, fig. 7); (right) a *shāhūf* photographed by Wilfred Thesiger, 1949 (Pitt Rivers Museum, University of Oxford: 2004.130.25290.1).

A2.15 ***Zārūq*** pl. *zawārik (sanbuk, sambuk, zawariq, zarūk, zarukah)* 10–20 m LOA: a double-ended, open *sanbūq* was common in the Red Sea and Southern Arabia, and was often sewn, and known as a *zaruq*. This vessel often has a distinctive stepped stem and is sometimes fitted with bulwarks which may change its profile. The smaller *zaima* is similar with a curved stem and sternpost (Al Salimi and Staples 2019:69–70; Agius 2002:77–86; Facey and Martin 1979:147–150; Hawkins 1977:74-79; Hornell 1942:23–24, 34; Prados 1997:187–192).

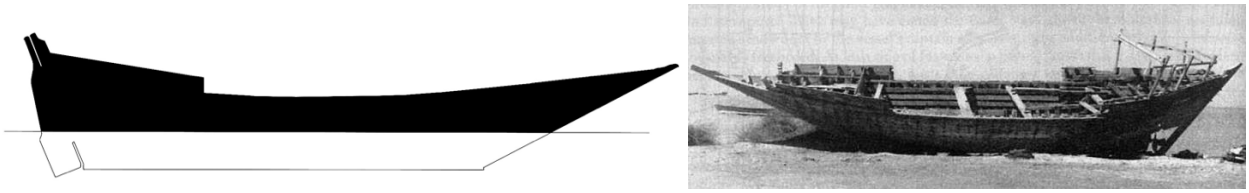


Figure A2.15 (Left) *zārūq* [original sanbūq] (after Prados 1997: fig. 3); (right) *zārūq* [original sanbūq] with bulwarks (Prados 1997: fig. 4).

A2.16 ***Zārūqa*** pl. *zawārik (zarukah, zarooqa, garookuh)* 5–15 m LOA: a *zārūqah* is a small double-ended, open craft of the Musandam peninsula, referred to also as a *mashūah* or *shāhūf*. This vessel appears similar in profile but smaller than the *battīl qarib* and *baqqāra* but should not be confused with the *zaruq* of Southern Arabia. Larger seagoing versions of the *zārūqa*, as depicted in the Science Museum model 1929-1066, left below, were recorded in the Gulf in the nineteenth century (Al Salimi and Staples 2019:70–71; Facey and Martin 1979:147–150; Vosmer 1997:219, 222, 226–227; Weismann et al. 2014:425–434; Rowand 1915:2324–2325).

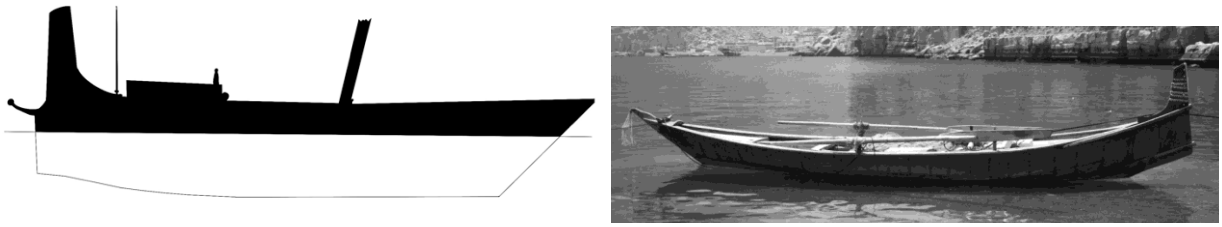


Figure A2.16 (Left) a nineteenth century seagoing *zārūqa* (after Weismann et al. 2014:426, fig. 11); (right) a modern, smaller *zārūqa* from Musandam (from Weismann et al. 2014:430, fig. 17).

APPENDIX B: CATALOGUE OF VISUAL SOURCES

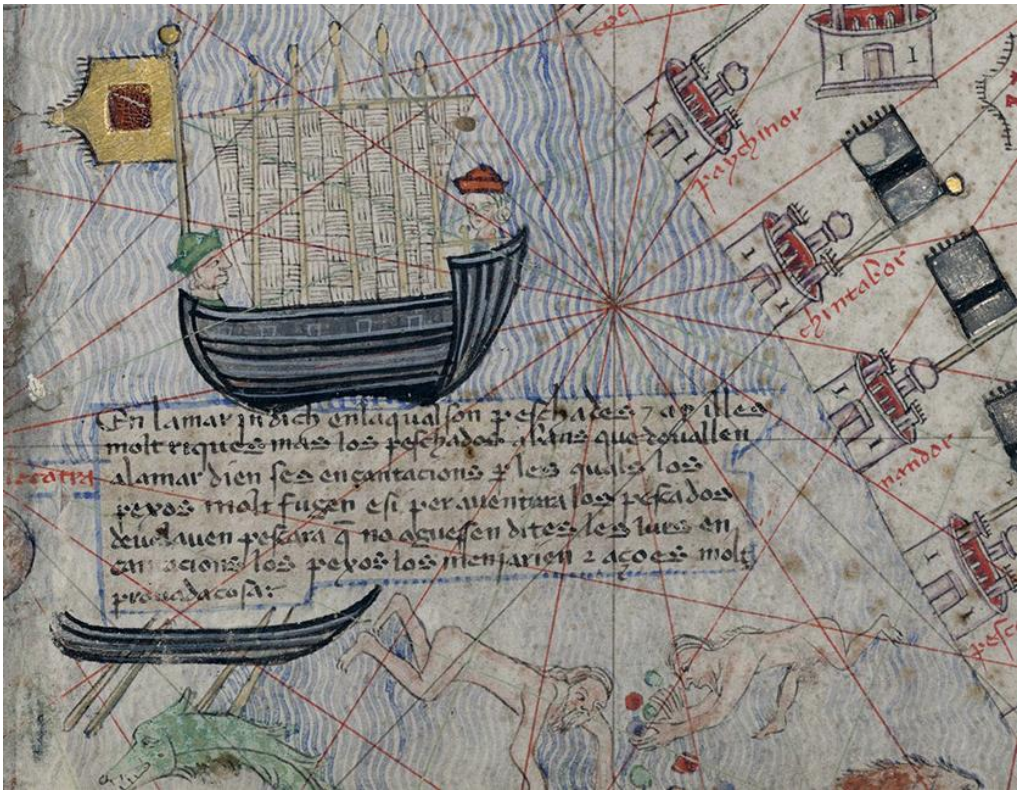
Appendix B is a catalogue of visual sources that depict vernacular watercraft of the Persian Gulf between 1200 and 1900. These sources include watercraft engaged in activities not restricted to acts of maritime violence, as vernacular watercraft were also used for many purposes other than fighting. The categories of iconographic sources included are graphic sources (Section **B1**), Islamic manuscript illustrations (Section **B2**), glyphs and graffiti (Section **B3**), models (Section **B4**) and photographs (Section **B5**). These categories are defined in Chapter 5. Section **B6** lists missing sources that were unavailable at appropriate resolution or that were identified too late for inclusion in the main catalogue.

Individual entries are listed alphabetically then chronologically within their category, with a full citation listed in the bibliography under **Artworks**. Uncertain or estimated dates are prefixed with circa (c.). References in Section B3 on glyphs and graffiti are arranged alphabetically and then by the site naming convention used in the source. The location of the site is included after the citation in square parentheses under the site number and artefact numbers are given in square parentheses under individual figures. In the case of Kapel 2017 [B3.8] the site numbers are shown under the figure and artefact numbers are shown to the right of or as close to the individual watercraft as possible.

B1 Graphic sources

B1.1

Abraham 1375 [detail]



B1.2

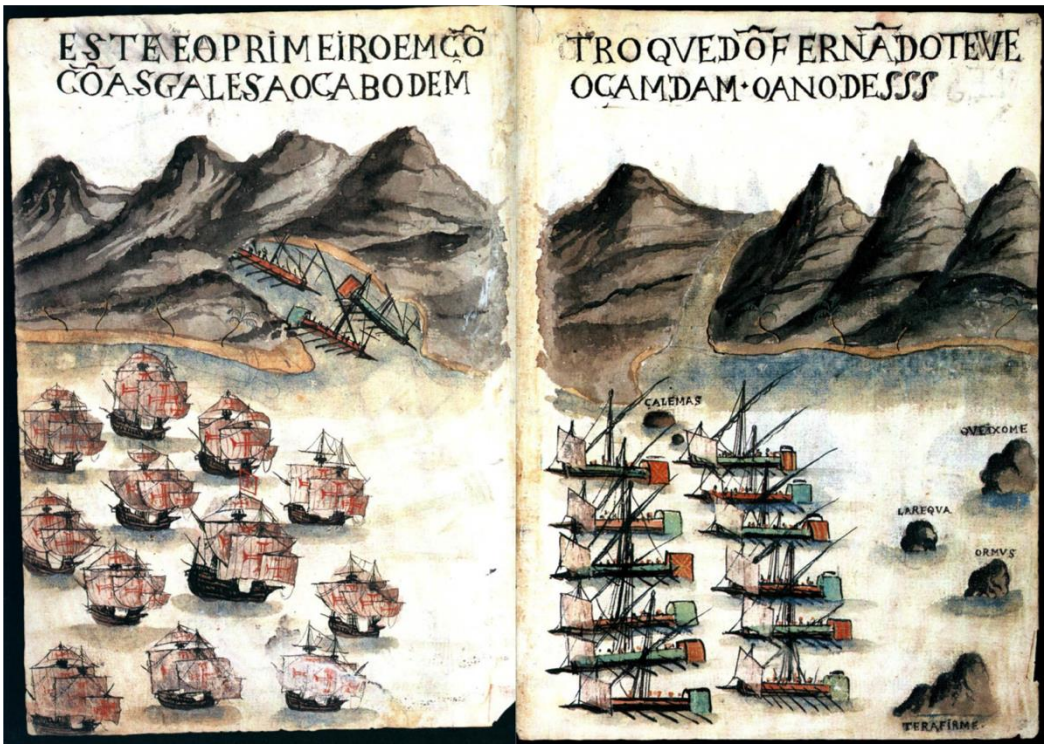
Anon. c.1400–1450 [detail]

B1.3

Anon. c.1507–1599 [detail]

B1.4

Anon. c.1564:ff.83v–84r



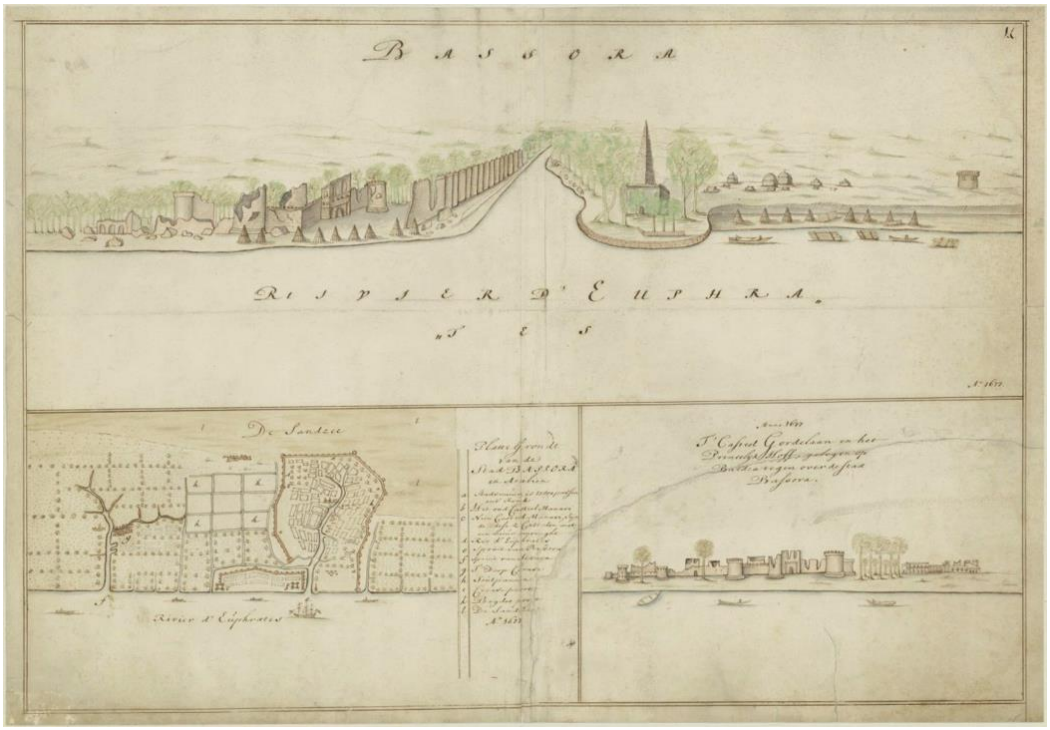
B1.5

Anon.

c.1564:ff.84v–85r

B1.6

Anon. c.1600–1699a

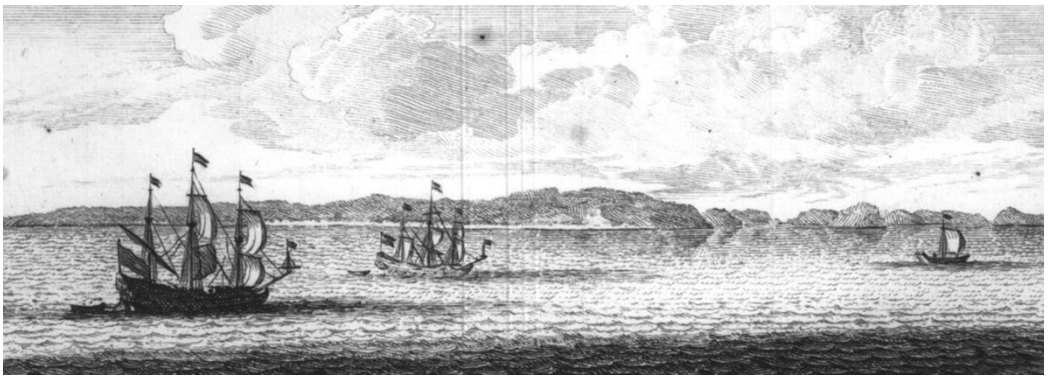


B1.7

Anon. c.1600–1699b [detail]

B1.8

Anon. c.1600–1699c



B1.9

Anon. c.1600–1699d [detail]

B1.10

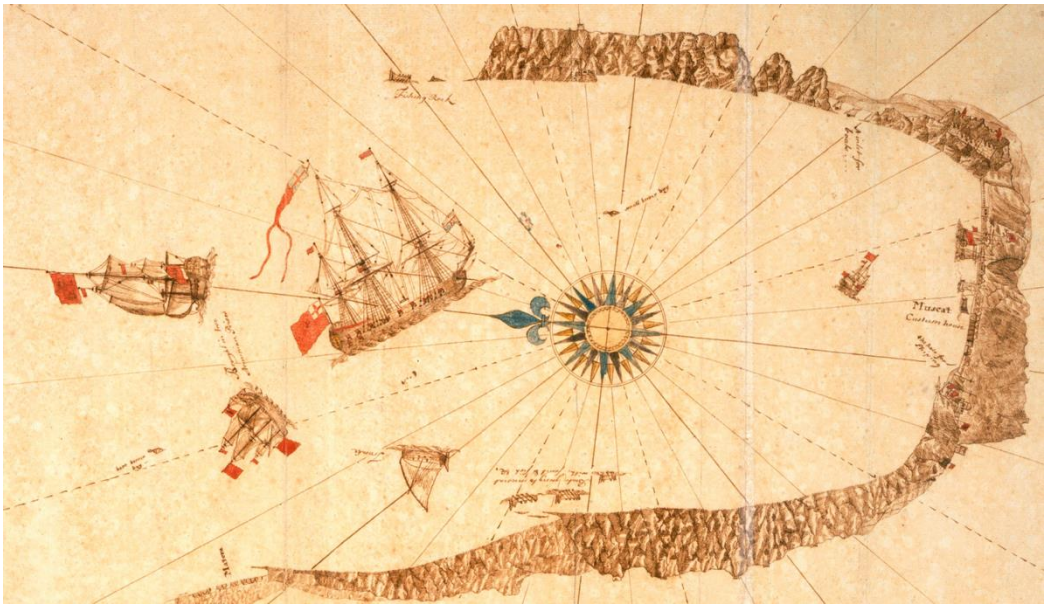
Anon. c.1600–1699e [detail]

B1.11

Anon. 1645

B1.12

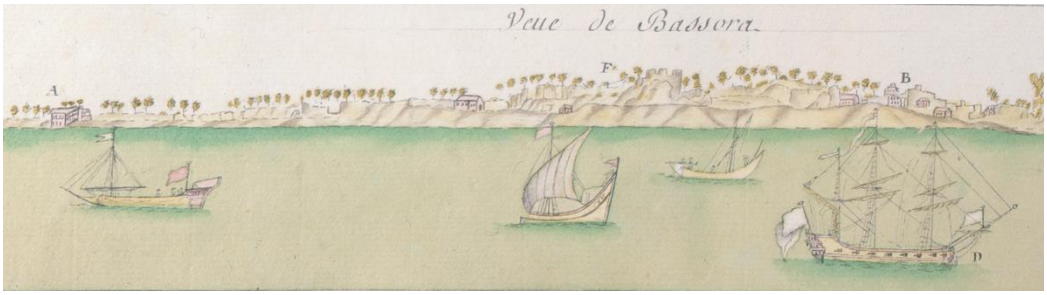
Anon. 1704a [detail]



B1.13

Anon. 1704b

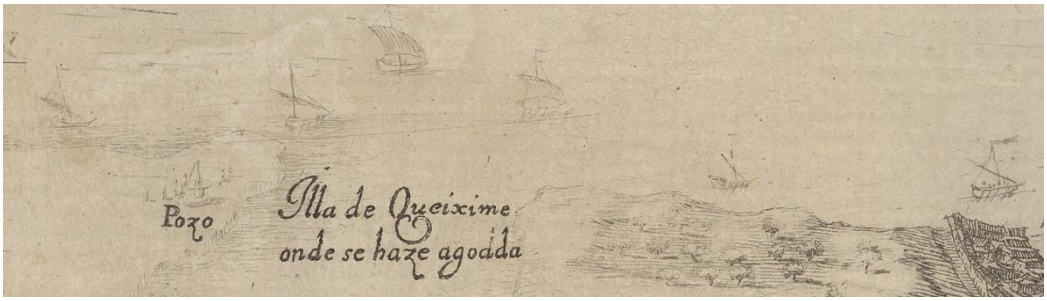
[detail]



B1.14

Anon. 1713

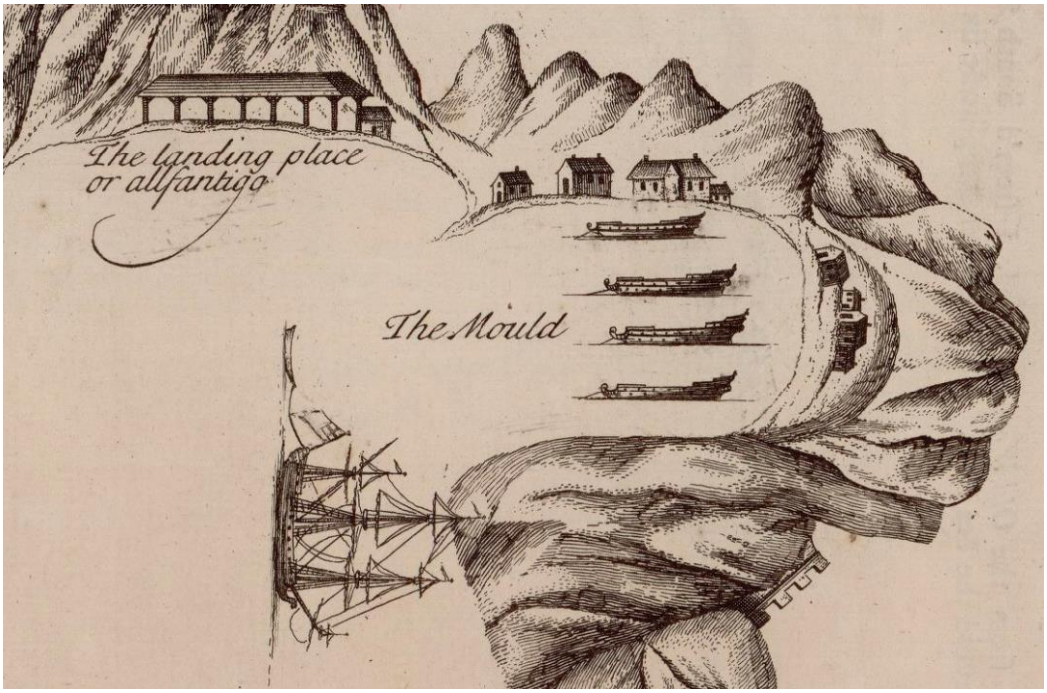
[detail]



B1.15

Anon. 1716

[detail]



B1.16

Anon. 1809

[detail]

B1.17

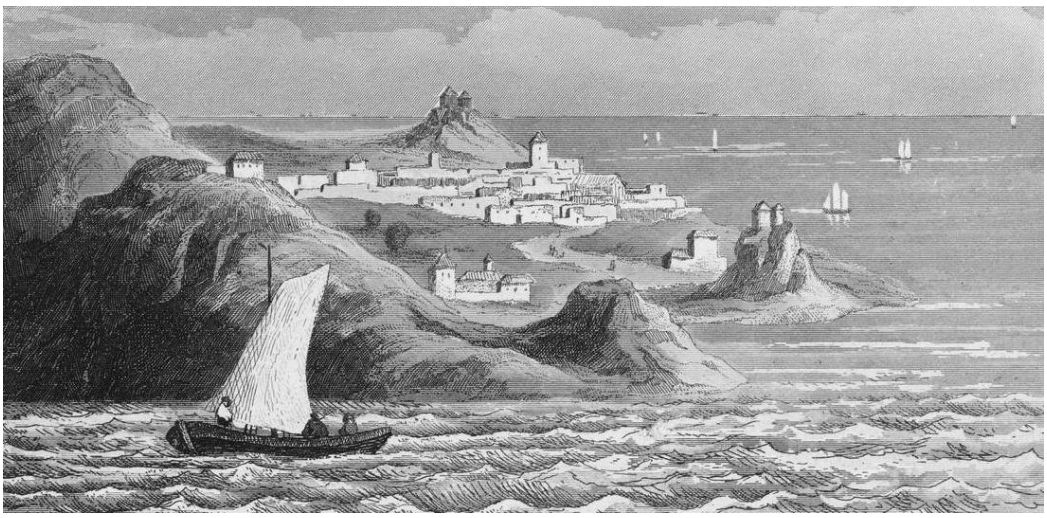
Anon. 1810

[detail]

B1.18

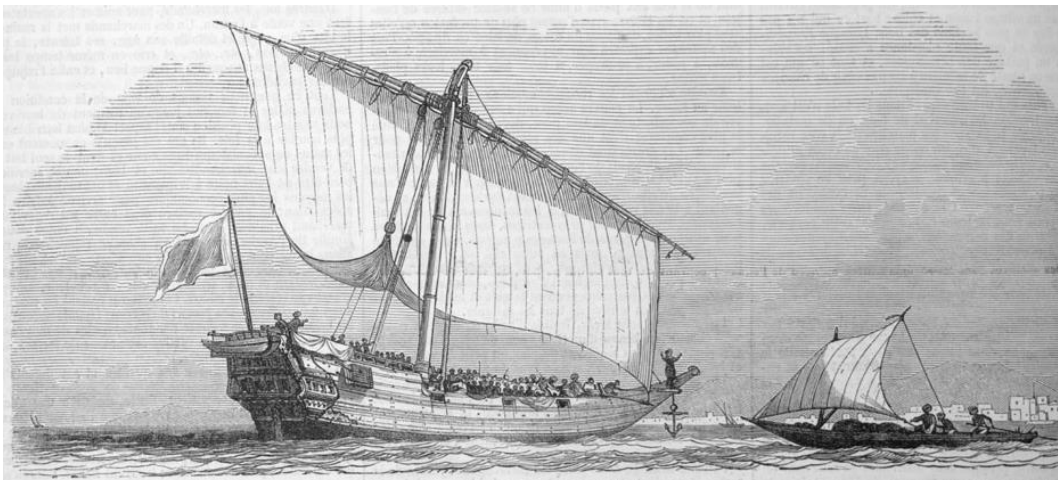
Anon. 1846

[detail]



B1.19

Anon. 1849

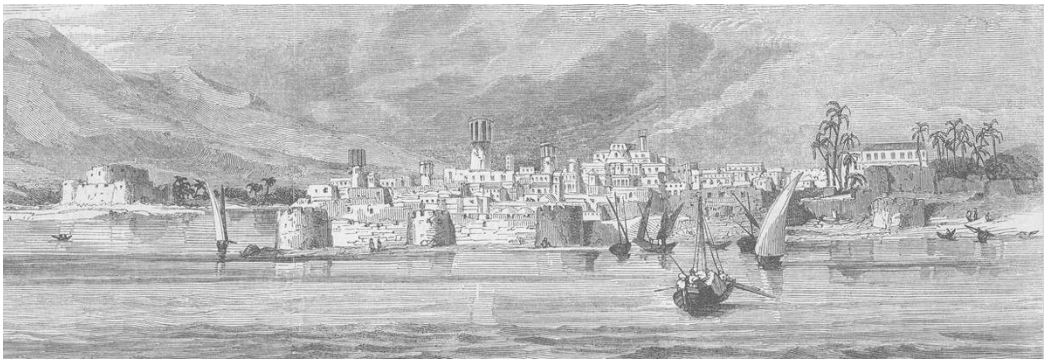


B1.20

Anon. c.1850

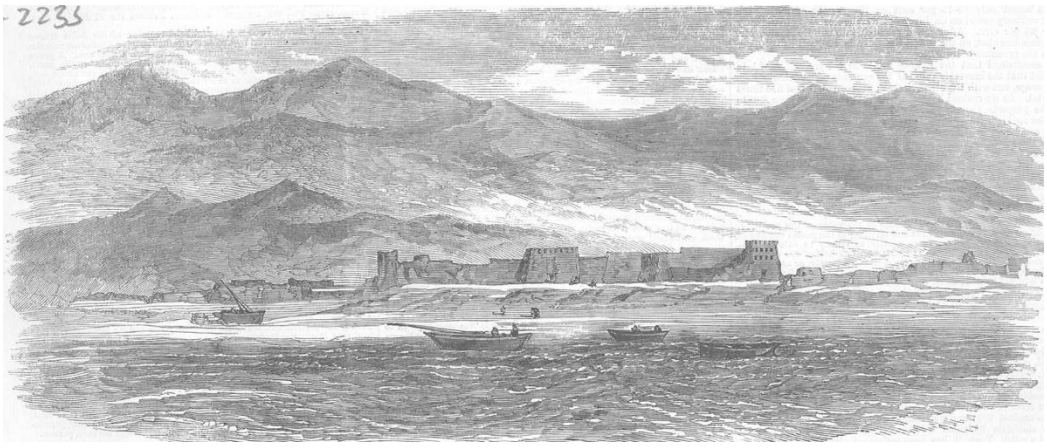
B1.21

Anon. 1856



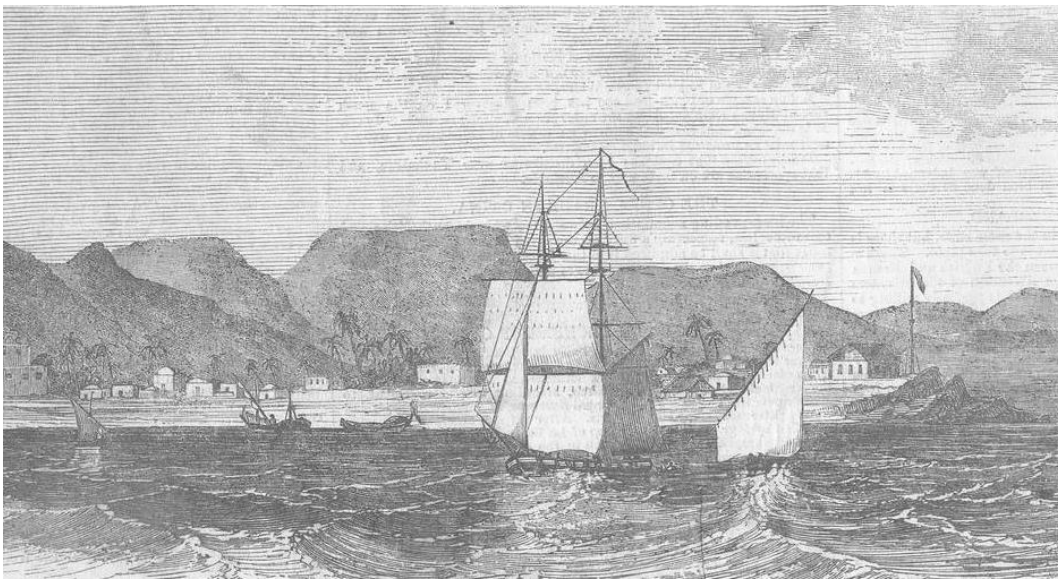
B1.22

Anon. 1857a



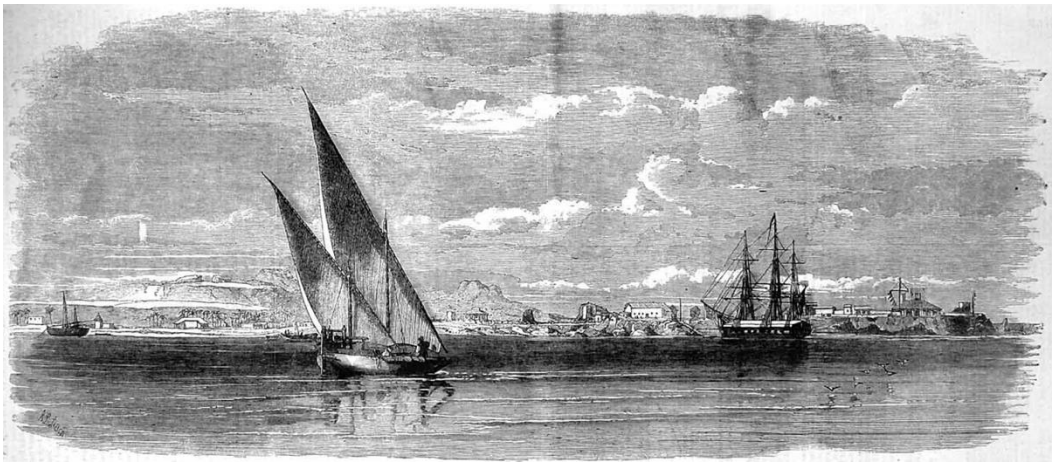
B1.23

Anon. 1857b



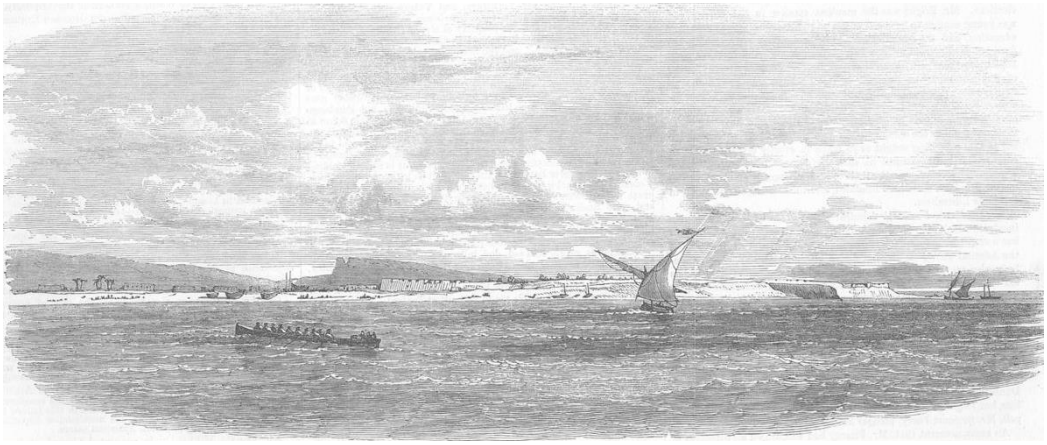
B1.24

Anon. 1857c



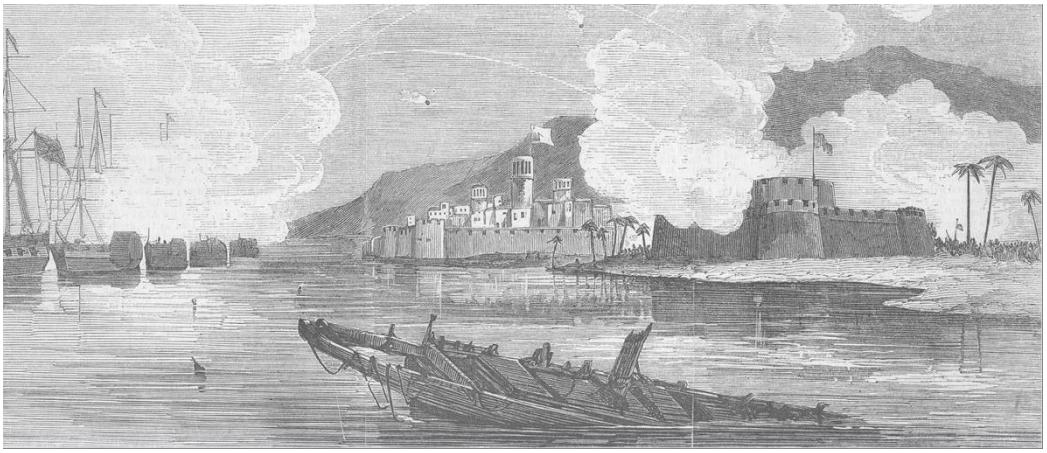
B1.25

Anon. 1857d



B1.26

Anon. 1857e



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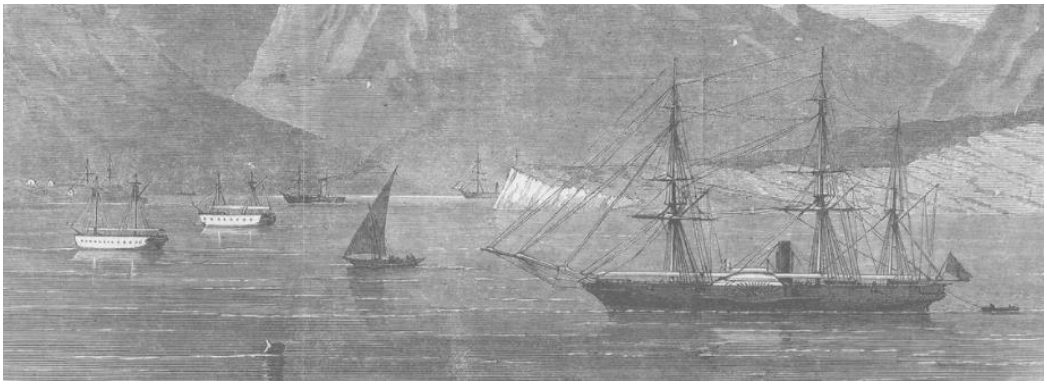
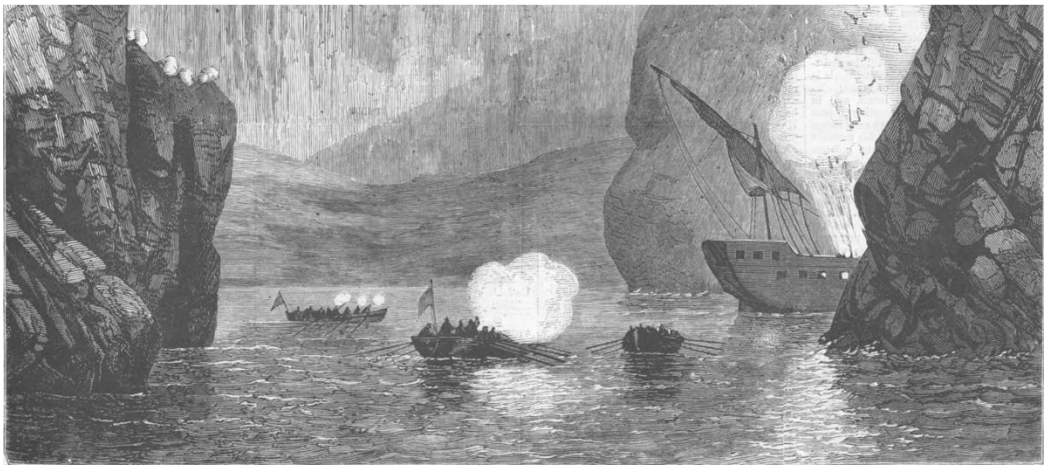
Anon.1865



B1.28

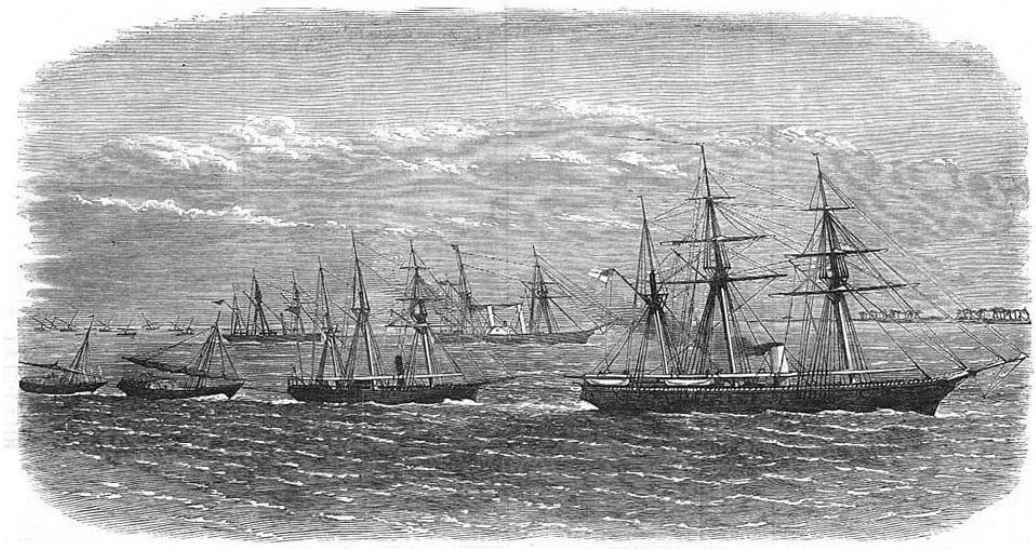
Anon. 1868

[detail]



B1.29

Anon. 1869a



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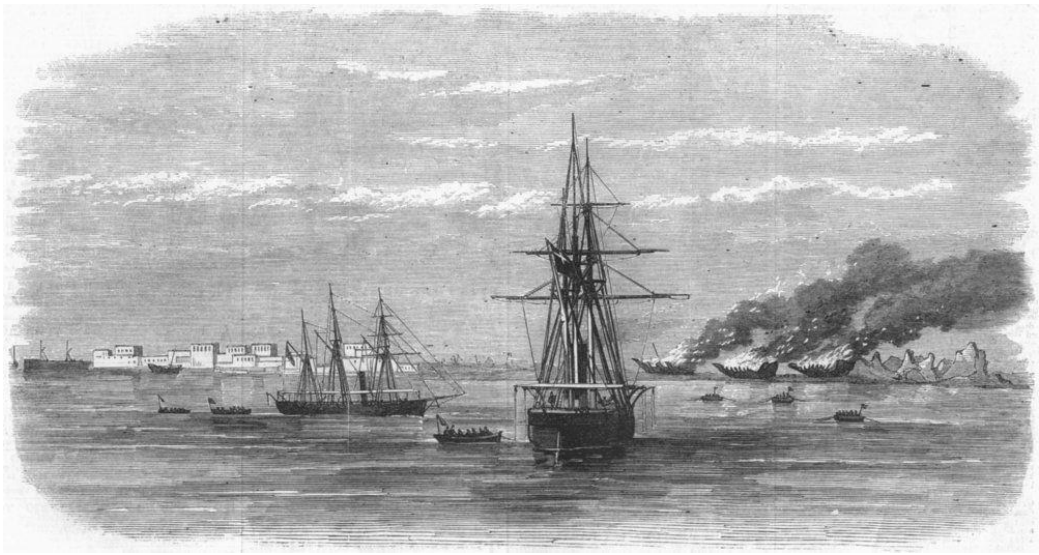
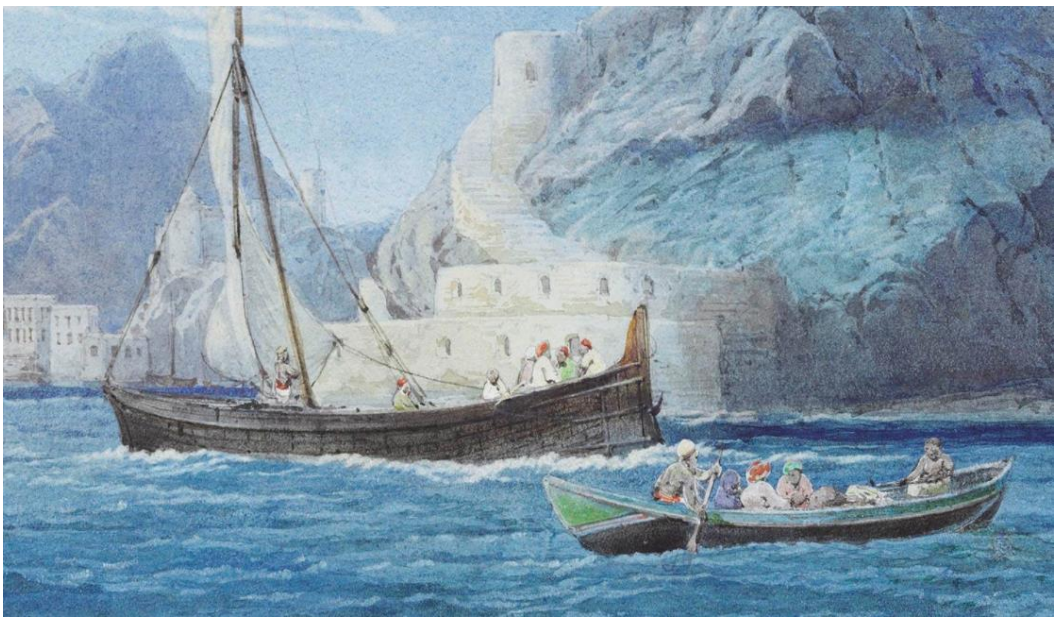
Anon. 1869b



B1.31

Anon. 1870c

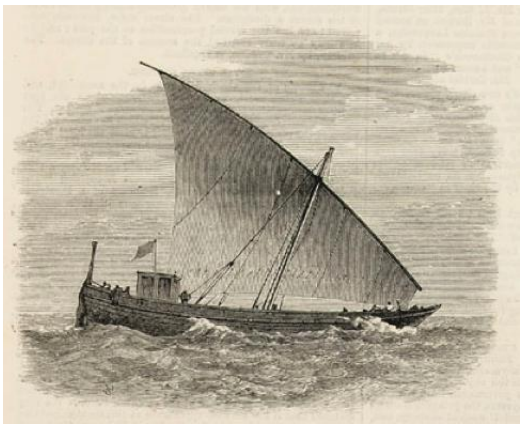
[detail]



B1.32

Anon. 1873a

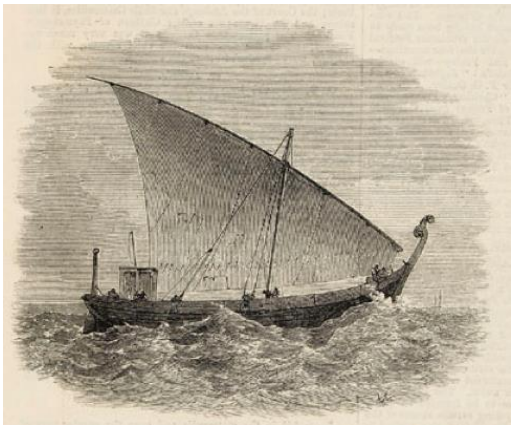
[left]



B1.33

Anon. 1873b

[right]



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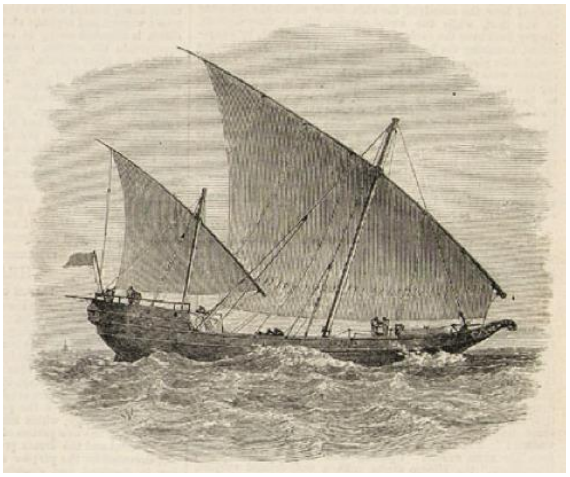
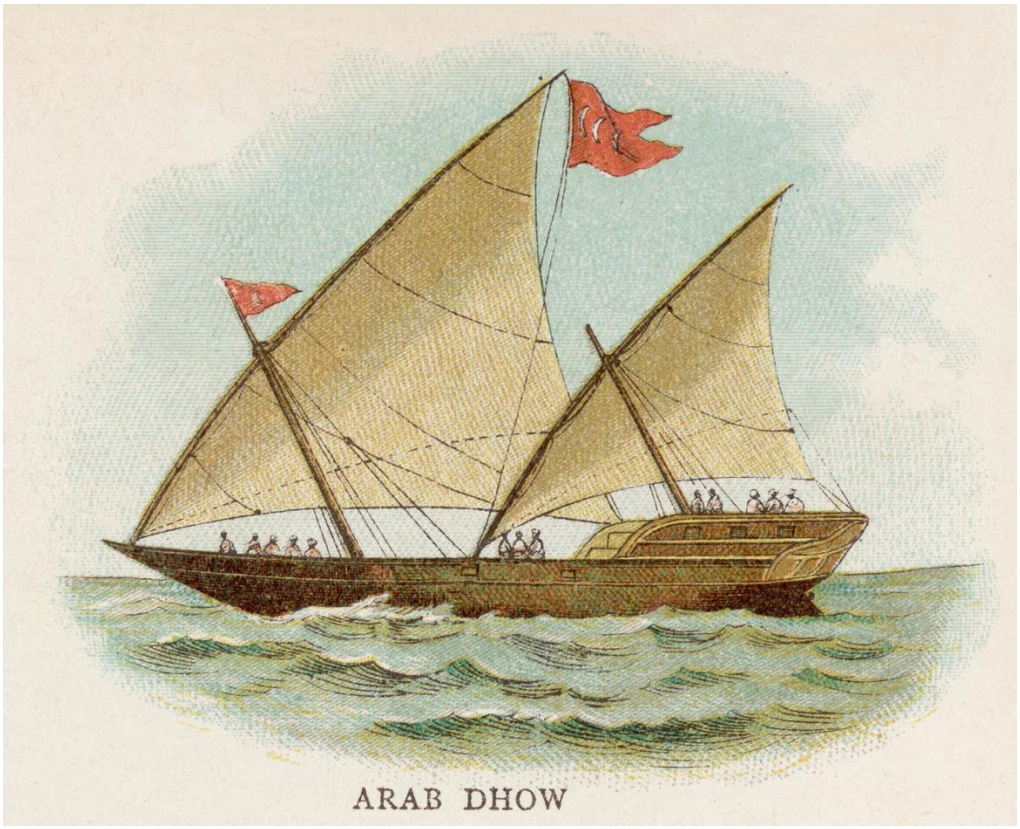


B1.35

Anon. 1873d

B1.36

Anon. c.1880



B1.37

Anon. 1881

B1.38

Anon. 1882

B1.39

Barlow 1686

(Maeer

2019:fig.3)

Removed due to copyright restrictions

B1.40

Bellin 1746

B1.41

Bouttats and

Peeters 1690a

B1.42

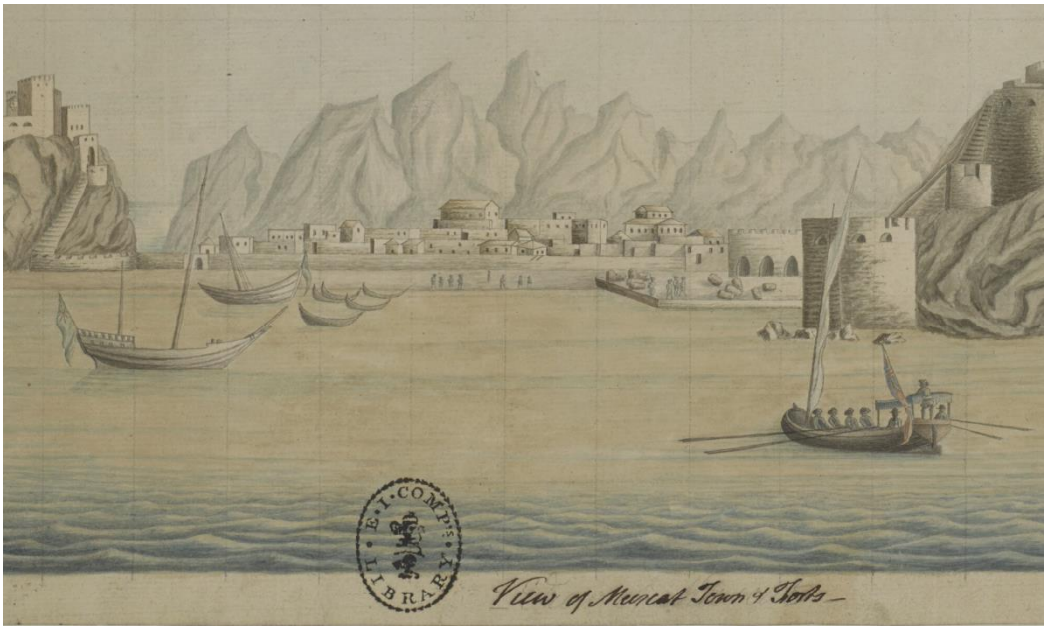
Bouttats and Peeters 1690b

B1.43

BL IOR/X/3127 [detail]

B1.44

BL IOR/X/3211 [detail]



B1.45

BL ST1062a

B1.46

BL ST1062b

B1.47

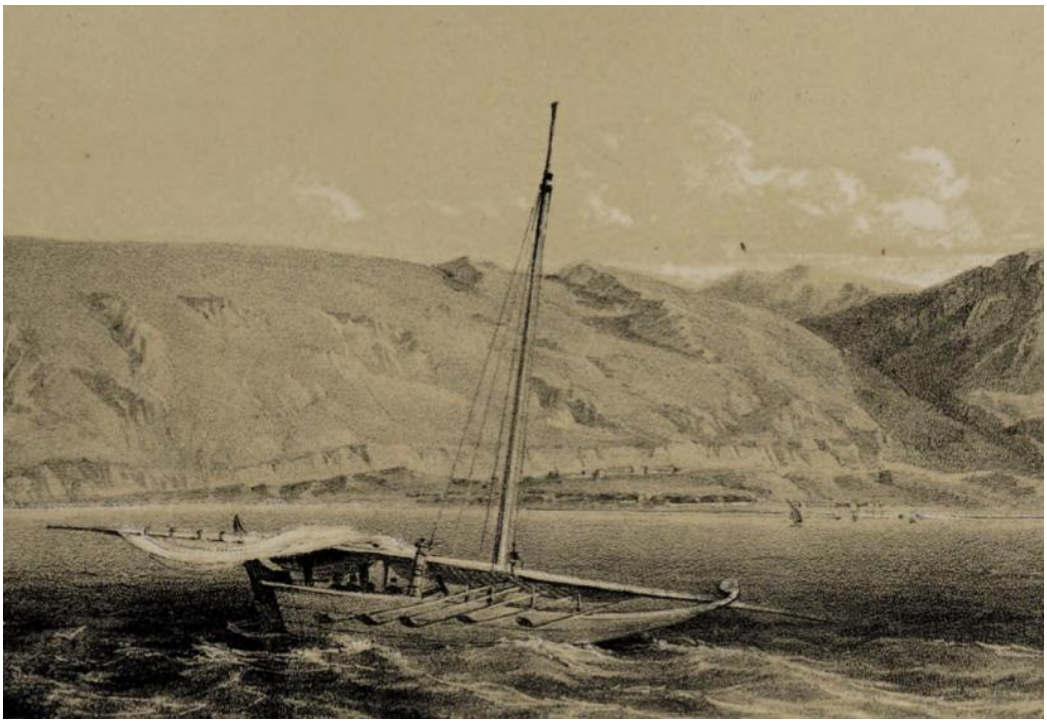
BL ST1062c

B1.48

BnF 1410–1412

B1.49

Chesney 1850a: pl.XIII [detail]



B1.50

Chesney 1850b: pl.X [detail]

B1.51

Collins c.1630 [detail]

B1.52

Cussons 1820

B1.53

Daniell, W.

c.1790–1837

B1.54

Daniell, T. 1793

B1.55

Daniell, T.

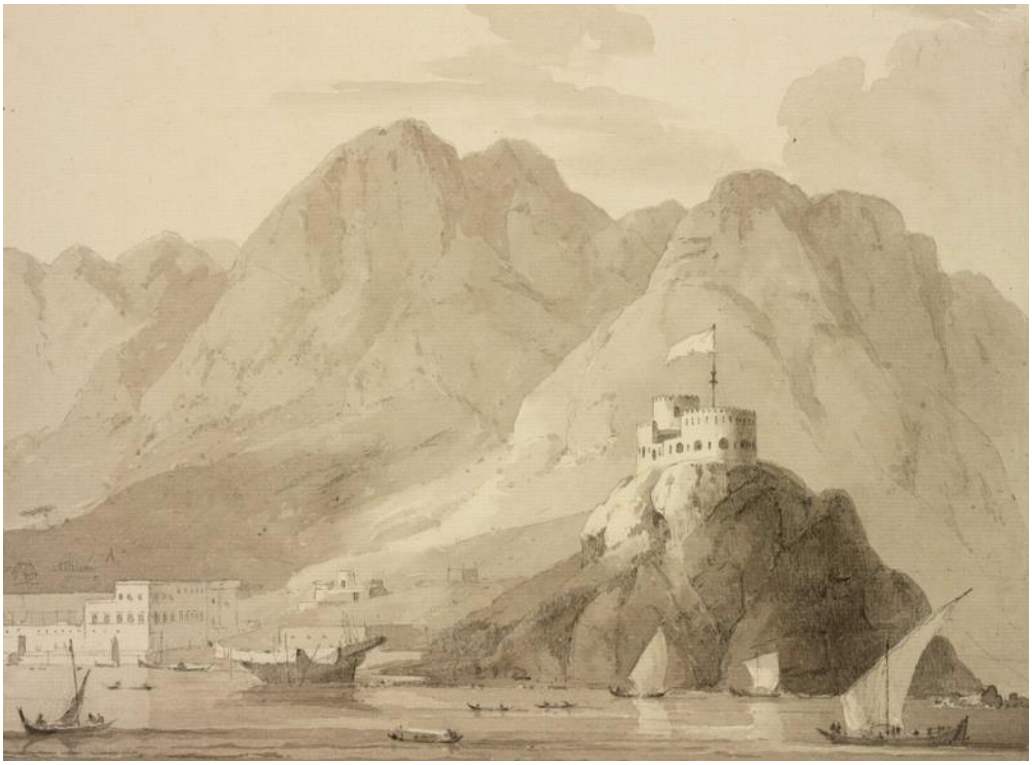
c.1793 [detail]

Removed due to copyright restrictions

B1.56

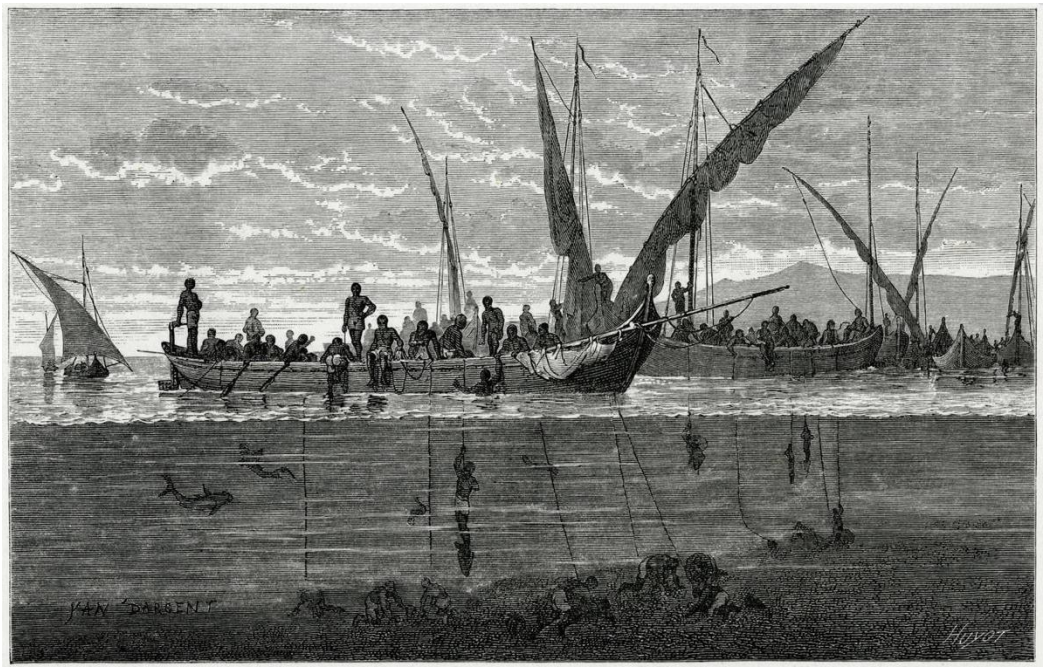
Daniell, W.

1793



B1.57

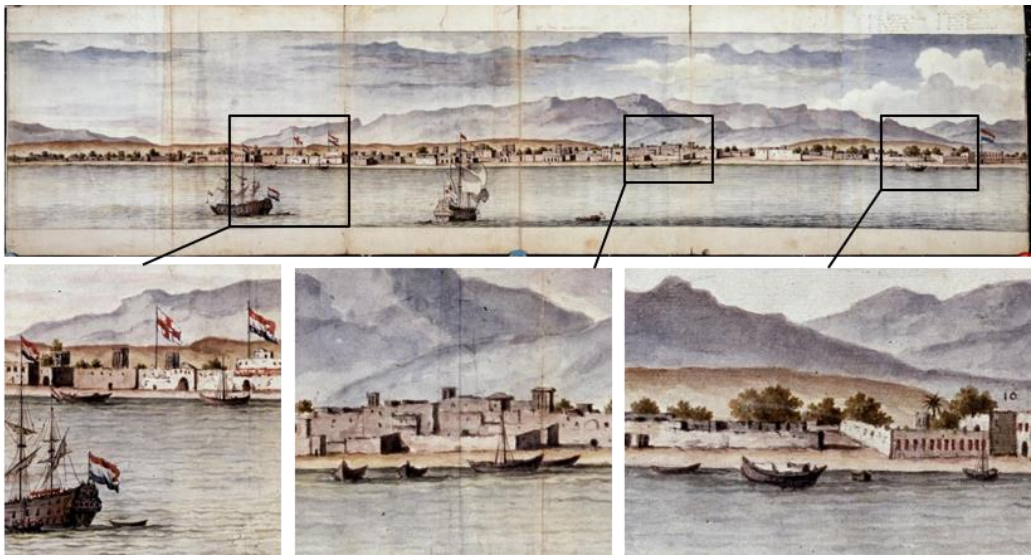
D’Argent 1870



B1.58

De Bruyn 1704

[inset detail]



B1.59

De Bruyn 1714

B1.60

De Bry 1599

B1.61

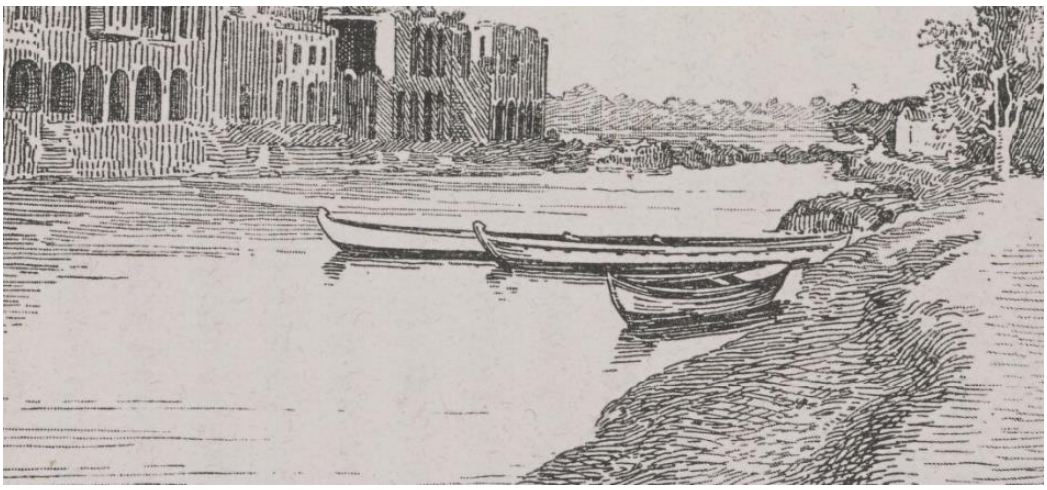
Decker and Marshoorn c.1665–1685 [detail]

B1.62

de Rivoyre 1883a [detail]

B1.63

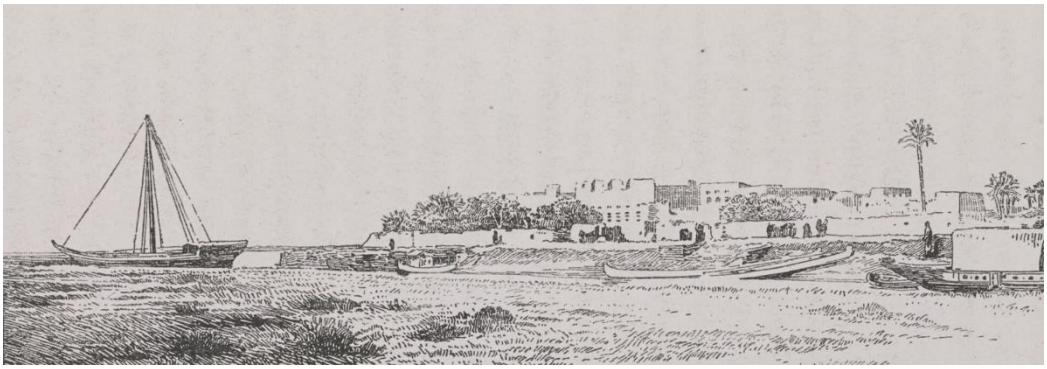
de Rivoyre 1883b [detail]



B1.64

de Rivoyre

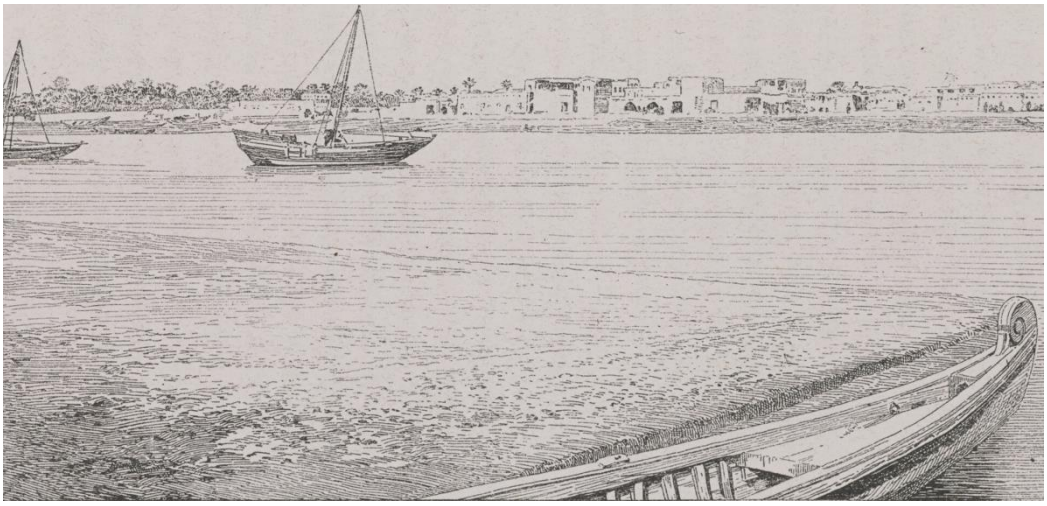
1883c [detail]



B1.65

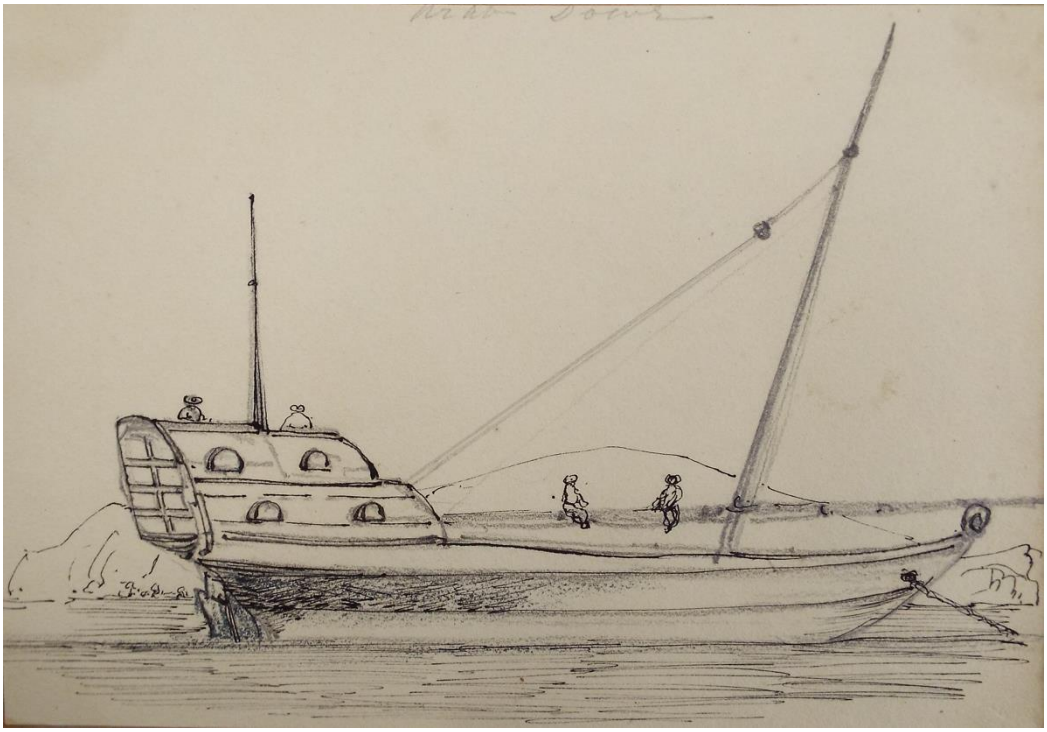
de Rivoyre

1883d [detail]



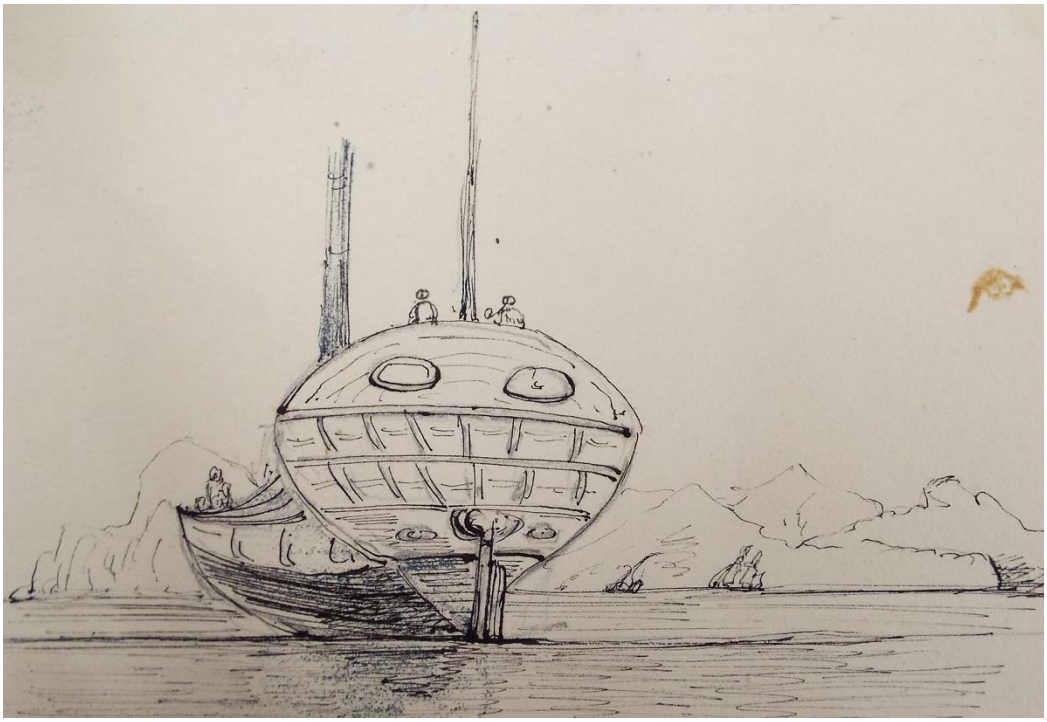
B1.66

Edgell 1832a



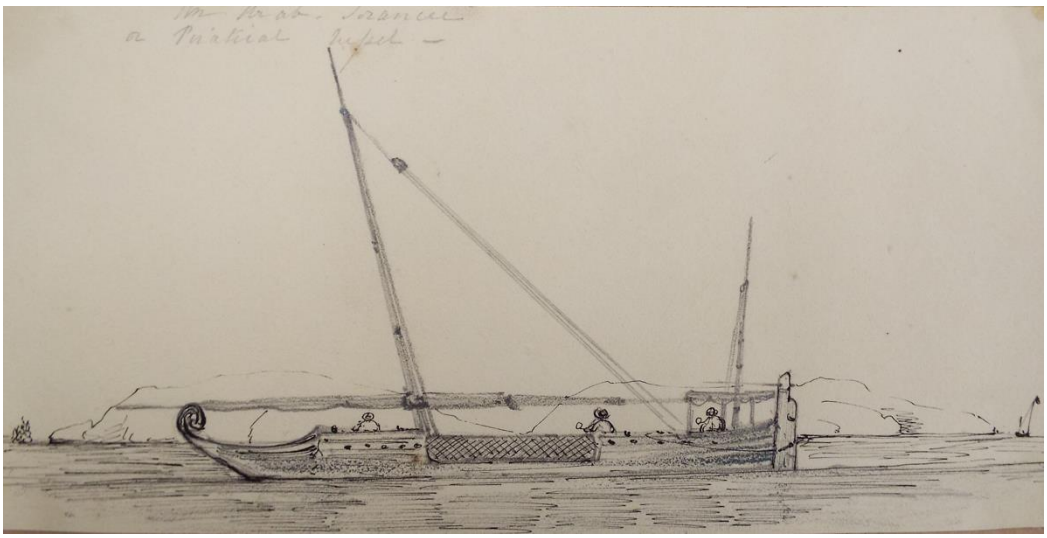
B1.67

Edgell 1832b



B1.68

Edgell c.1832



B1.69

Farington

c.1700–1799

[detail]

B1.70

Flandin 1851

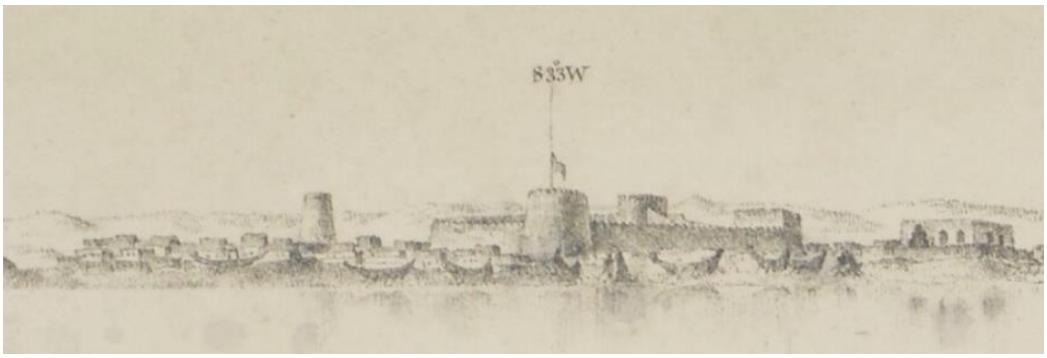
B1.71

Geiger 1637 [detail] (from Carter 2012:69)

Removed due to copyright restrictions

B1.72

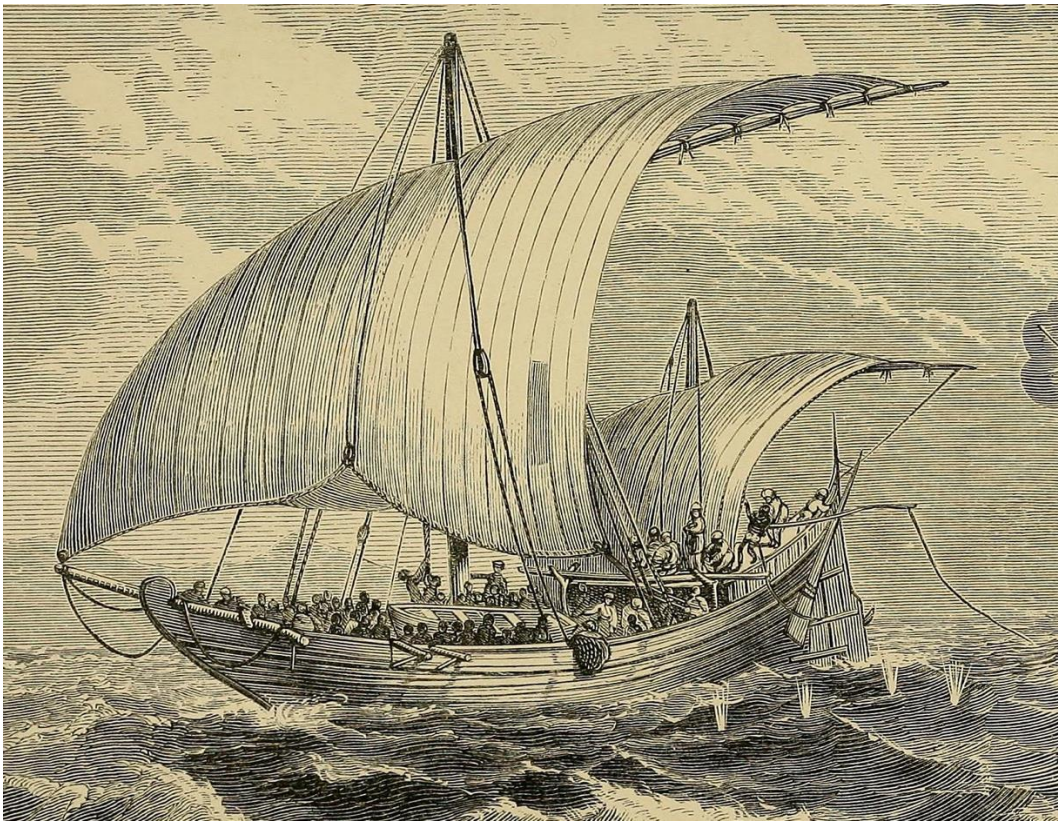
Guy and Brucks 1823 [inset detail]



B1.73

Henn 1873

[detail]

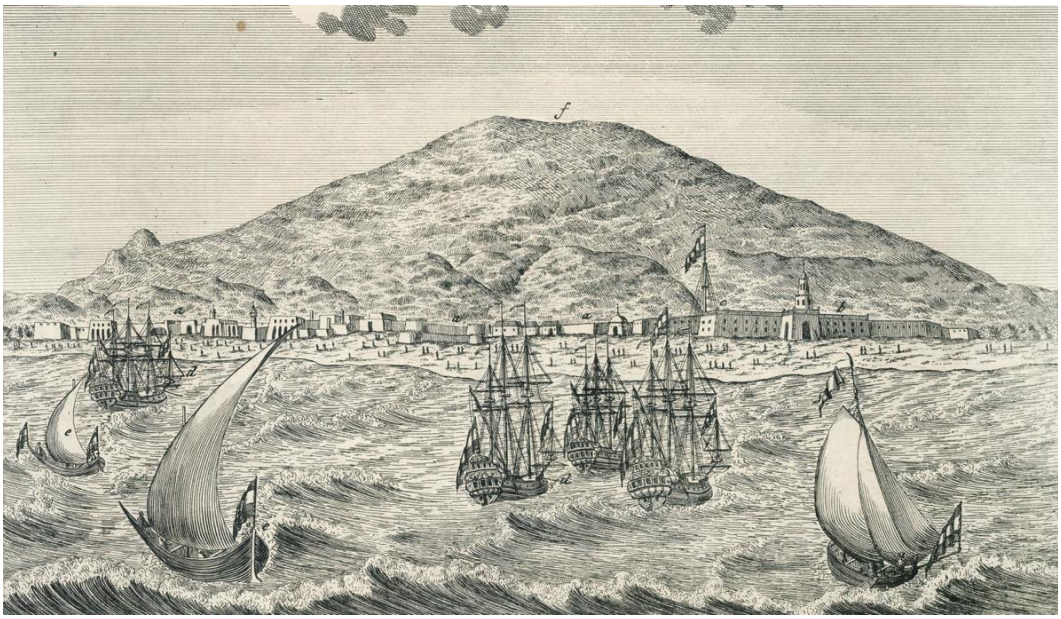


B1.74

Heydt and Tetschner

c.1735–1744

[detail]



B1.75

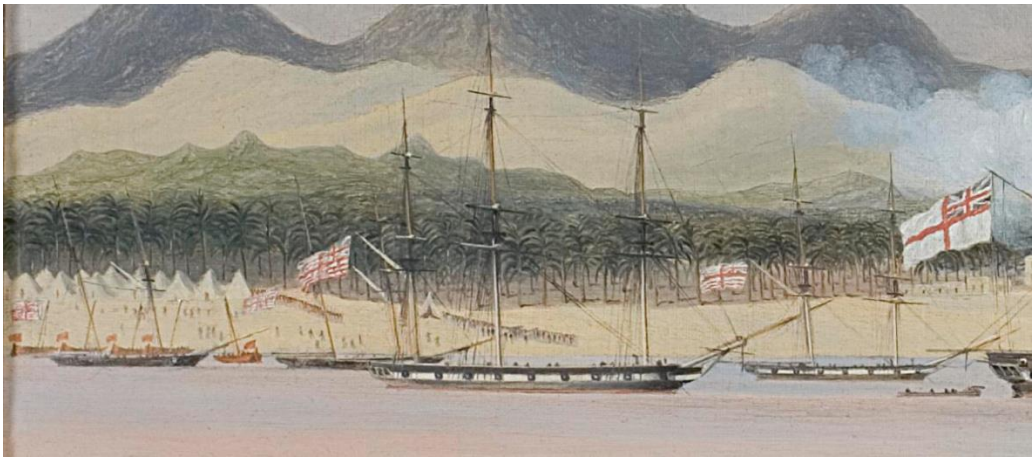
Hipschman, and van Meurs c.1680

B1.76

Hornbrook c.1840a [detail]

B1.77

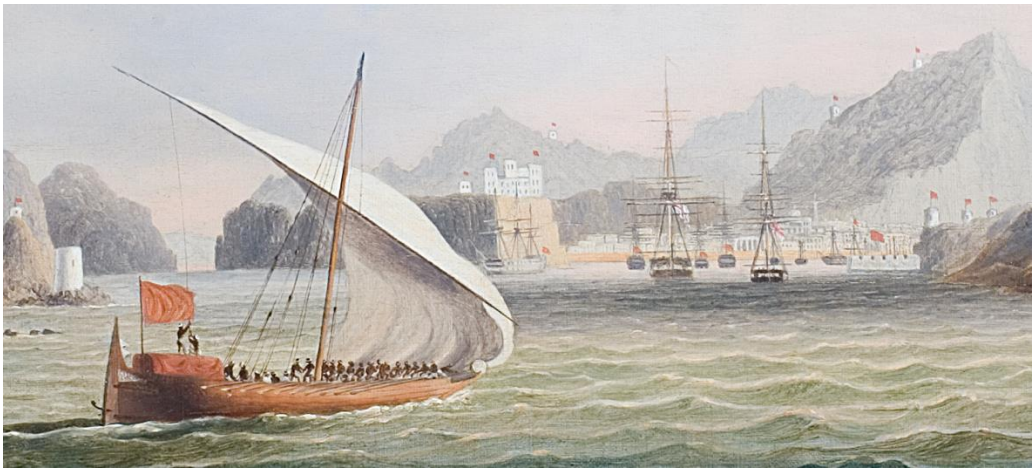
Hornbrook c.1840b [detail]



B1.78

Hornbrook

c.1840c [detail]



B1.79

Hornbrook

c.1840d [detail]

B1.80

Houghton

1825:f.12r

[detail]

B1.81

Houghton

1825:f.13r

[detail]

B1.82

Houghton

1825:f.14r

[detail]

B1.83

Houghton

1825:f.15r

[detail]

B1.84

Igglesden 1819

[detail]

B1.85

Kaempfer and Schenchzer

c.1650–1699

B1.86

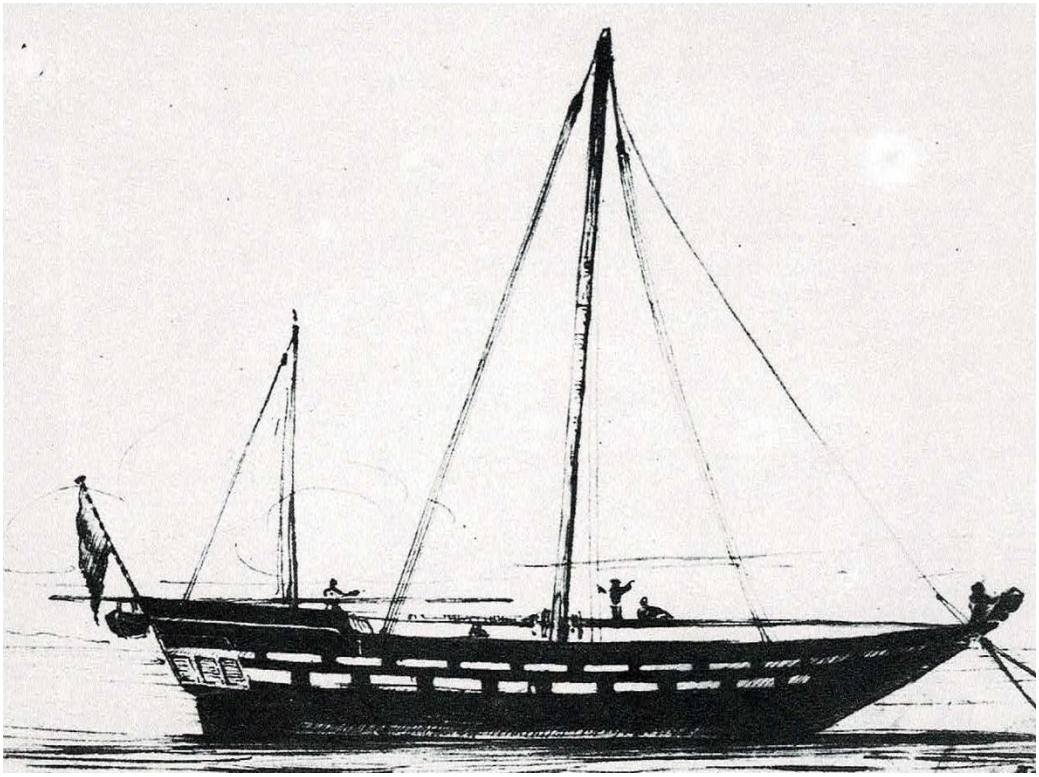
Kip 1682

[detail]

B1.87

Kirk 1832

[detail]



B1.88

Layman 1787

B1.89

Loch c.1819a

[detail]

B1.90

Loch c.1819b [detail]

B1.91

Loch c.1819c [detail]

B1.92

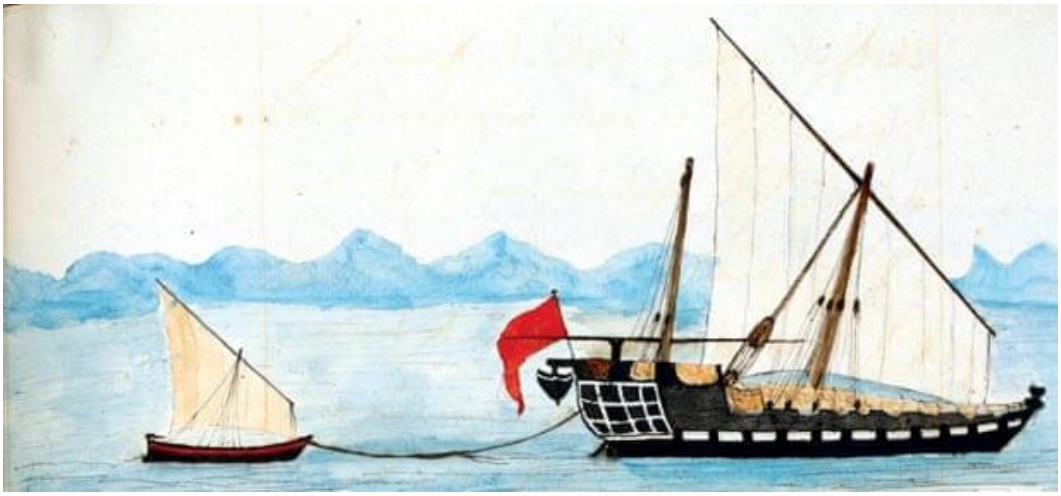
Luyken 1682 [left]

B1.93

Luyken 1689 [right] (reissued in Thévenot 1727:576)

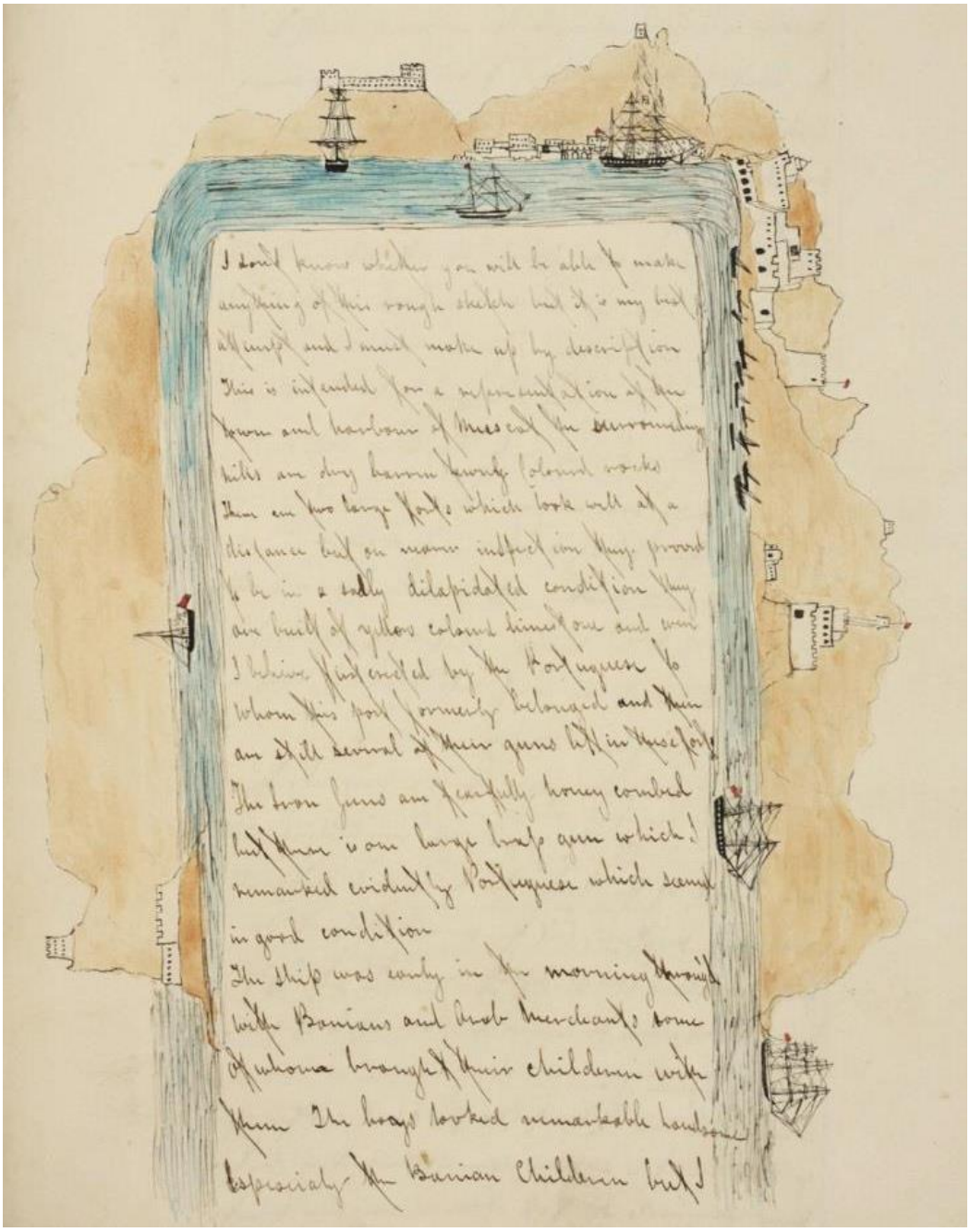
B1.94

Machell 1847



B1.95

Machell c.1847



B1.96

Marmocchi

1840–1847

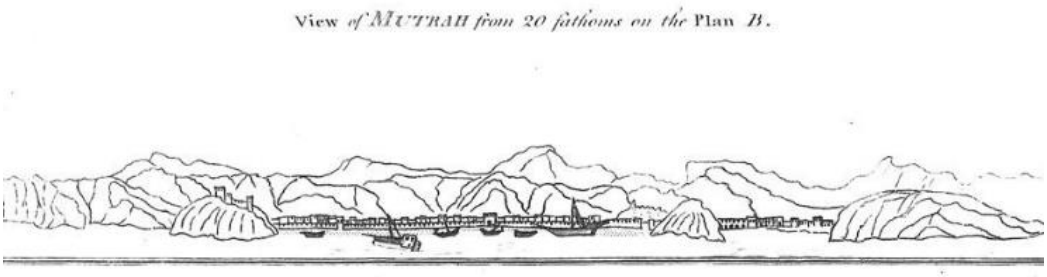
B1.97

Mathan c.1632–1634

B1.98

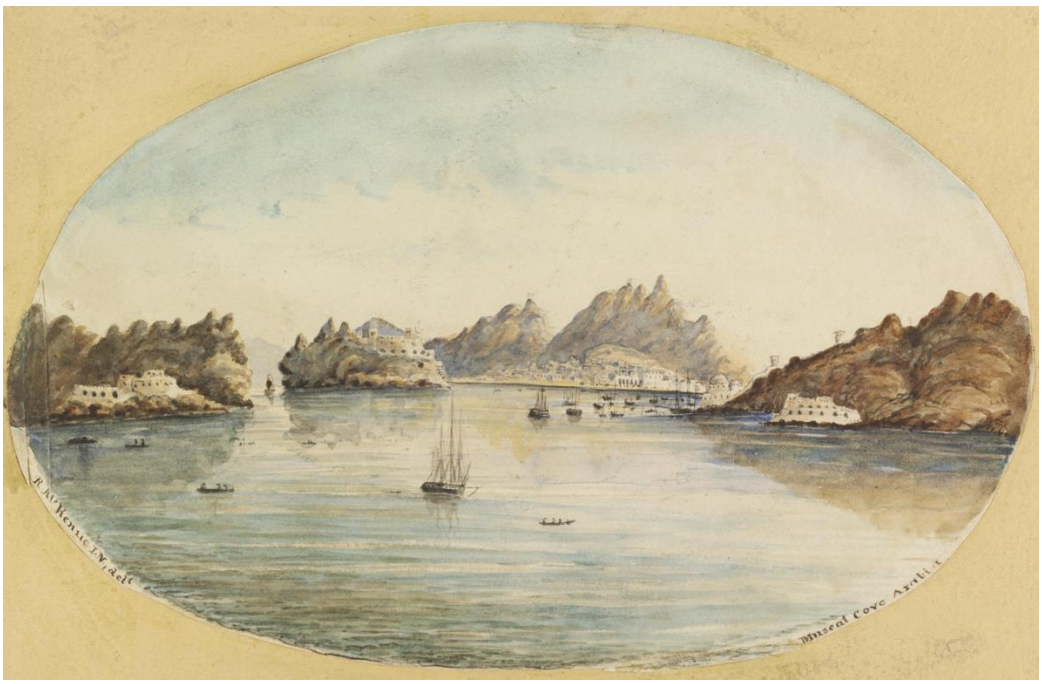
McCluer 1785

[detail]



B1.99

McKenzie 1826



B1.100

Monleón

c.1870a

B1.101

Monleón

c.1870b

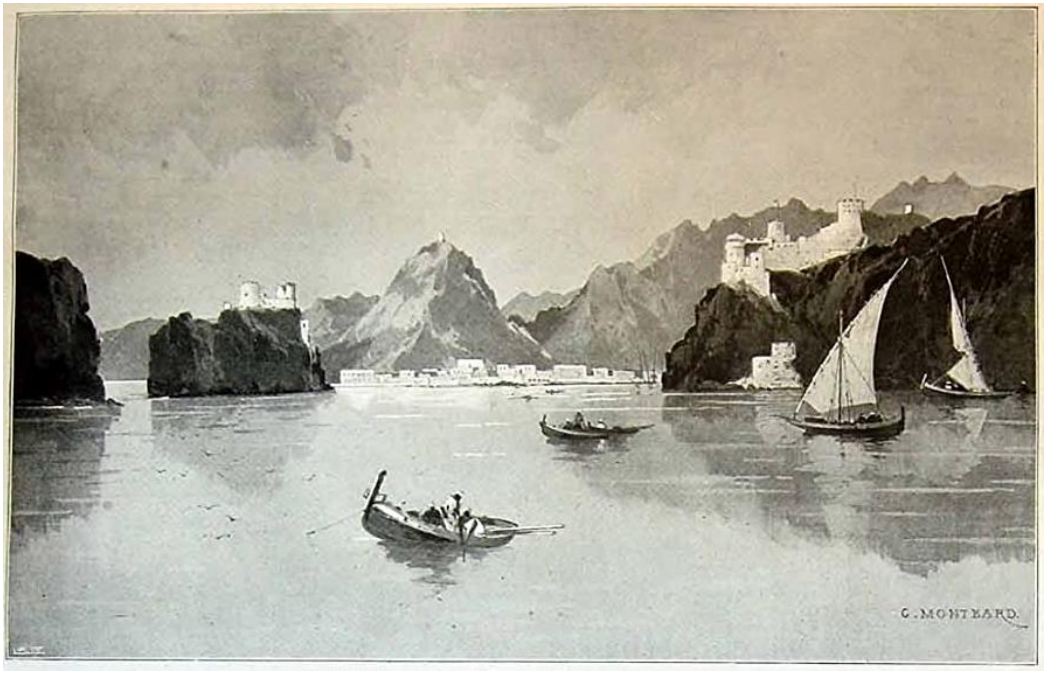
B1.102

Monleón

c.1870c

B1.103

Montbard 1898



B1.104

Morier 1812:pl. II [detail]

B1.105

Morier 1812:pl. III [detail]

B1.106

Morier 1812:pl. IV [detail]

B1.107

Morier 1812:pl. V [detail]

B1.108

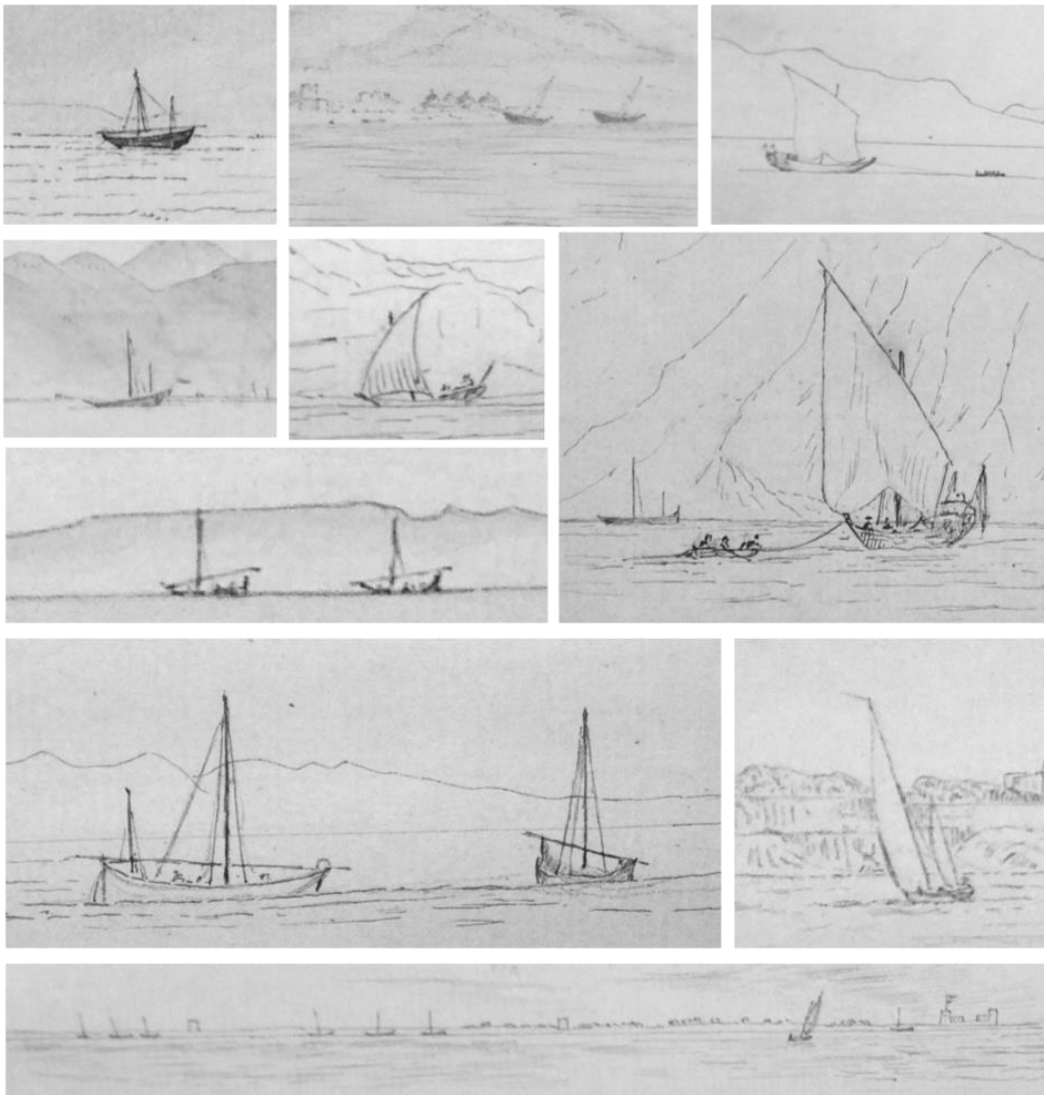
Nash 1895

Removed due to copyright restrictions

B1.109

NMM NVP/17

[detail]

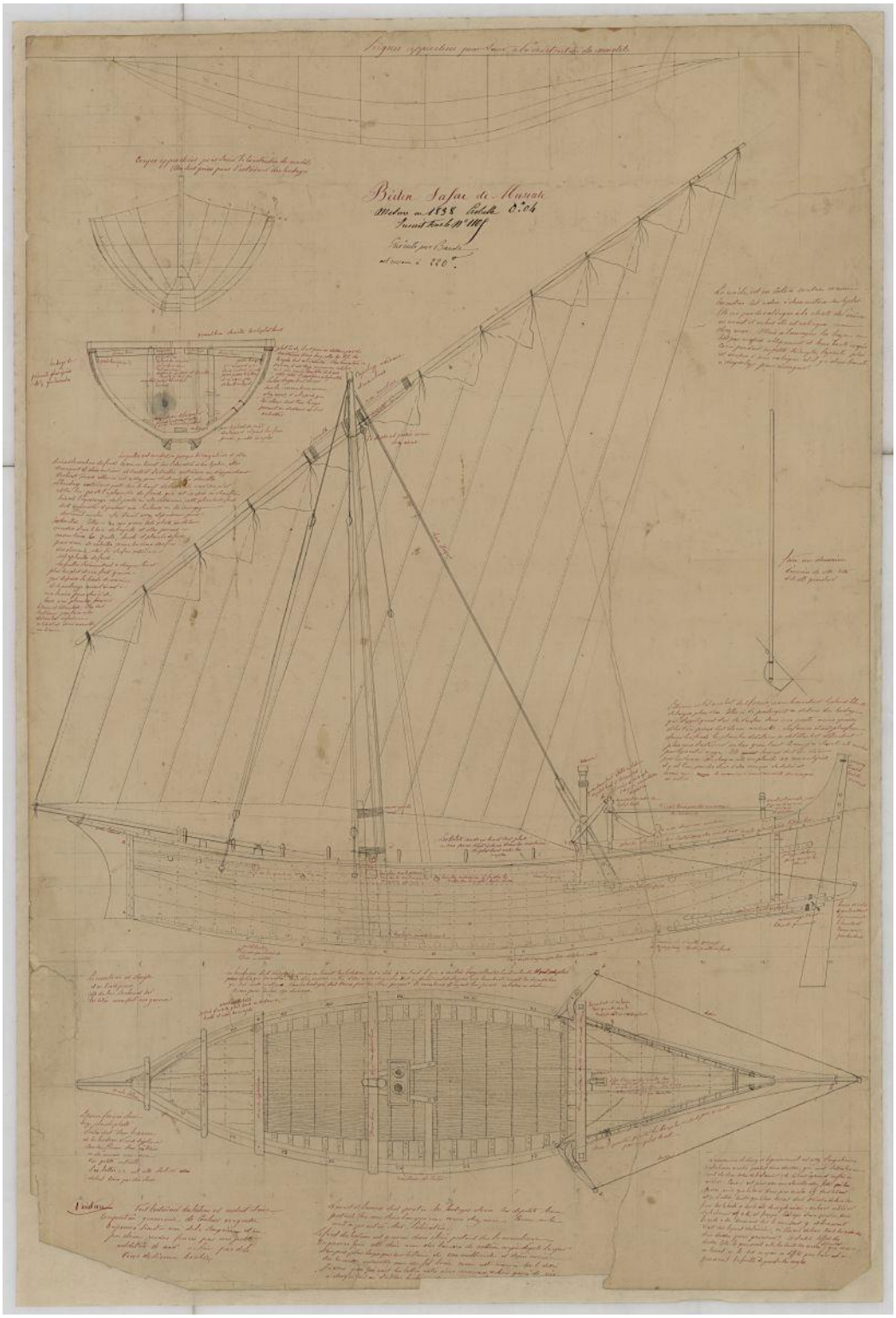


B1.110

Papety 1846

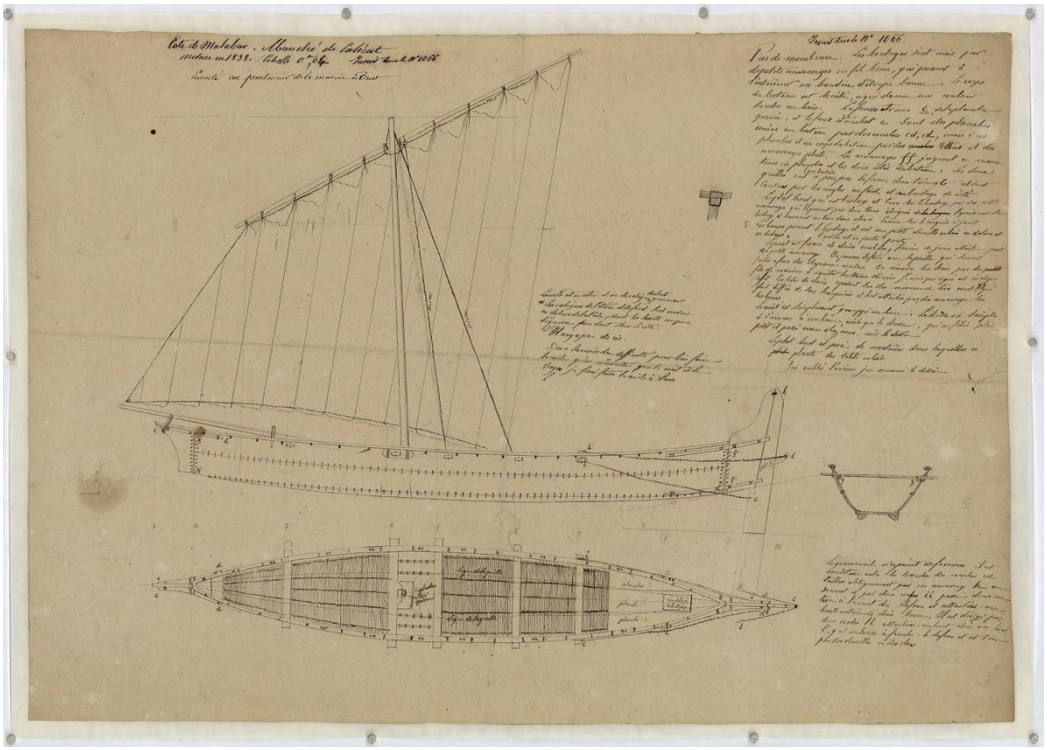
B1.111

Pâris 1838a



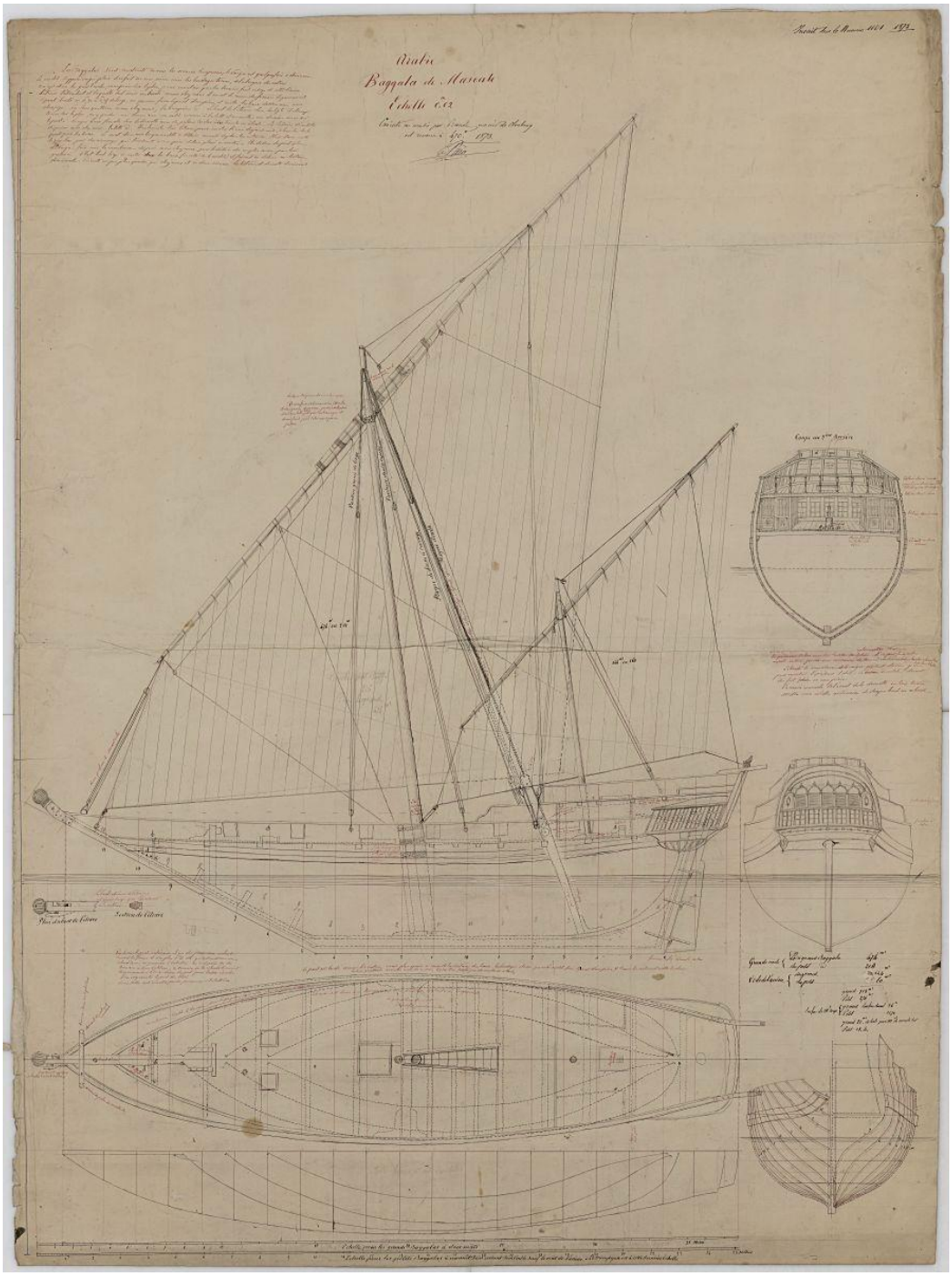
B1.112

Pâris 1838b



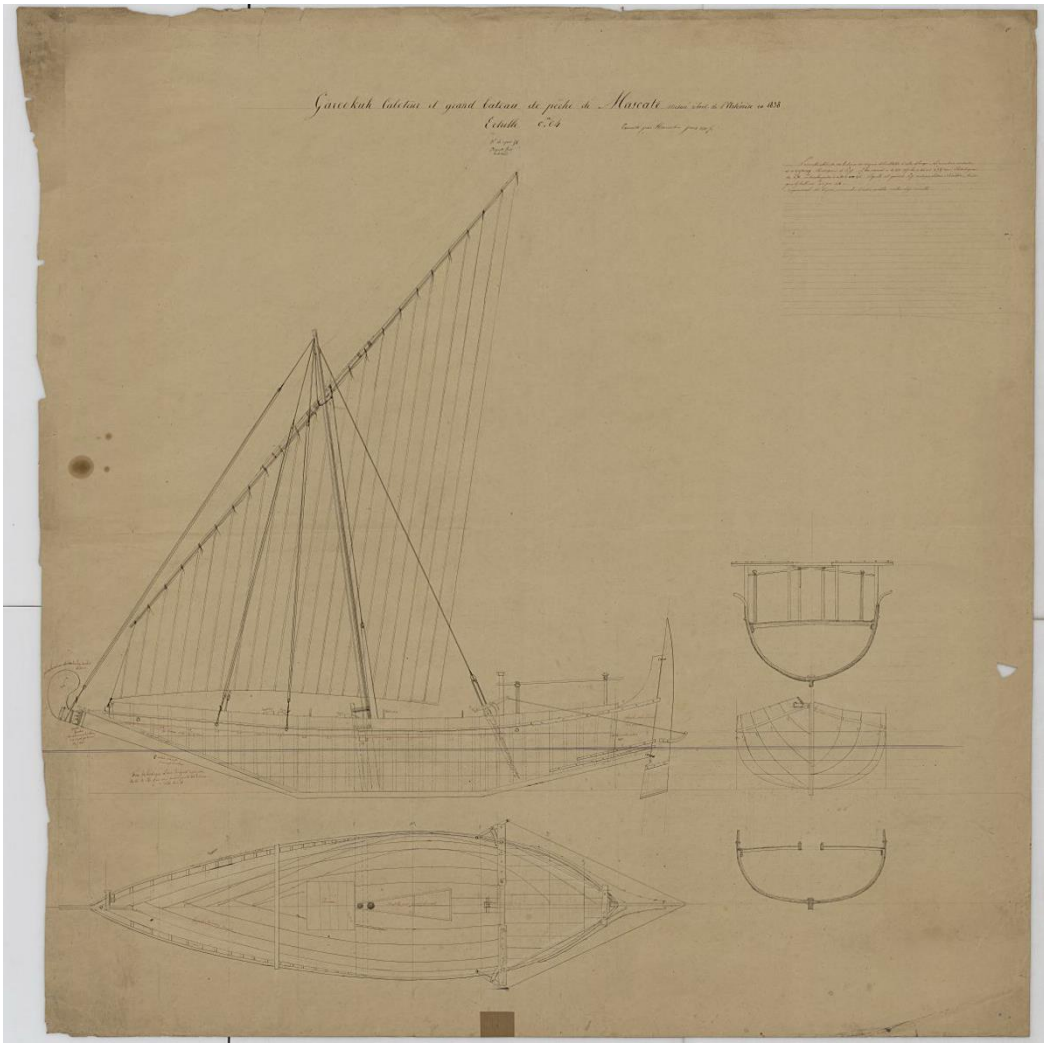
B1.113

Pâris 1838c



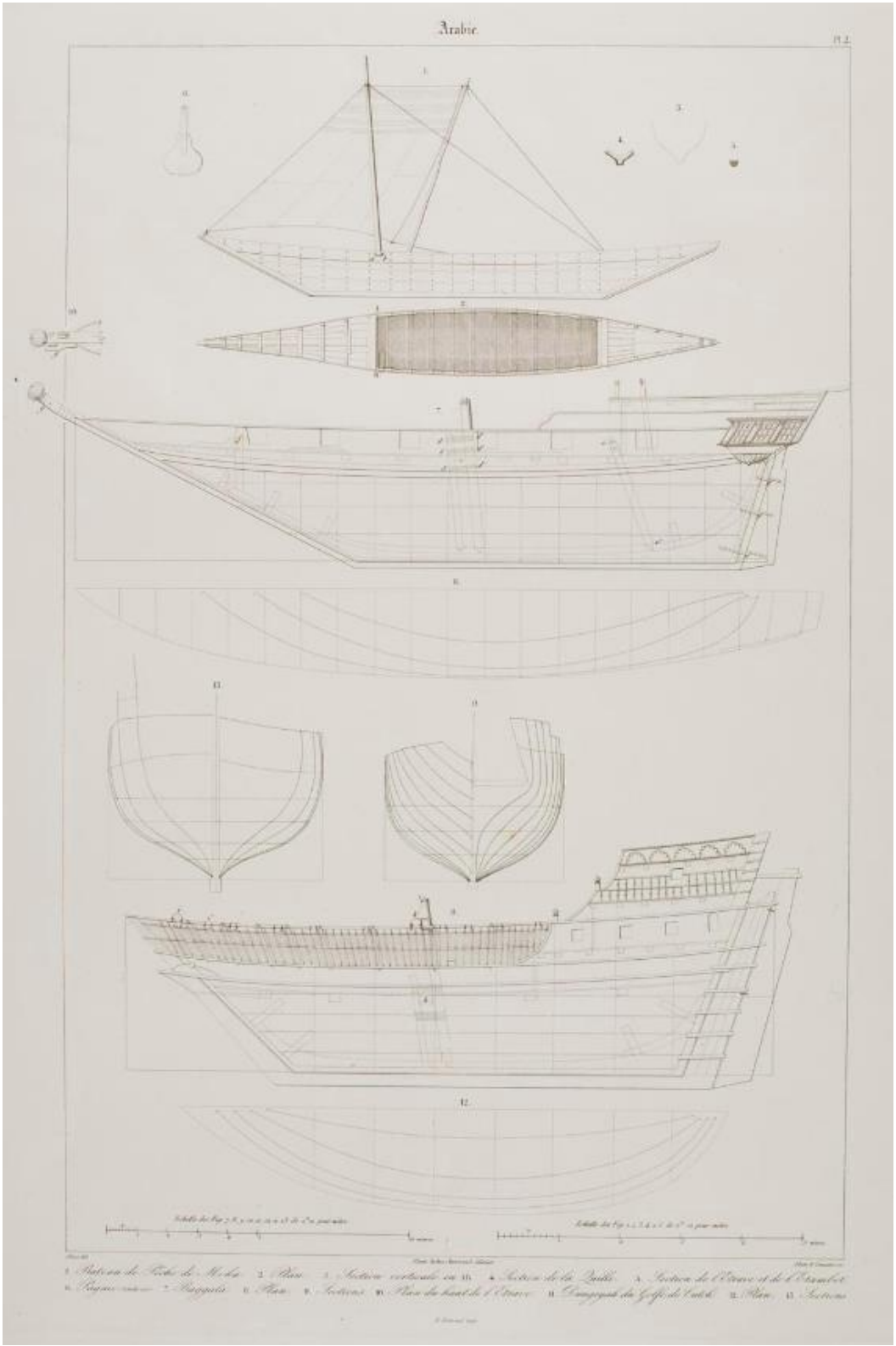
B1.114

Pâris 1838d



B1.115

Pâris 1841:pl.2



B1.116

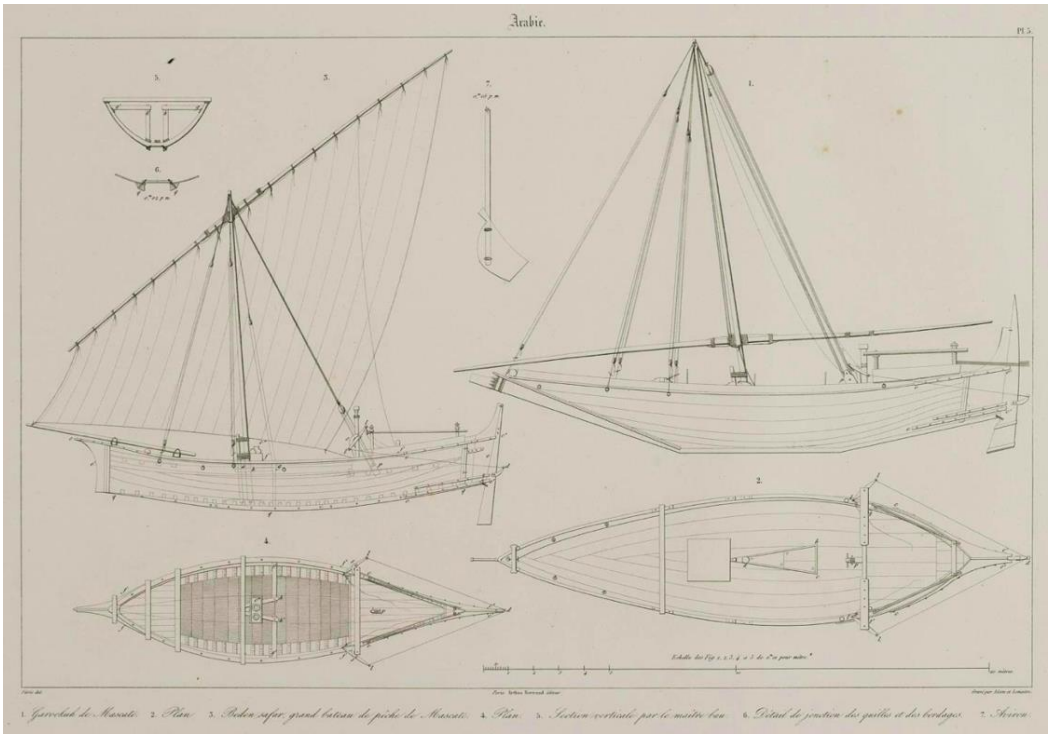
Pâris 1841:pl.3

B1.117

Pâris 1841:pl.4

B1.118

Pâris 1841:pl.5



B1.119

Pâris 1841:pl.6

B1.120

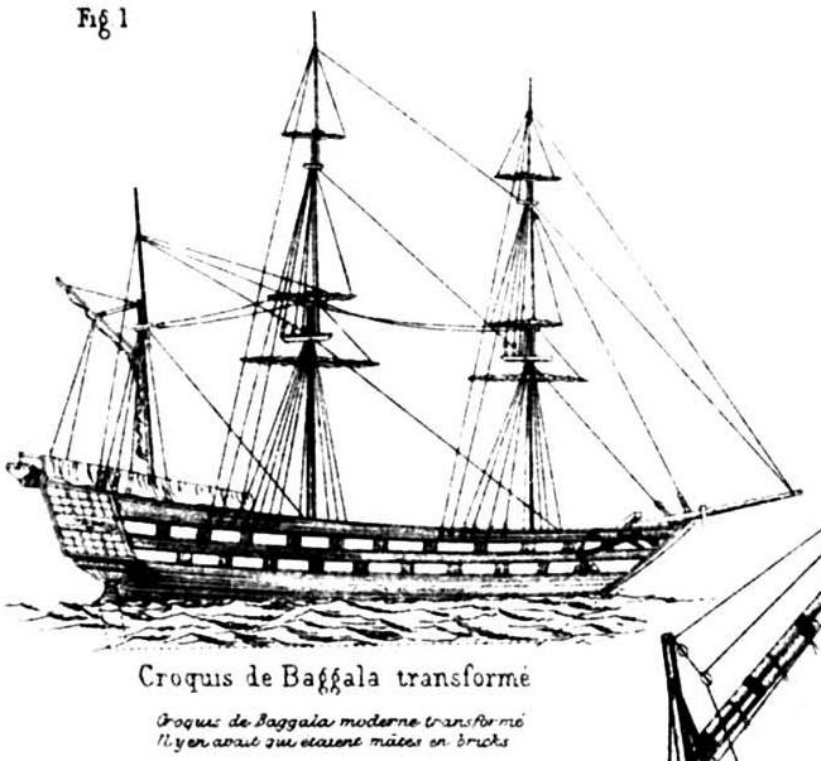
Pâris 1841:pl.7

B1.121

Pâris 1841:pl.9

B1.122

Pâris 1879:pl.125, fig.1



B1.123

Pasini 1859

B1.124

Peeters c.1677

Removed due to copyright restrictions

B1.125

Reclus 1895

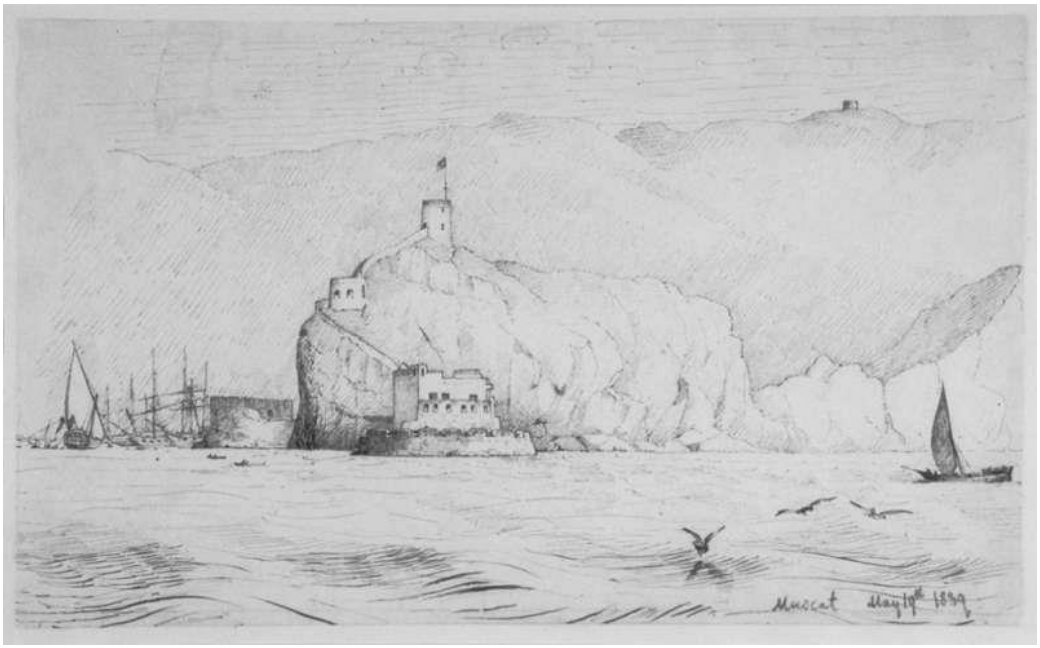
[detail]

B1.126

Rundle c.1839a

B1.127

Rundle c.1839b



B1.128

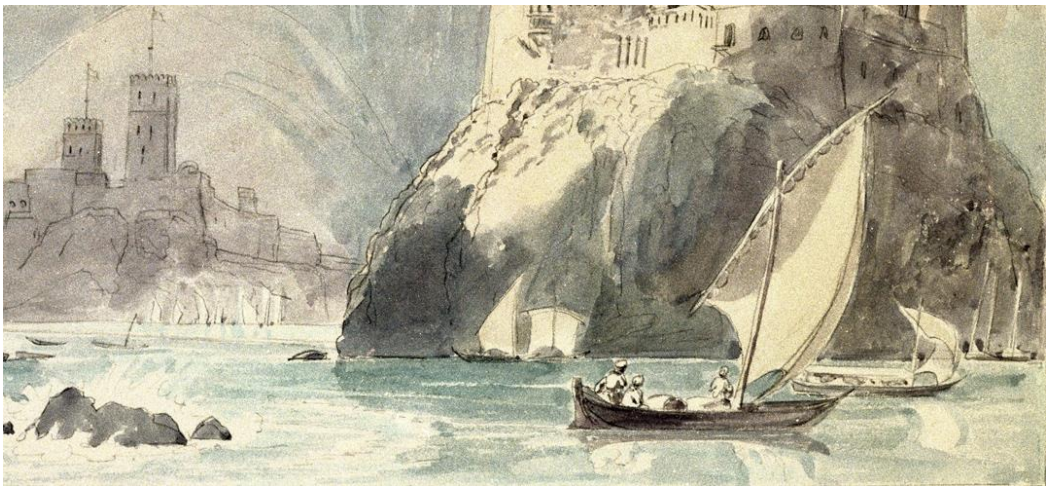
Smith c.1819

[detail]

B1.129

Smith c.1822a

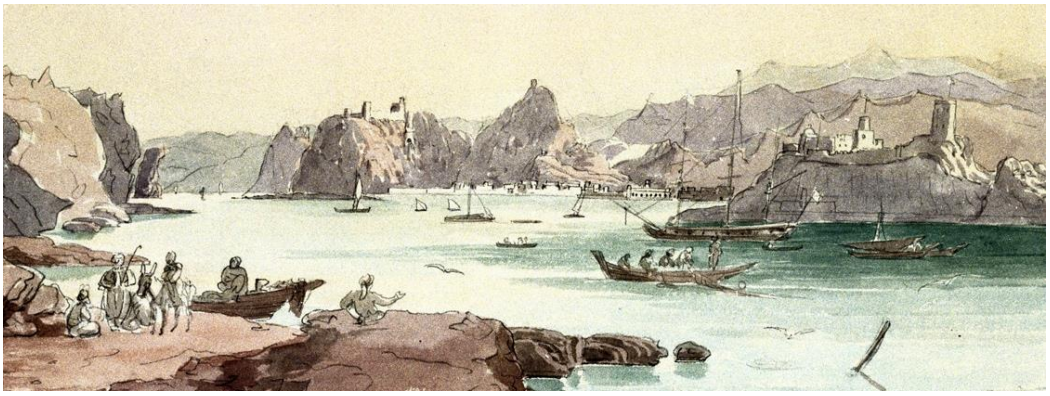
[detail]



B1.130

Smith c.1822b

[detail]



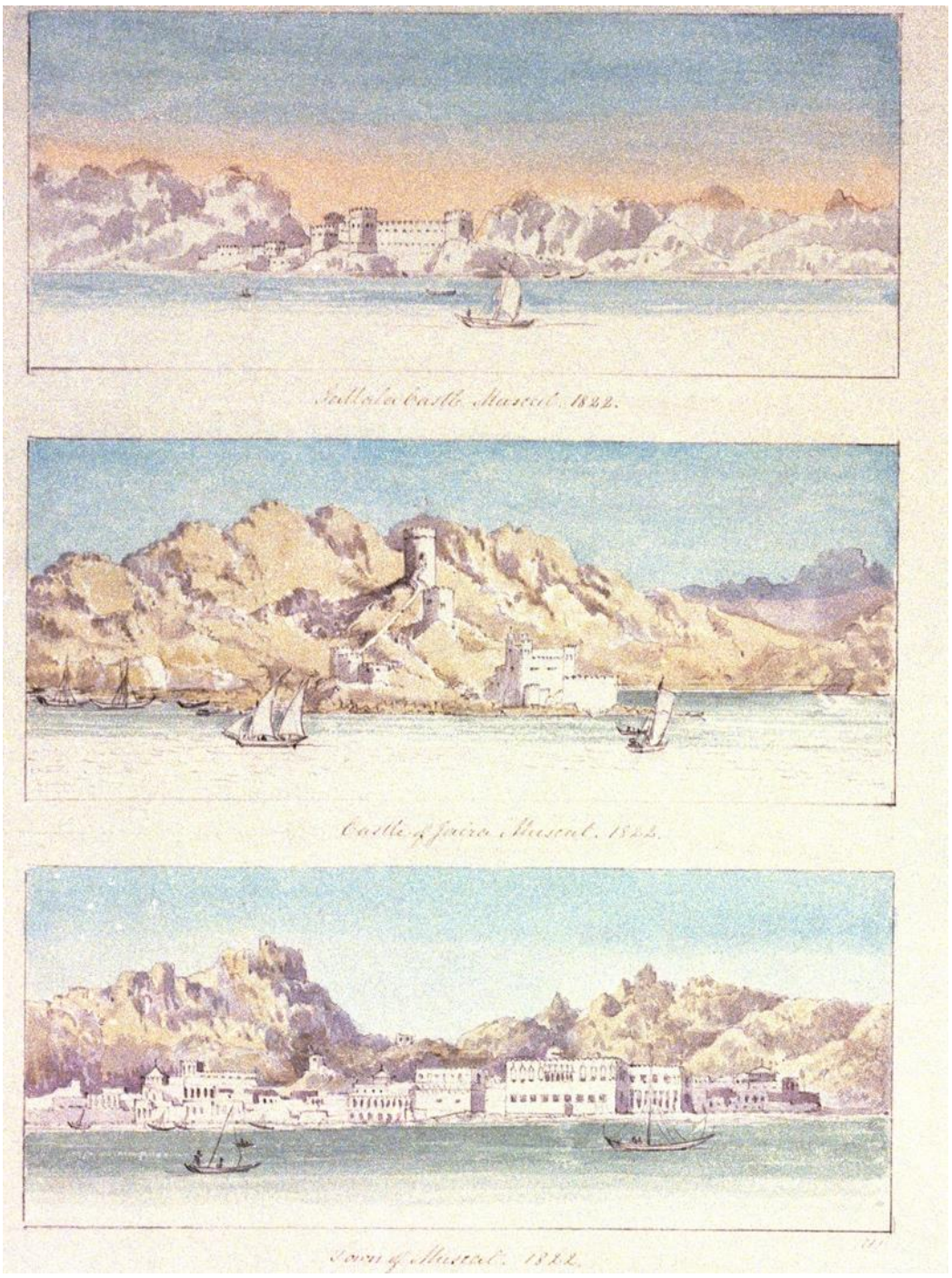
B1.131

Smith c.1822c

[detail]

B1.132

Smith c.1822d



B1.133

Smith c.1840a

[detail]

B1.134

Smith c.1840b

[detail]

B1.135

Teixeira c.1648

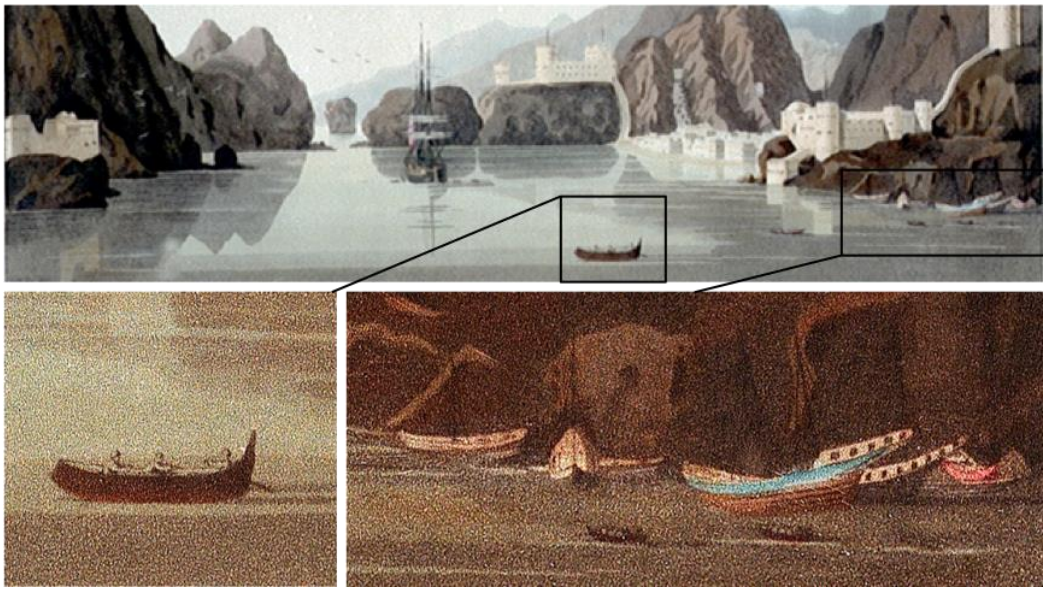
B1.136

Temple 1813a

B1.137

Temple 1813b

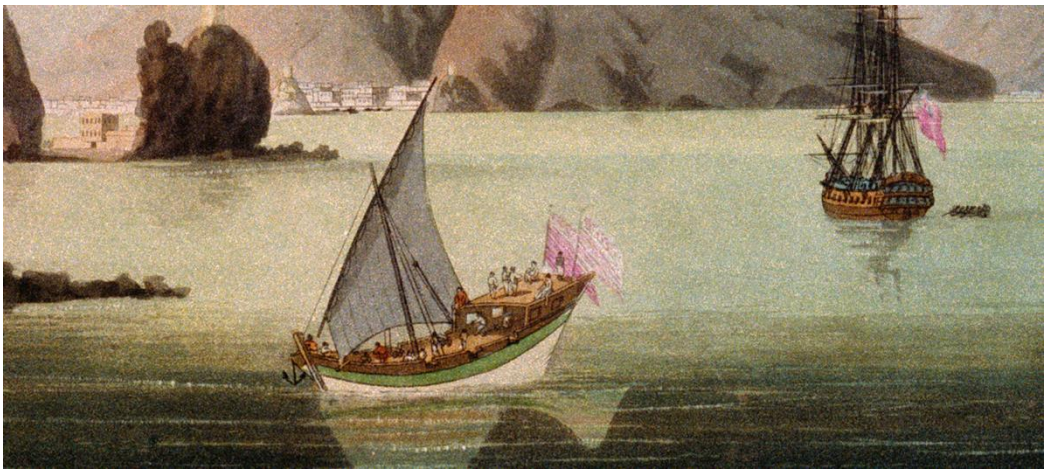
[inset detail]



B1.138

Temple 1813c

[detail]



B1.139

Temple 1813d

[detail]

B1.140

Temple 1813e

[detail]

B1.141

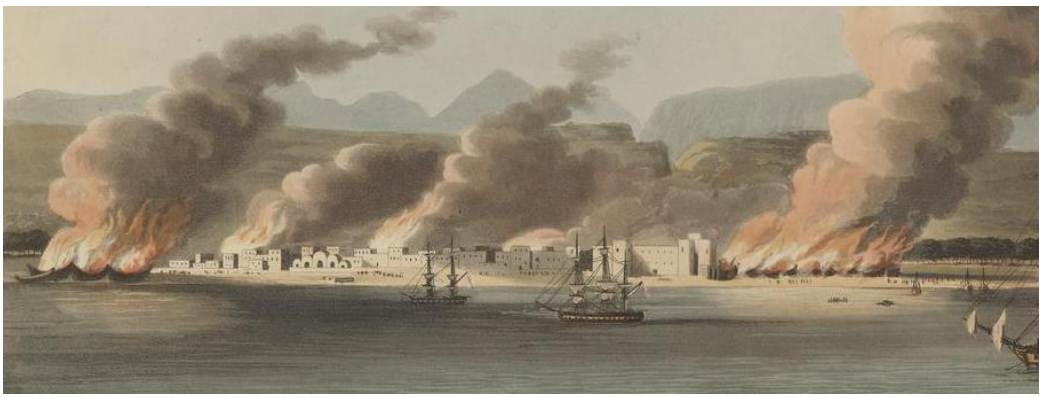
Temple 1813f

[detail]

B1.142

Temple 1813g

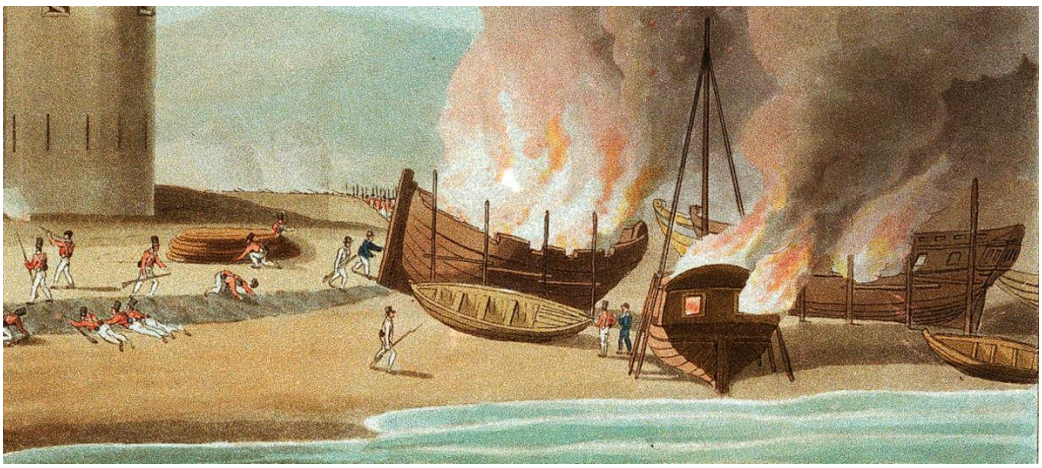
[inset detail]



B1.143

Temple 1813h

[detail]



B1.144

Thevet 1575

B1.145

Thevet 1575

(from Carter

2012:78)

Removed due to copyright restrictions

B1.146

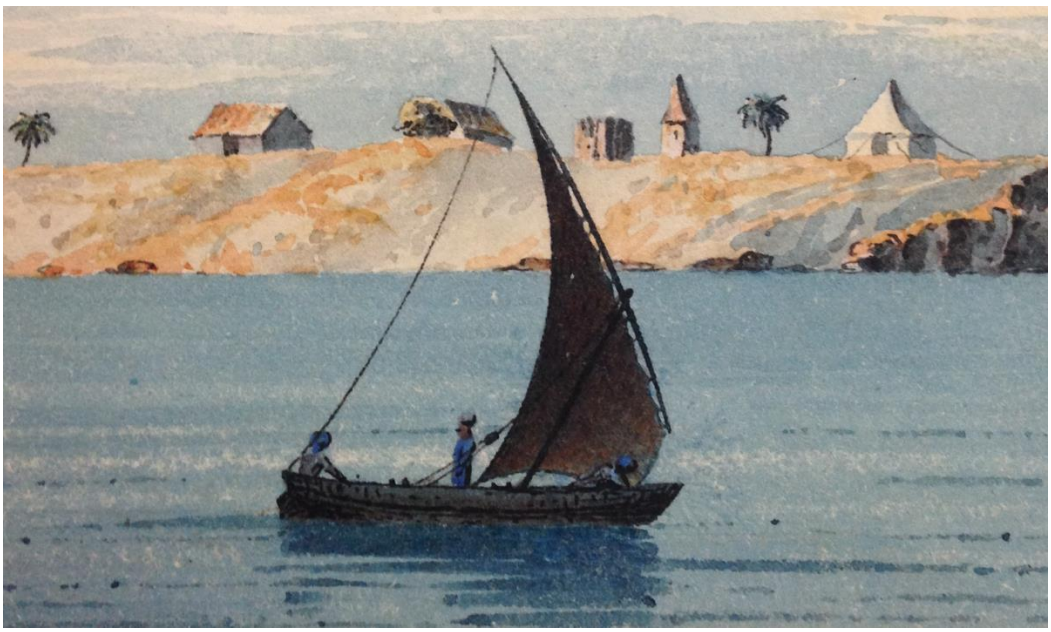
Thirtle 1809

[detail]

Removed due to copyright restrictions

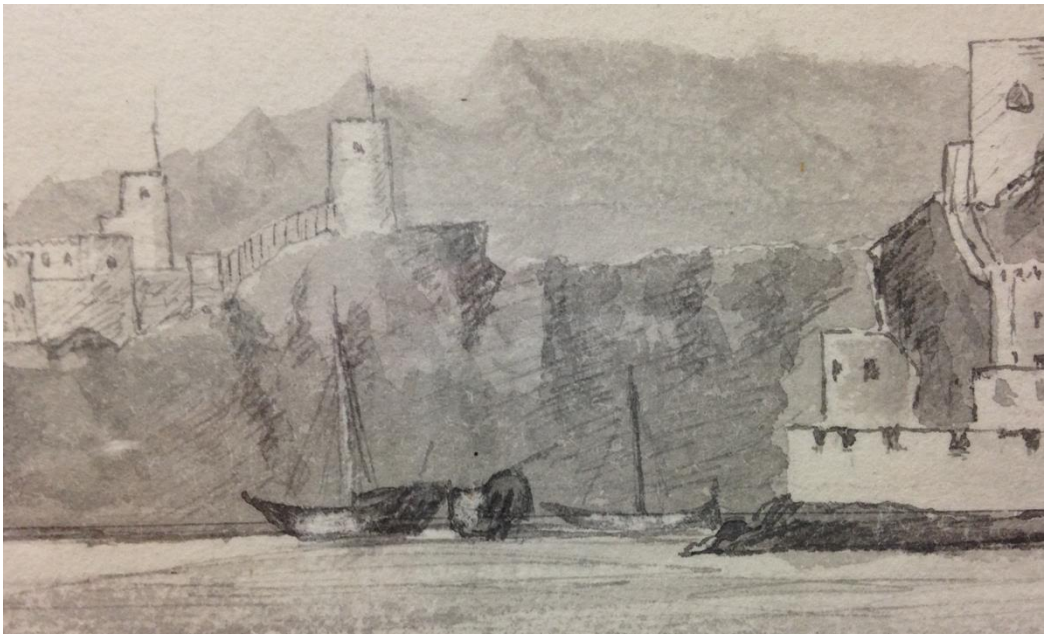
B1.147

TNA ADM 344/1208 [detail]



B1.148

TNA ADM 344/1226 [detail]

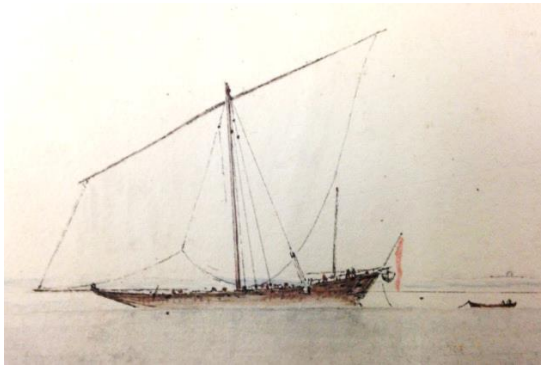


B1.149

TNA ADM 344/1242 [left, detail]

B1.150

TNA ADM 344/1243 [right, detail]



B1.151

Van der Aa

c.1725 [detail]

B1.152

Van der Straet

1594–1596

B1.153

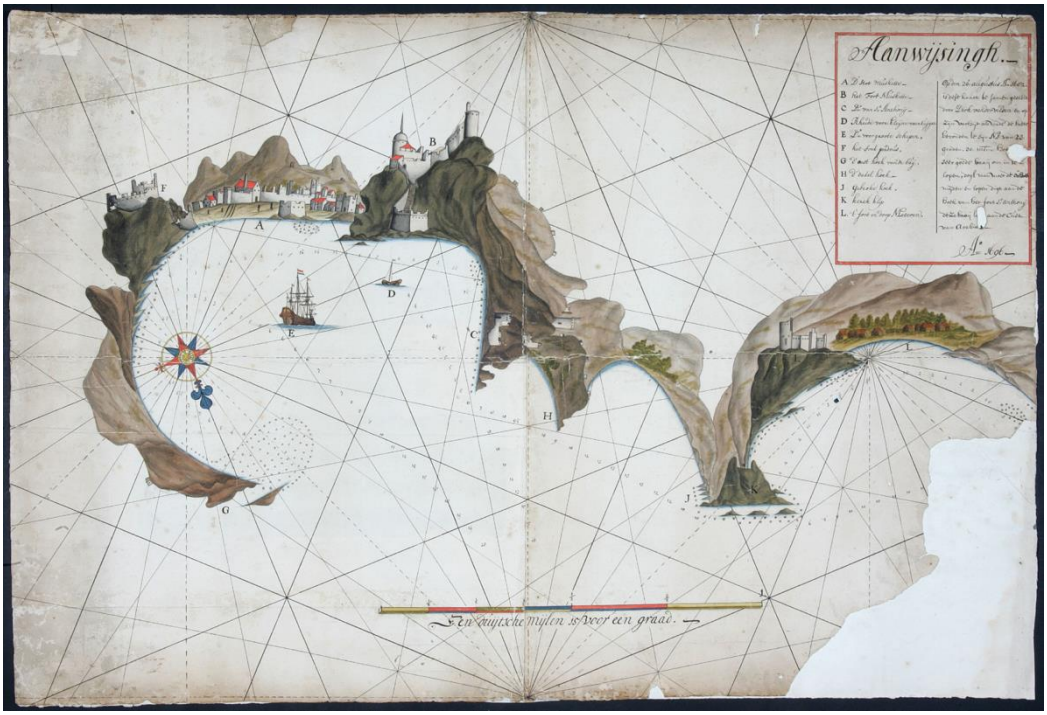
Van der Straet

c.1596

B1.154

Van der Velden

1682



B2 Islamic manuscript illustrations

B2.1 AIC McNear 1977.147 (c.1550)

B2.2 AKAG Jewett 1935.15.1 (1400–1499)

Removed due to copyright restrictions

B2.3 AKM 0094 (1525)

B2.4 Aga Khan Museum 264: f.448a (1582)

B2.5 AKTC Geneva 2005.1.269 (Ms 12): f.277r (1492)

Removed due to copyright restrictions

B2.6 Al-Sabah Cat.22: f.360v (1513)

Removed due to copyright restrictions

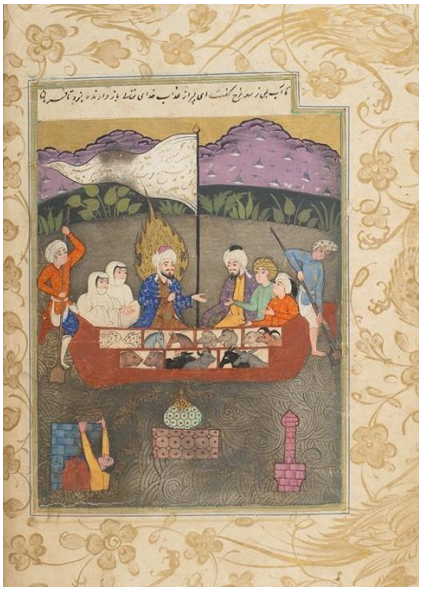
B2.7 Al-Sabah Cat.32: f.146r (c.1550)

B2.8 BL 1937,0710,0.323 (1580–1590)

B2.9 BL Add MS 15531: f.12r (1536)

B2.10 BL Add MS 16561: f.60 (1468)

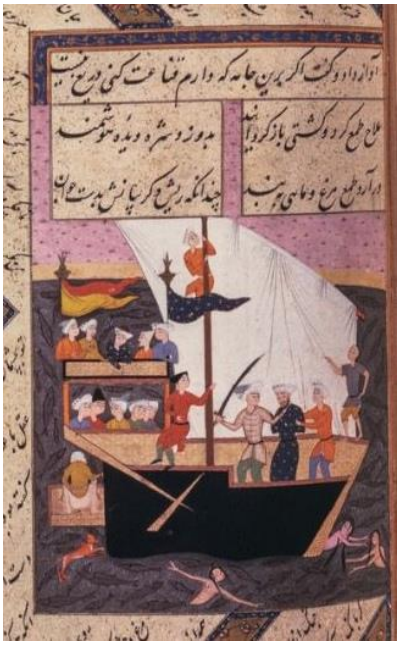
B2.11 BL Add MS 18188: f.232v (1486)



B2.12 BL Add MS 18576: f.19v (1500–1599)

B2.13 BL Add MS 7801: f.43r (1697)

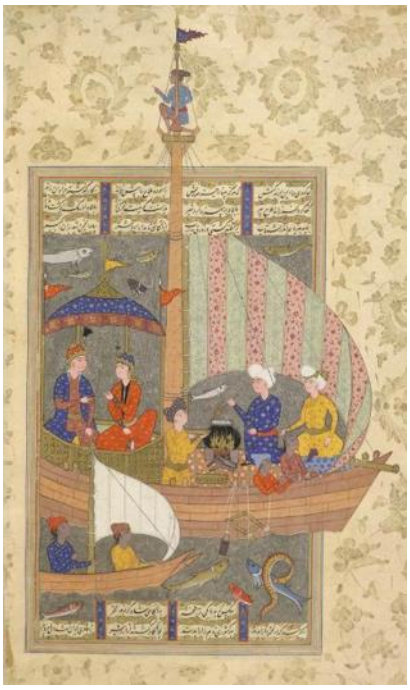
B2.14 BL Add MS 7801: f.49r (1697)



B2.15 BL Add MS 24944 (c.1566)

B2.16 BL Add MS 27257: f.245r (c.1590–1595)

B2.17 BL Add MS 27257: f.337v (c.1590–1595)



B2.18 BL Add MS 27257: f.349v (c.1590–1595)

B2.19 BL IO Islamic 1256: f.150v (1630–1640)

B2.20 BL IO Islamic 137: f.50r (1533)

B2.21 BL IO Islamic 138: f.24r (1465)

B2.22 BL IO Islamic 741: vol.1, f.326r (1580)

B2.23 BL IO Islamic 84: f.42v (1624–1625)

B2.24 BL Or 1359: f.208a (c.1552)

B2.25 BL Or 1403: f.138v (1438)

B2.26 BL Or 6810: f.225v (1490–1499)

B2.27 BL Johnson MS 888: f.124b (c.1580) (Robinson 1976: 57, fig.183)

B2.28 BLO MS Bodl. Or. 133: f.42a (1390–1450)

B2.29 BLO Ms Elliot 325: f.290r (1494)

B2.30 BnF MS Arabe 3929: f.155v (1201–1300)

B2.31 BnF MS Arabe 5847: f.61r (1236–1237)

B2.32 BnF MS Arabe 5847: f.119v (1236–1237)

B2.33 BnF MS Arabe 5847: f.121r (1236–1237)

B2.34 BnF MS Arabe 6075: f.4v (1702)

B2.35 BnF MS Arabe 6094: f.68r (1222)

B2.36 BnF Ms Supp.Turc 316: f.447v (1527)

B2.37 BnF Pers.Supp. 54: f.19r (1581)

B2.38 BnF Pers.Supp. 54: f.108v (1581)

B2.39 BnF Pers.Supp. 151B: f.155 (1604)

B2.40 BnF Pers.Supp. 332: f.50r (1388)

B2.41 BnF Pers.Supp. 332: f.201v (1388)

B2.42 BnF Pers.Supp. 332: f.207v (1388)

B2.43 BnF Pers.Supp. 332: f.228v (1388)

B2.44 BnF Pers.Supp. 641: f.59r (1560)

B2.45 BnF Pers.Supp. 765: f.82 (1600–1699)

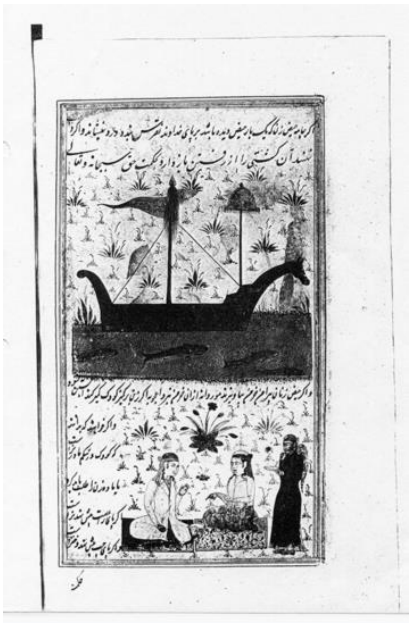
B2.46 BnF Pers.Supp. 1113: f.89r (c.1430–1434)

B2.47 BnF Pers.Supp. 1313: f.20v (c.1595)

B2.48 BnF Pers.Supp. 1313: f.102r (c.1595)

B2.49 BnF Pers.Supp. 1476: f.89r (c.1540–1550)

B2.50 BnF Pers.Supp. 1567: f.27v (1560)



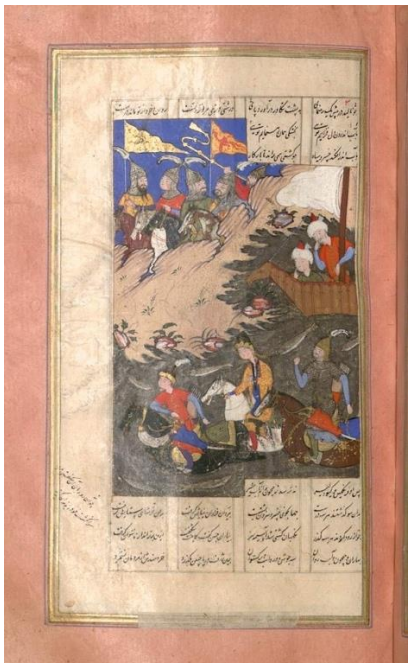
B2.51 BnF Pers.Supp. 1568: f.7v (1560)

B2.52 BnF Pers.Supp. 2051: f.181v (1483)

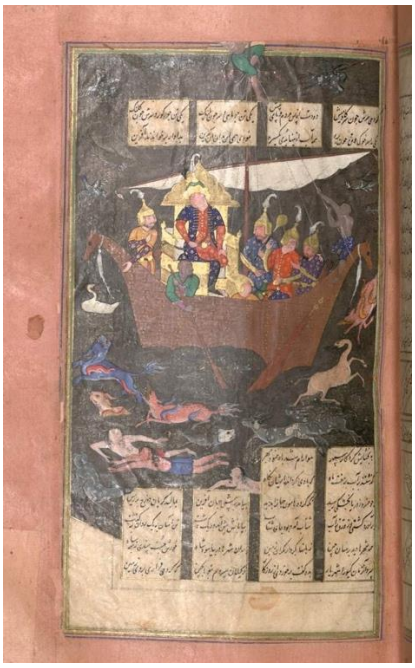
Removed due to copyright restrictions

B2.53 Bonhams Sale 11 June 2020 Lot 5 (1550–1599)

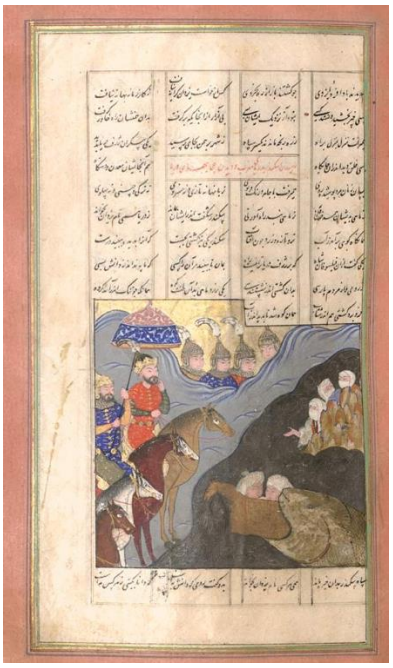
B2.54 BPU de Genève Ms.o.117: f.141r (1550–1599)



B2.55 BSB Munich ms Cod. Pers. 10:Image No.369 (1550–1575)



B2.56 BSB Munich ms Cod. Pers. 10:Image No.713 (1550-1575)



B2.57 BSB Munich ms Cod. Pers. 10:Image No.999 (1550–1575)

B2.58 CBL MS 119: f.15b (1427)

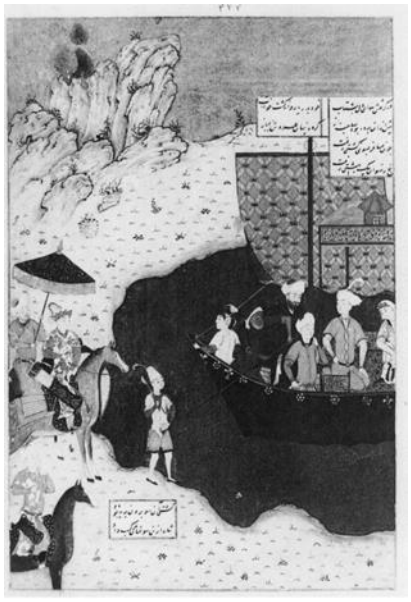
B2.59 CBL MS 119: f.27v (1427)

B2.60 CBL MS 156: f.73v (1478)

B2.61 CBL MS 212: f.366 (1545)

B2.62 CBL MS 277: f.14 (1550–1599)

B2.63 CBL Per 158: f.146v (1480)



B2.64 CBL Per 163: f.215 (1485)

B2.65 CBL Per 295: f.338v (1500)

Removed due to copyright restrictions

B2.66 CL Sale 10 Oct 2013 lot 93 (1600–1699)

Removed due to copyright restrictions

Removed due to copyright restrictions

Removed due to copyright restrictions

B2.67 CL Sale 12241 Lot 45.2 (1587)

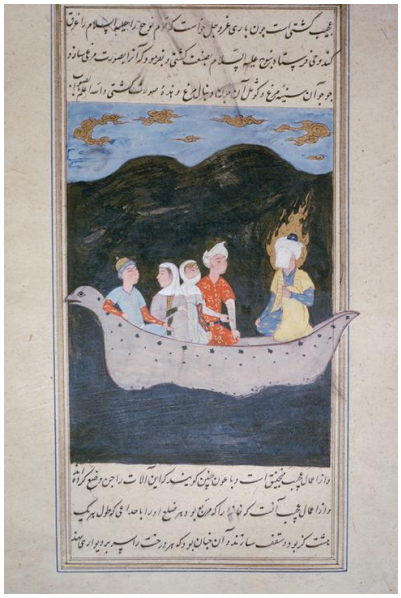
B2.68 CL Sale 15984 Lot 64 (1500–1550)

B2.69 CL Sale 15984 Lot 66 (1500–1550)

B2.70 CMA 58.24.4E (1500–1599)

B2.71 CMA 58.24.6A (1400–1499)

B2.72 CMA 58.27.3A (c.1430)



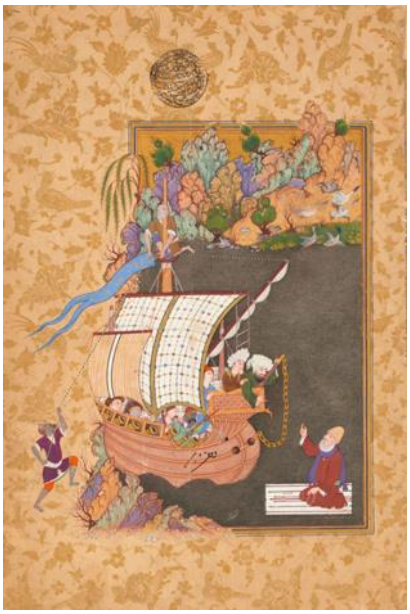
B2.73 CNL *Aja'ib al-Mukhlukat* (1500–1599) (AKG1894275)

B2.74 CNL *Khamsa* (1600–1699) (AKG1780833)

B2.75 DaK Cairo Ms. Ta'rih Farisi no.73: f.154r (1393)

B2.76 DCC 5/1997 (1224)

B2.77 DCC 8/2005 (c.1425)



B2.78 DCC 11/2016 (c.1600–1608)

Removed due to copyright restrictions

B2.79 DCC Alamy P9CDND (1400–1499)

B2.80 ENLA Cairo no.265M (1493)

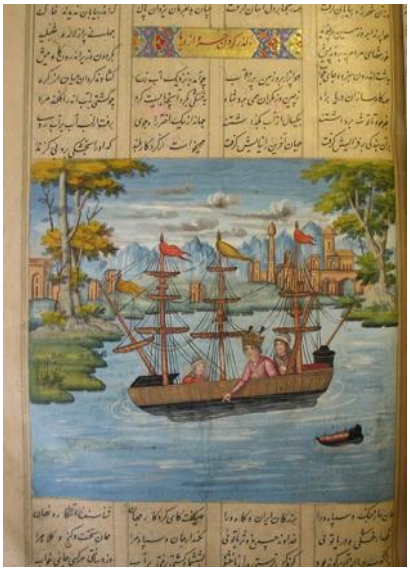
B2.81 FGA F1908.284 (1548)

B2.82 FGA F1937.27 (1496)

B2.83 FGA F1946.12.194 (1556–1565)

B2.84 FGA F1952.35: f.1r (1341)

B2.85 FLP Lewis O.51: f.130r (1550–1599)



B2.86 FLP Lewis O.58: f.260r (1800–1849)

Removed due to copyright restrictions

B2.87 FM Cambridge Ms 22-1948 f.33v (c.1435)

B2.88 GPM Tehran Ms.2189 S&R 2005:132 (1500–1599)

B2.89 GPM Tehran Ms.2223: f.136 (1550–1599)

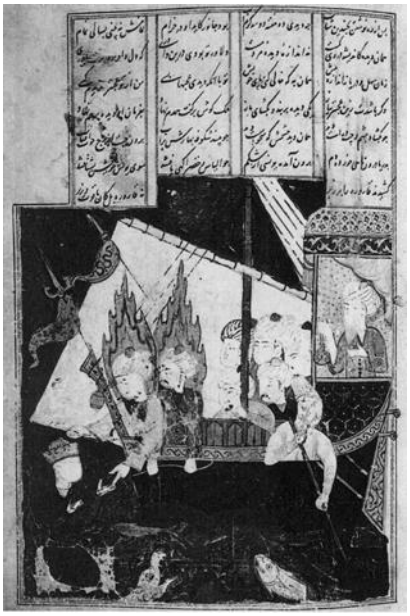
B2.90 GPM Tehran Ms.2226: f.136 (1612)

B2.91 GPM Tehran Ms.2237 Vol1:44 (1500–1599)

B2.92 GPM Tehran Ms.2239 f.708 (1817)

B2.93 GPM Tehran Ms.2250: f.144r (1500–1599)

B2.94 HT Isfahan Ms 232: f.1026 (1525–1549)



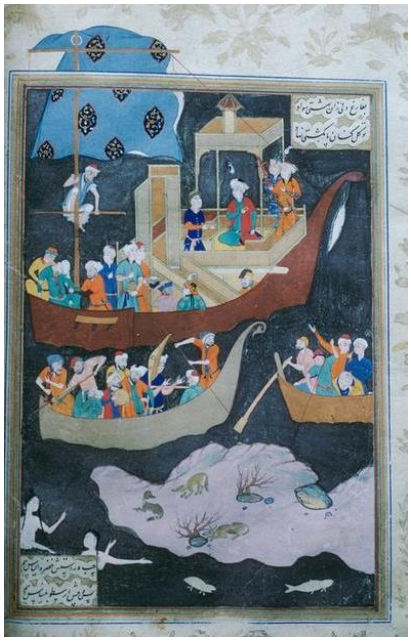
B2.95 IMB M-287/27109: f.189a (1496–1497)

B2.96 IMB M-287/27109: f.237b (1496–1497)

B2.97 IMJ B69.0540 (1620–1630)

B2.98 IMJ B69.0903 (1599)

B2.99 IMJ 335903 (1519)



B2.100 IOS St Petersburg *Khamsa* (1539–1543) (AKG1032894)

B2.101 IOS St Petersburg *Khamsa* (1550) (AKG1780990)

B2.102 IOS St Petersburg Ms D-212: f.353a (1550)

B2.103 IOS St Petersburg Ms.S23: f.139 (c.1230)

B2.104 IOS St Petersburg Ms.S23: f.260 (c.1230)

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B2.105 IUK T6045: f.87a (1594)

Removed due to copyright restrictions

B2.106 IUK T6045: f.558b (1594)

Removed due to copyright restrictions

B2.107 IUK T6045: f.594a (1594)

B2.108 JRL Ryl Pers 3: f.61a (1632)

B2.109 JRL Ryl Pers 3: f.70b (1632)

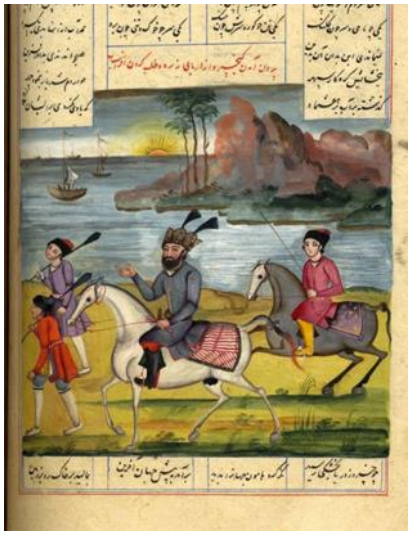
B2.110 JRL Ryl Pers 3: f.71b (1632)

B2.111 Keir Ms III.234–290: f.26b (1570–1580)

B2.112 Keir Ms III.234–290: f.159v (1570–1580)

B2.113 Keir MS *Shāhnāmah*: f.248b (1626)

B2.114 Khalili MS 727: f.285a (1313–1314)



B2.115 LHASB Ms Perzsa Fol/3: f.218v (1800–1899)

B2.116 Malik *Kitab suwar al-kawakib* (1400–1499) (AKG17237944)

B2.117 MCA Tehran *Shah Tamasp*: f.216v (1527)

B2.118 Malik Ms 5986: f.25 (1480–1490)

B2.119 MCA Tehran *Shah Tamasp*: f.70v (1527)

Removed due to copyright restrictions

B2.120 MDA Tehran no. 221M (c.1476–1487)

Removed due to copyright restrictions

Removed due to copyright restrictions

B2.121 MDA Tehran no. 436/437 (1400–1499)

B2.122 Melikian-Chirvani 2007:189 (1504)

B2.123 MET 13.228.16: f.295r (1607)

B2.124 MET 13.228.5.2 (1523–1524)

B2.125 MET 1970.301.1: f.18v (1525–1535)

B2.126 MET 1970.301.1: f.33v (1525–1535)

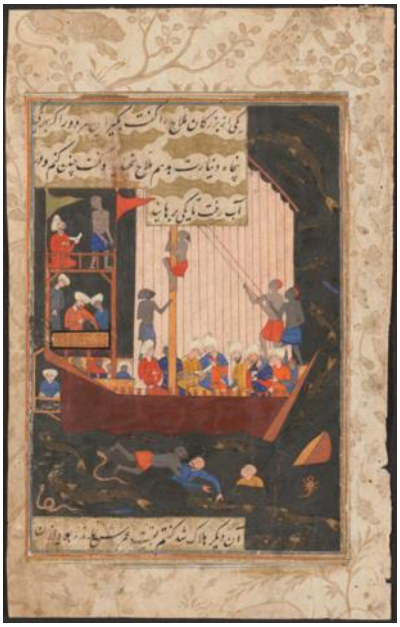
B2.127 MET 55.125.1 (c.1476–1486)

B2.128 MFA Boston 19.778 (1450–1499)

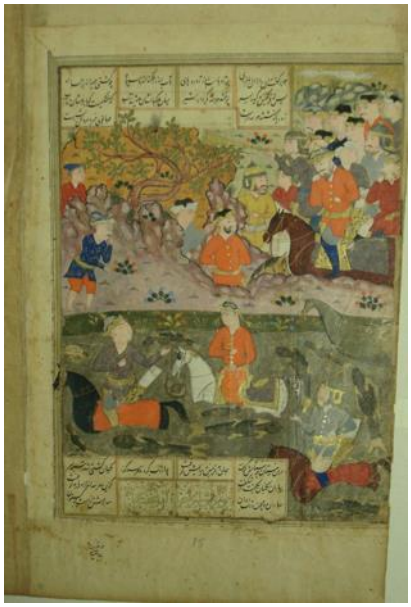
B2.129 MGP Alamy HN2MB6 (1500–1599)

B2.130 Mondfeld 1979:15 (1700–1749)

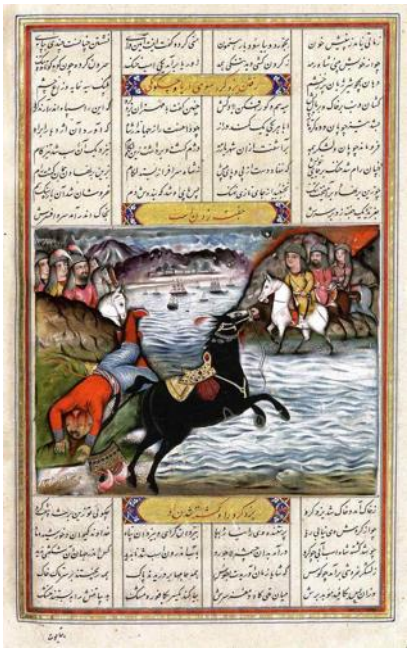
B2.131 MUCEM 2012.4.14 (1850–1899)



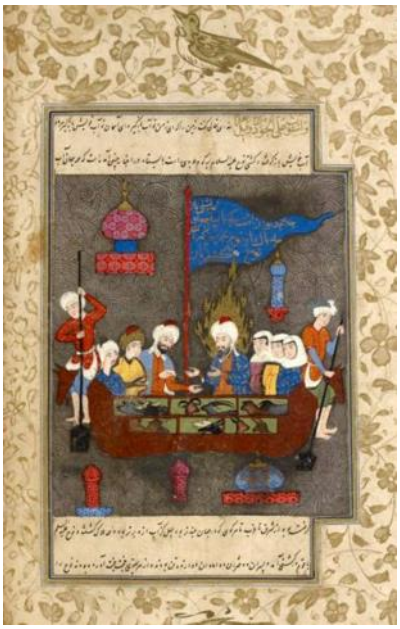
B2.132 MUL 131955-5240 (1550)



B2.133 NDNM 57.27/17(a)–(n): f.153v (1450–1499)

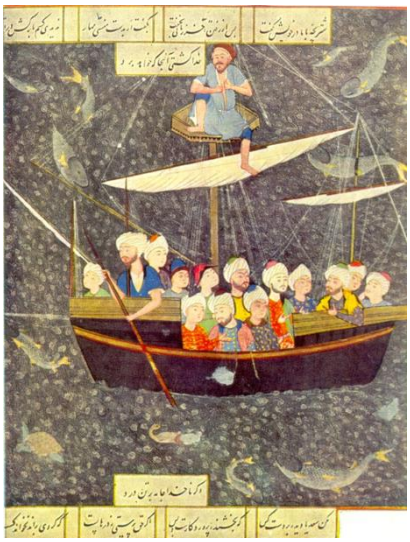


B2.134 NLR PNS 394: f.397v (1837)



B2.135 NYPL Spencer Coll. Ms.1: 1658027 (1577)

B2.136 NYPL Spencer Coll. Pers. Ms.46: f.19 (c.1580)



B2.137 ONB Vienna A.F.103: f.50v (c.1530–1540)

B2.138 ONB Vienna N.F.118: f.372v (1616)

B2.139 PAM 70.27.12 (1550–1599)

B2.140 PAM 72.37.2 (1550–1599)

B2.141 PUL Islamic MSS 3-310: f.212b (1589–1590)

B2.142 PUL Islamic MSS no.58G: f.136r (1674)

B2.143 RAM S&R 2005:189 (1576)

B2.144 RAS MS 178: f.98b (1475)

B2.145 RAS MS 244: f.33b (1575)

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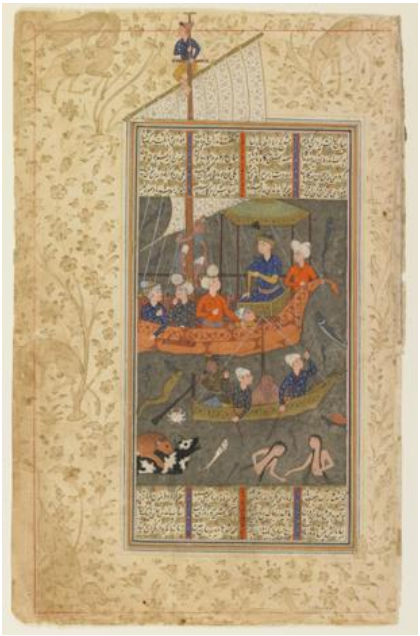
B2.147 RAS MS1635: f.36b (1848–1849)

Removed due to copyright restrictions

Removed due to copyright restrictions

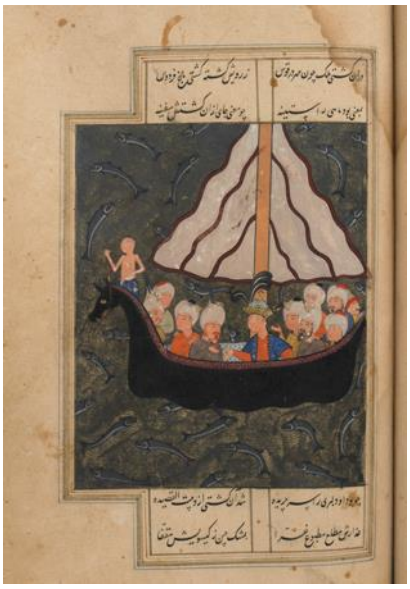


B2.148 Raza P.4134 MsIV.II vol1: 236 (1430)

B2.149 RISD Eastman 1950: pl IX (1475–1500)

B2.150 Sackler S1986:257 (c.1590–1600)

B2.151 Sackler S1986:265 (c.1590–1600)



B2.152 Sackler S1986.39 (1520–1530)

B2.153 Sackler S1986.63: f.38r (c.1857)

B2.154 Sackler S86.0034: f.129a (1437)

B2.155 SBB Diez A fol. 70: S.04, Nr.01 (1400–1499)

B2.156 SBB Diez A fol. 71: S.17 (1400–1449)

B2.157 SBB Diez A fol. 72: S.16, Nr.02 (1400–1449)

B2.158 SBB Diez A fol. 73: S.39, Nr.02 (1450–1499)

B2.159 SBB Diez A fol.3: f.23r (1575–1599)

B2.160 SBB Hs.or.2371: f.180v (1200–1299)

B2.161 SBB Hs. Or.14071: f.23r (1500–1549)

B2.162 SBB Minutoli 154: f.285r (1800–1849)

B2.163 SBB Minutoli 184: f.5r (c.1850)

B2.164 SBB MS or.fol.359: f.76v (1560–1570)

B2.165 SBB MS or.fol.4251: f.88v (1605)

B2.166 SBB MS or.fol.4255: f.146r (1489)

B2.167 SBB MS or.quart.1665: f.317v (1550–1599)

B2.168 SBB Sprenger 1420: f.62r (1800–1899)

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Removed due to copyright restrictions

Removed due to copyright restrictions

B2.169 SL Esad Efendi 2916: f.153a (1242–1258)

B2.170 Sotheby's AIW 22, 22 Apr 2015 Lot 120 (c.1550)

B2.171 Sotheby's AIW Lot 84 London 9 Oct 2013 (1500–1599)

Removed due to copyright restrictions

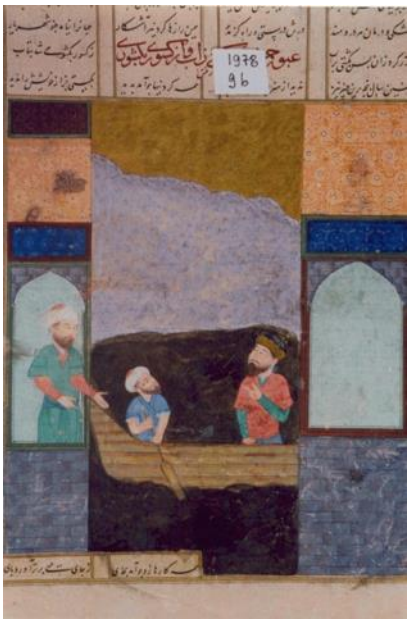
Removed due to copyright restrictions

B2.172 Soudavar 1992: cat no.71a (c.1535)

B2.173 Soudavar 1992: cat no.80b (1565)

B2.174 TIEM Istanbul Khamsa (1550) (AKG1517428)

B2.175 TIEM Istanbul Ms.1945: f.245v (1451)



B2.176 TIEM Istanbul Ms.1978: f.009v (1493)

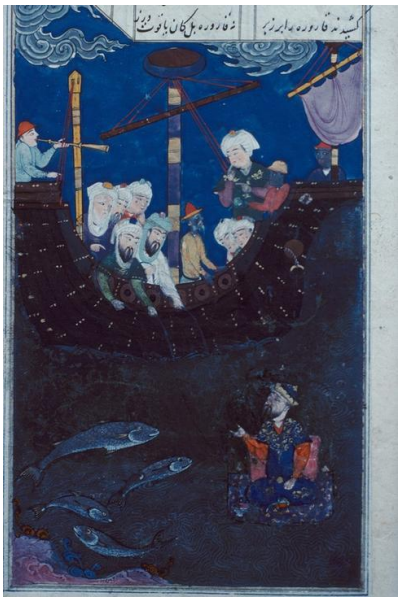
B2.177 TPL Ms.196 (1800–1899) (AKG1723808)

B2.178 TPL Ms.197 (1600–1699) (AKG1723806)

B2.179 TSK Istanbul H.788 (1500–1599) (AKG1781003)

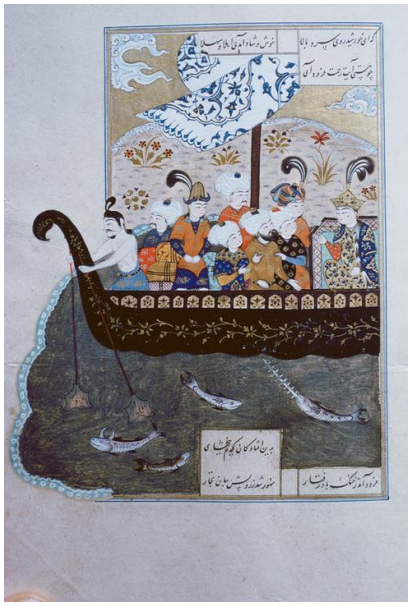
B2.180 TSK Istanbul H.795: f.152a (1478)

B2.181 TSK Istanbul H.801: f.315a (1497)



B2.182 TSK Istanbul H.801: f.322a (1497)

B2.183 TSK Istanbul H.831 (AKG1781000) (1530)



B2.184 TSK Istanbul H.831 (AKG1781001) (1530)

B2.185 TSK Istanbul H.831 (AKG1781002) (1530)

B2.186 TSK Istanbul H.1370: f.194v (1526)

B2.187 TSK Istanbul H.1653: f.12a (c.1428)

B2.188 TSK Istanbul *Khamsa*: 'Alexander' (1544)

B2.189 TSK Istanbul Ms B.250 (1575–1576)

B2.190 TSK Istanbul R.1021: f.147b (1463)

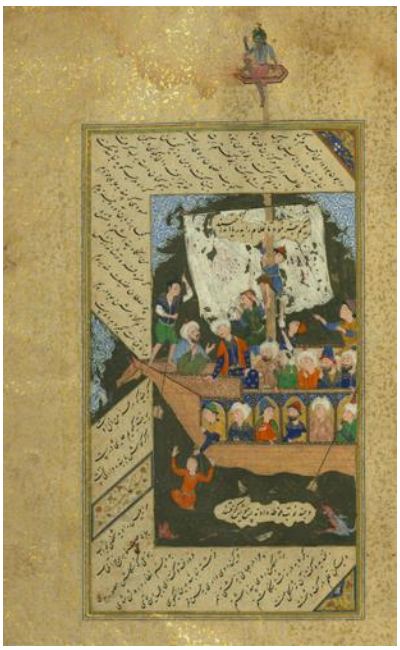
Removed due to copyright restrictions

B2.192 V&A AL.8290:2 (c.1840–1870)

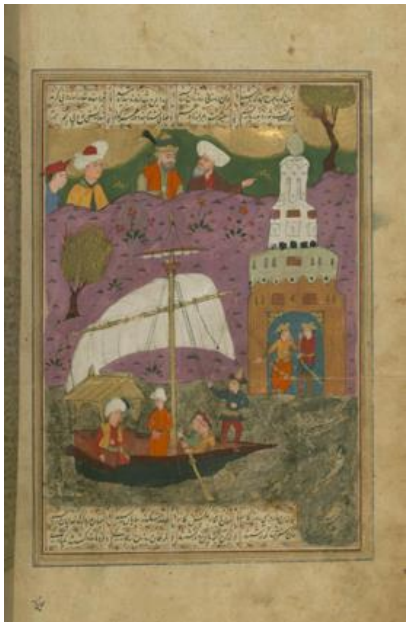
B2.191 TSM Istanbul R 1479, f.101b (1599) (Milstein 1990:3, fig.7)

B2.193 VWL OR130: f.32r (1576)

B2.194 Walters Ms. W.602: f.319a (1618–1619)



B2.195 Walters Ms. W.618: f.18a (1500–1599)



B2.196 Walters Ms. W.623: f.89b (1609)

B2.197 Walters Ms. W.627: f.110b (1476)

B2.198 Walters Ms. W.652: f.78b (1613)

B3 Glyphs and graffiti

B3.1

Agius 2005

[Oman]

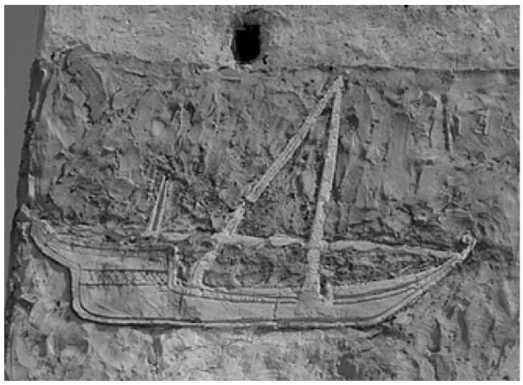
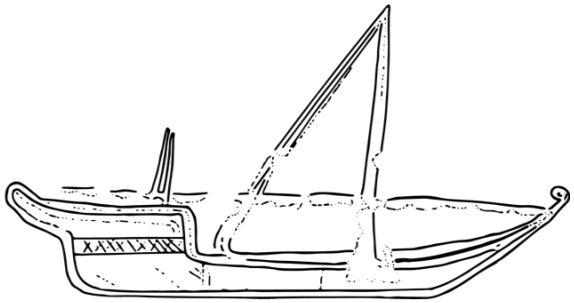
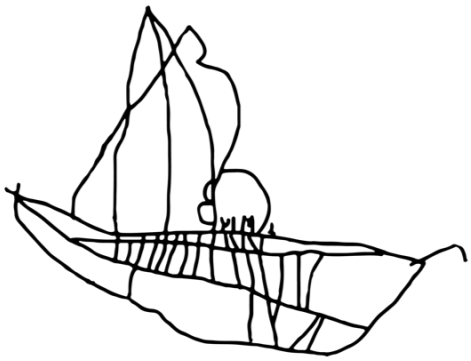


Fig.1 [.1]



[Drawn from photograph]

Fig.44 [.2]



[Drawn from photograph]

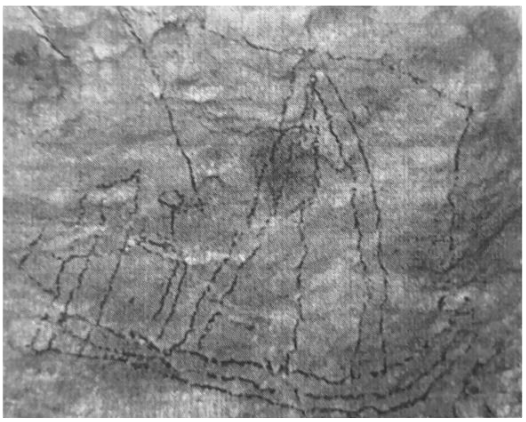
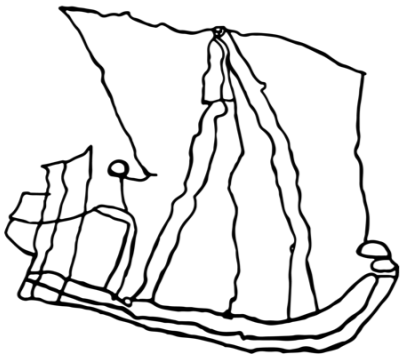


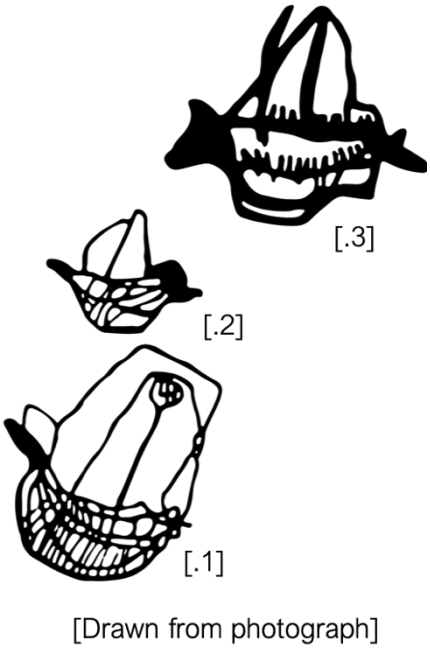
Fig.76 [.3]



[Drawn from photograph]

B3.2

Agius 2008: fig.3, 55 [Dhofar, Oman]



[Drawn from photograph]

B3.3

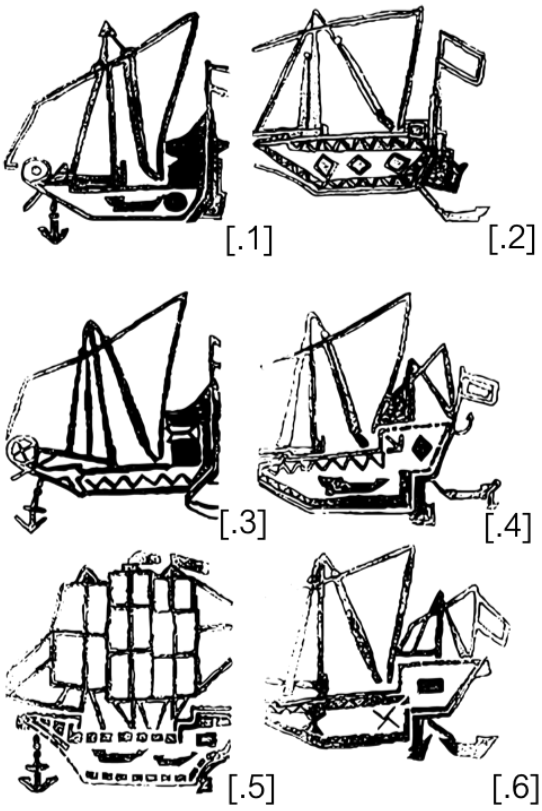
Agius 2002: fig.2, 20 [Liwa, Oman]

B3.4

Al Shaikh

2017

[Qatif, Saudi Arabia]



B3.5

Cooper et al. 2015

[al-Zubārah, Qatar]

Fig.2, graffito D1 [.1]

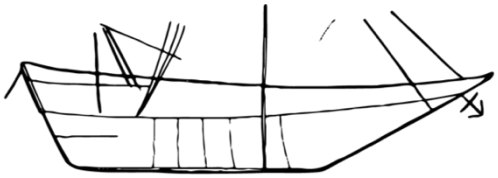


Fig.3, graffito D2 [.2]

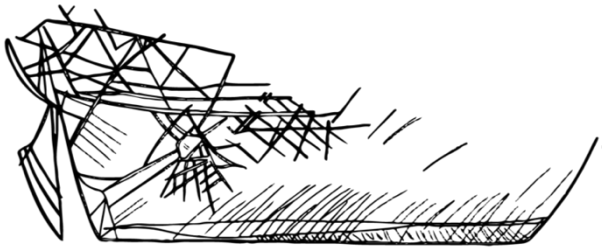


Fig.7, graffito D4 [.3]

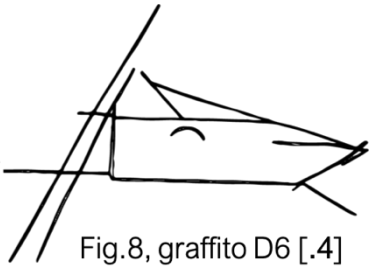


Fig.8, graffito D6 [.4]

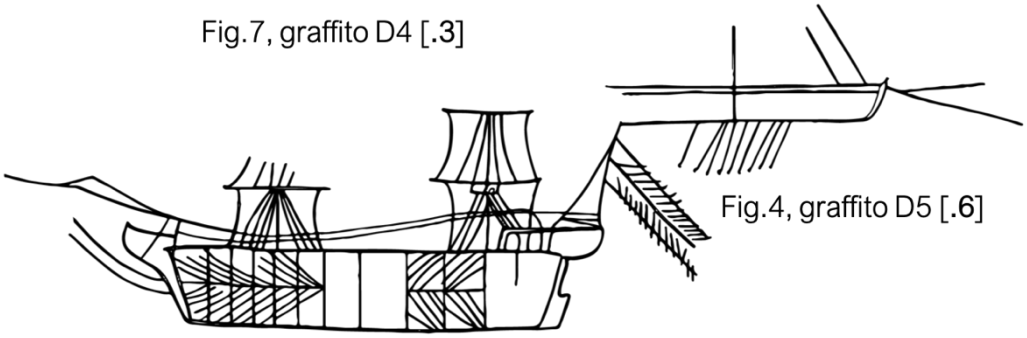


Fig.4, graffito D10 [.5]

Fig.4, graffito D5 [.6]

Fig.3, graffito D11 [.7]

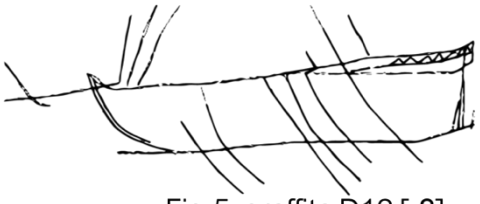


Fig.5, graffito D12 [.8]

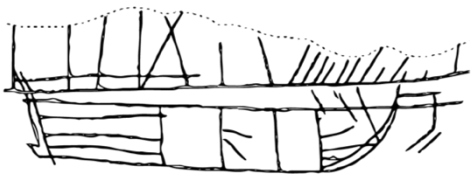


Fig.6, graffito D14 [.9]

Fig.10, ZEUP04 [.10]

(Not to scale; see originals for scales)

B3.6

Fossati 2015: fig.16, 5 [Wadi al Hareem, Oman]

Removed due to copyright restrictions

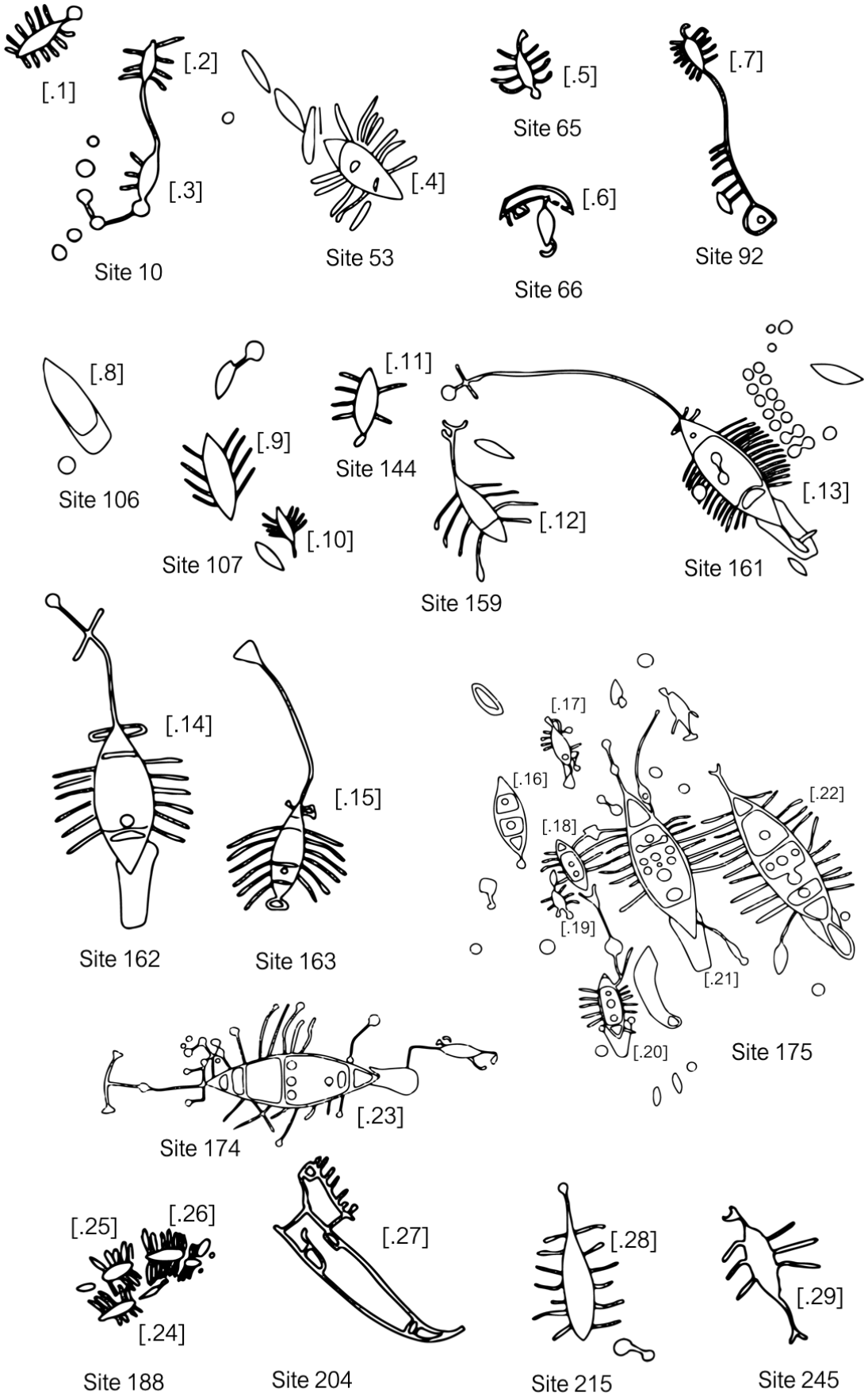
B3.7

Fossati 2017 [Oman]

Removed due to copyright restrictions

B3.8

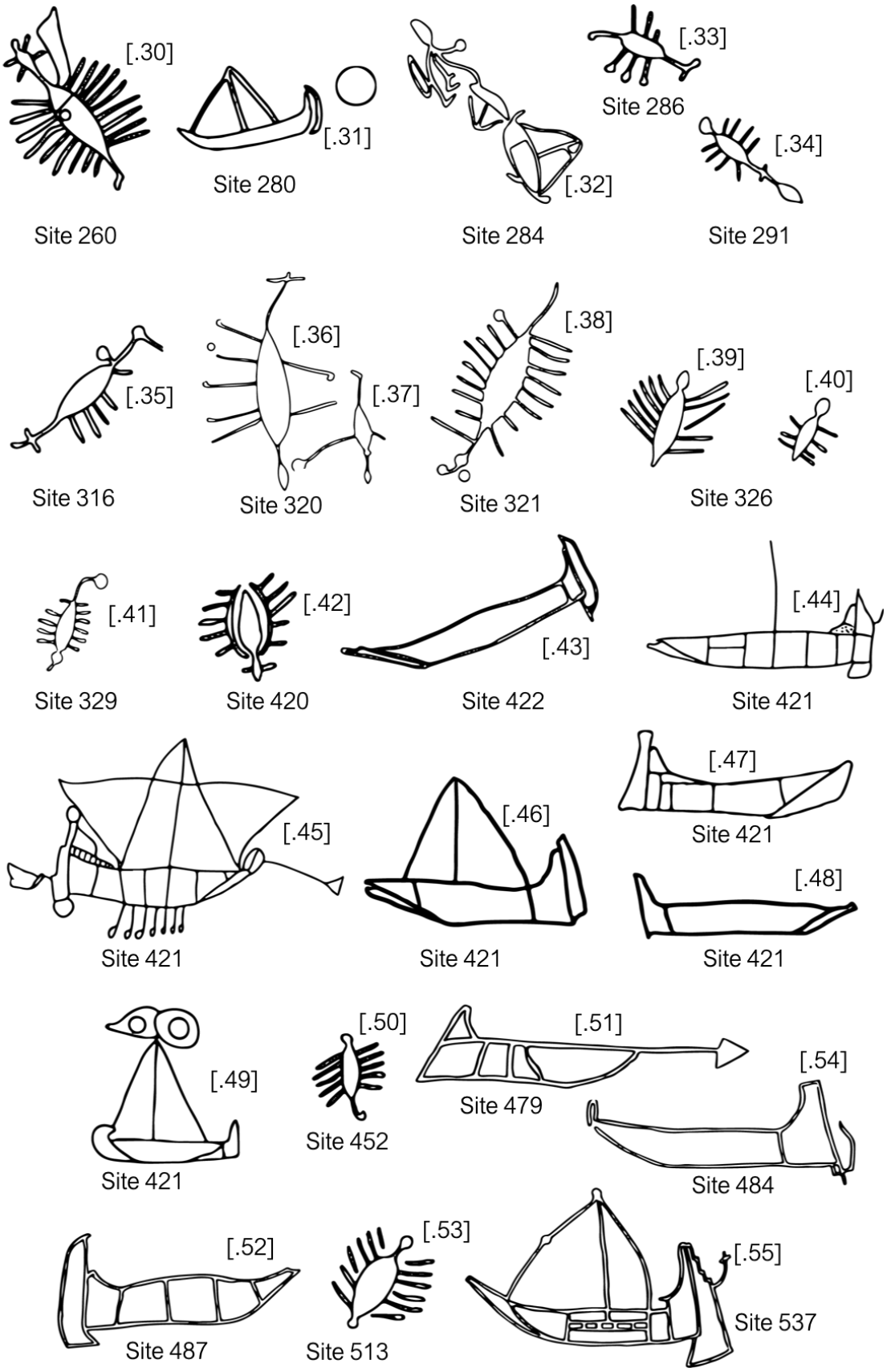
Kapel 2017 [al-Jusāsiyyah, Qatar]



(Not to scale; see originals for scales)

B3.8 …

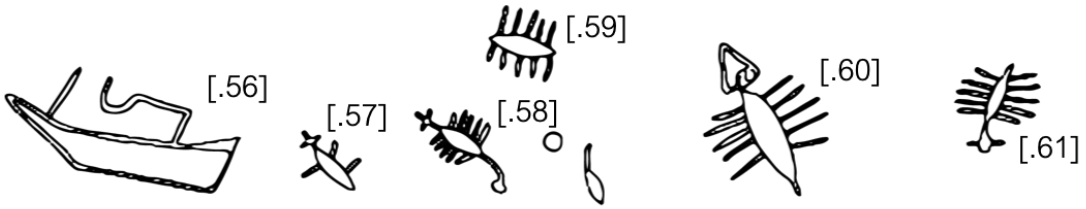
Kapel 2017 [al-Jusāsiyyah, Qatar]



(Not to scale; see originals for scales)

B3.8 …

Kapel 2017 [al-Jusāsiyyah, Qatar]



(Not to scale; see originals for scales)

B3.9

Kenderdine and Vosmer 1994 [Oman]

Fig.3a [.1]

Fig.3b [.2]

Fig.3c [.3]

Fig.3d [.4]

Fig.3e [.5]

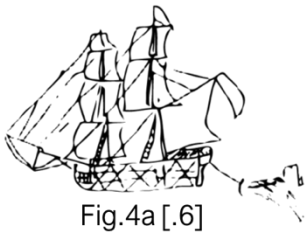


Fig.4a [.6]

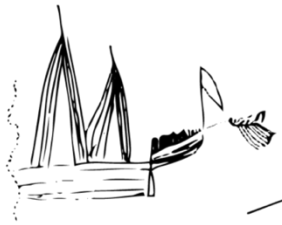


Fig.4b [.7]

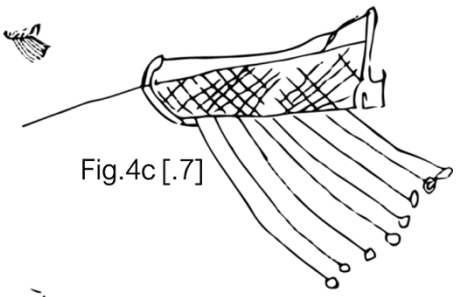


Fig.4c [.7]

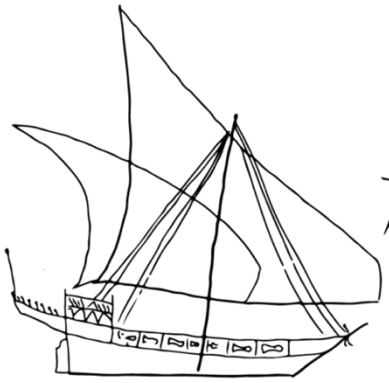


Fig.4d (redrawn from photograph) [.8]

Fig.4e [.9]

Fig.4f [.10]

(Not to scale)

B3.9 …

Kenderdine and Vosmer 1994 [Oman]

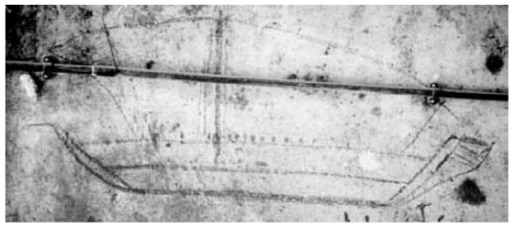


Fig.5 [.11]

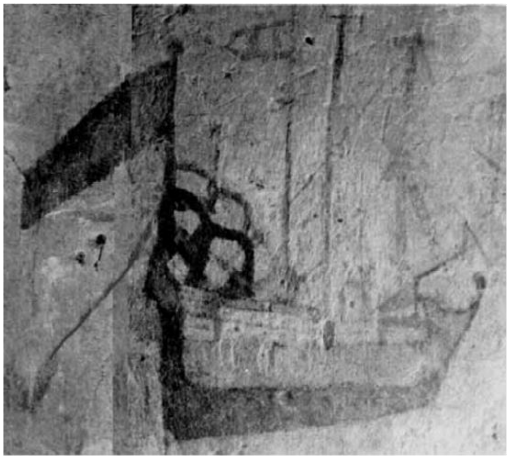


Fig.9 [.12]

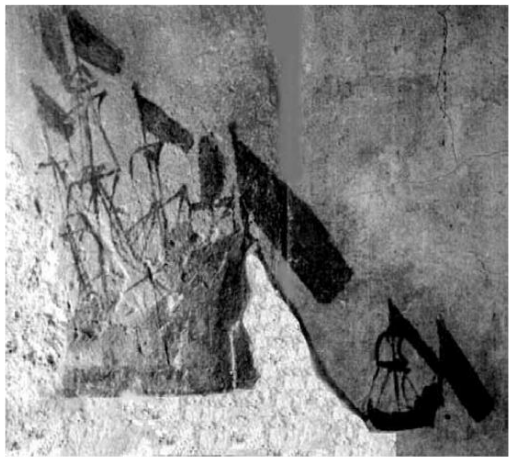


Fig.10 [.13] [.14]

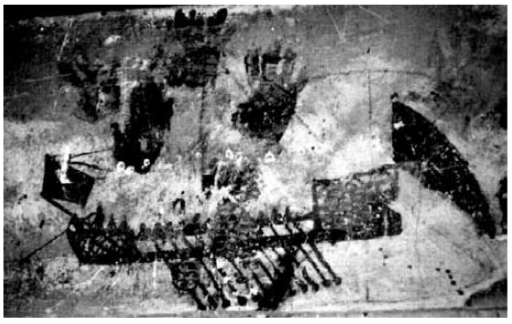


Fig.11 [.15]

Fig.12 [.16]

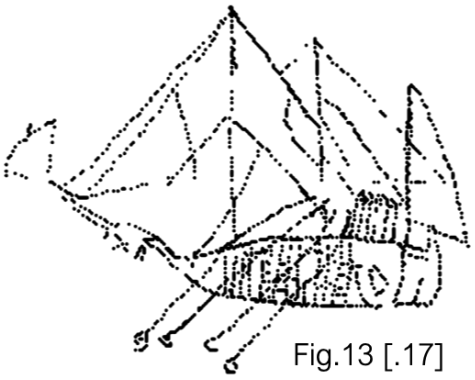


Fig.13 [.17]

Fig.14 [.18]

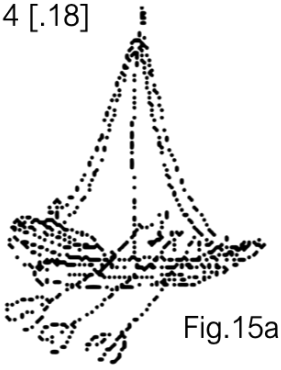


Fig.15a [.19]

Fig.15b (figure supplied by T. Vosmer 2019 [.20]

B3.9 …

Kenderdine and Vosmer 1994 [Oman]

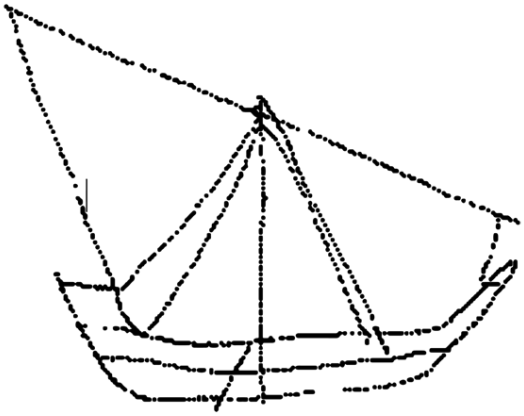


Fig.16 [.21]

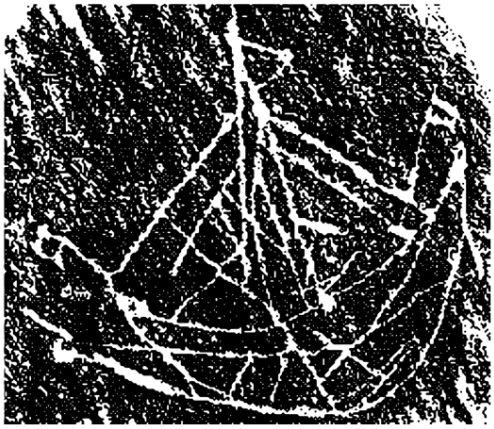


Fig.17 [.22]

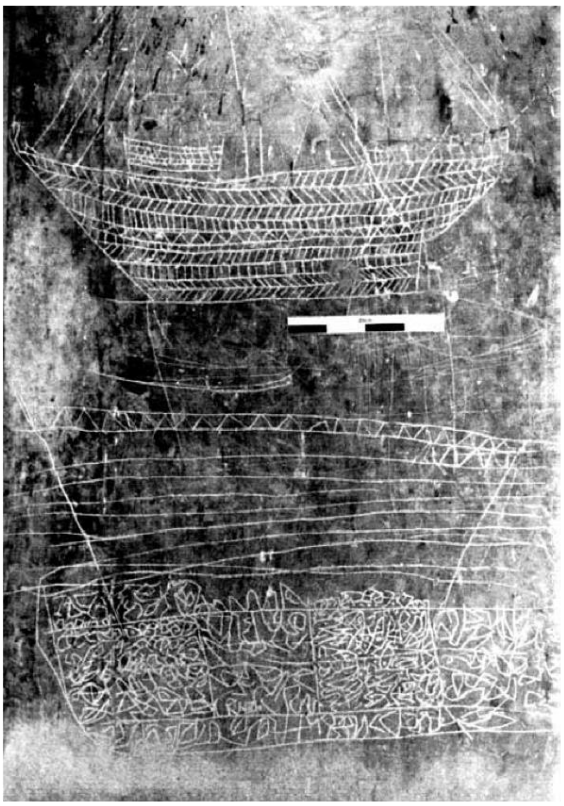


Fig.19 [.23]

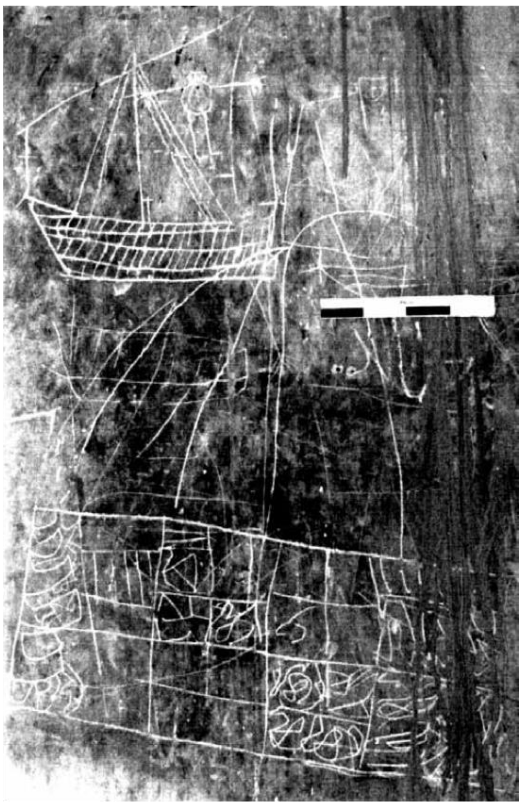


Fig.20 [.24]

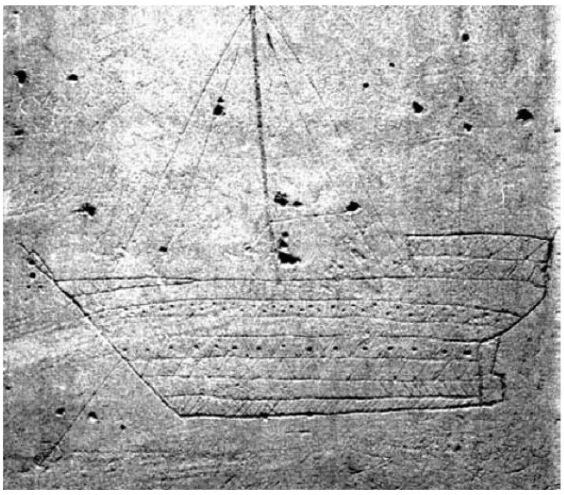


Fig.21 [.25]

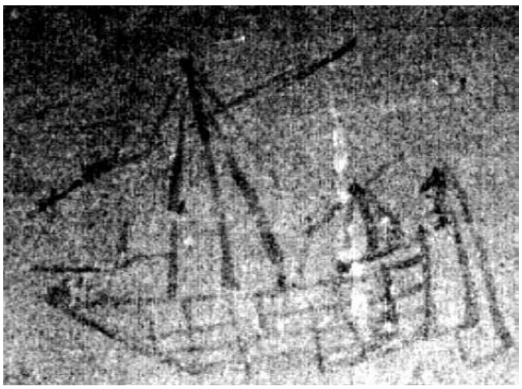


Fig.22 [.26]

B3.9 …

Kenderdine and Vosmer 1994 [Oman]

Fig.23 [.27]

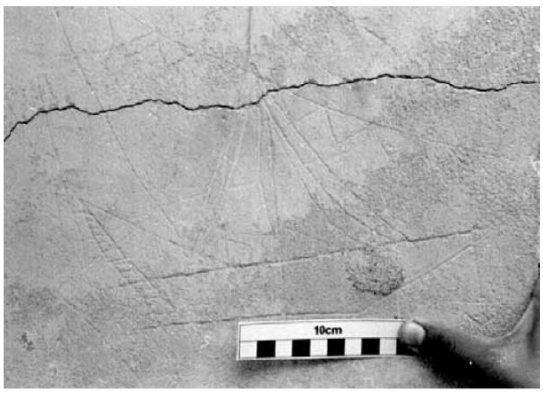


Fig.24 [.28]

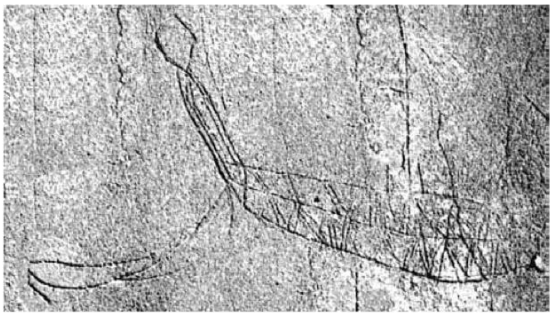


Fig.25 [.29]

Fig.26 [.30]

Fig.27 [.31]

Fig.28 [.32]

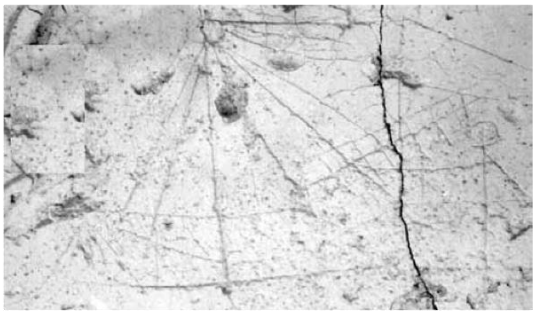
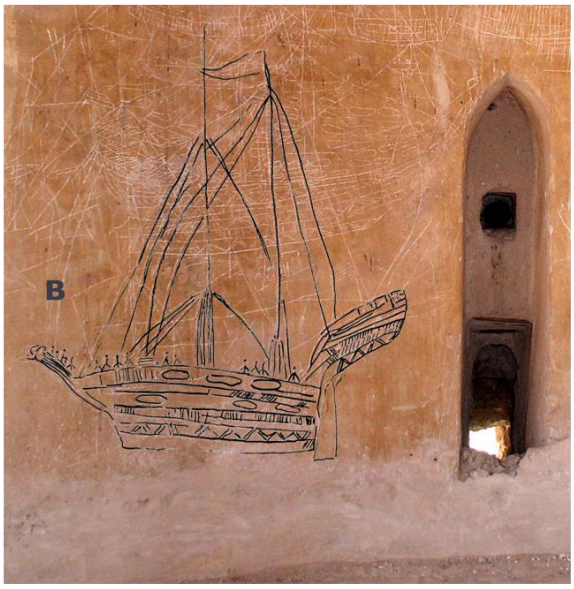
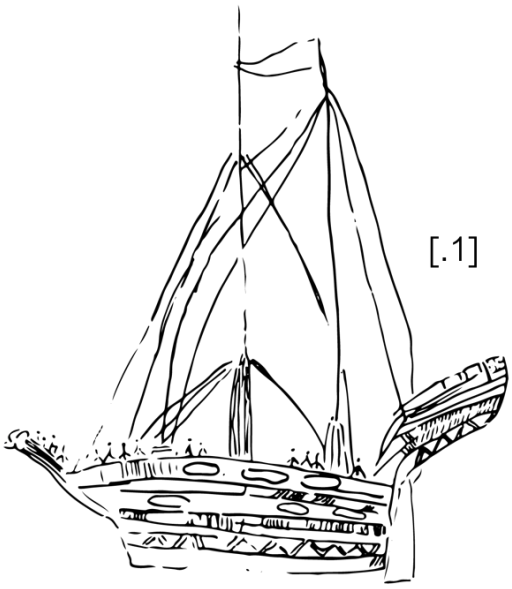


Fig.29 [.33]

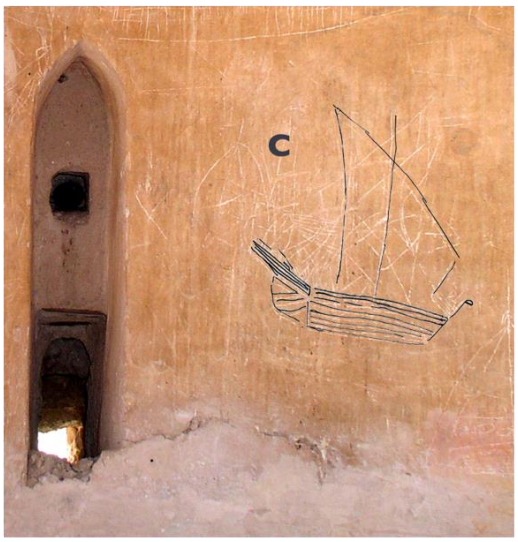
B3.10

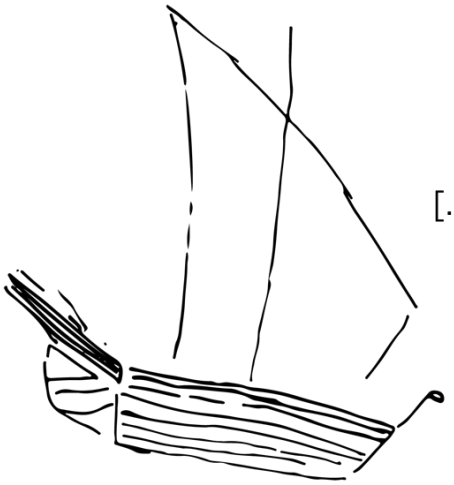
Vosmer 2019b–d [Bayt Na’am, Oman]



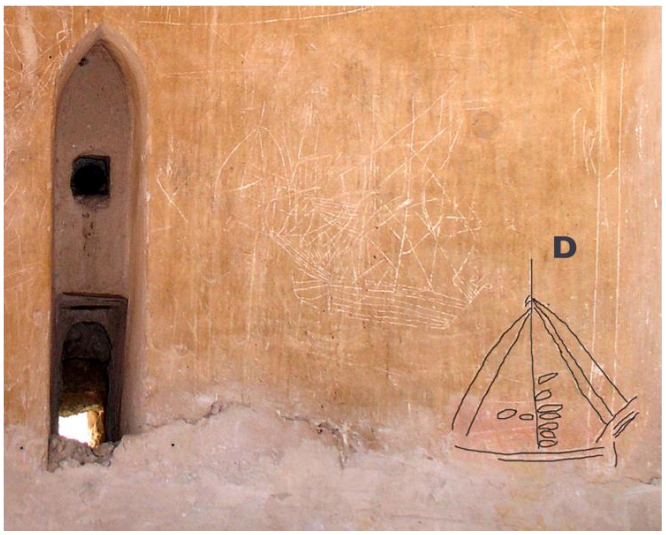


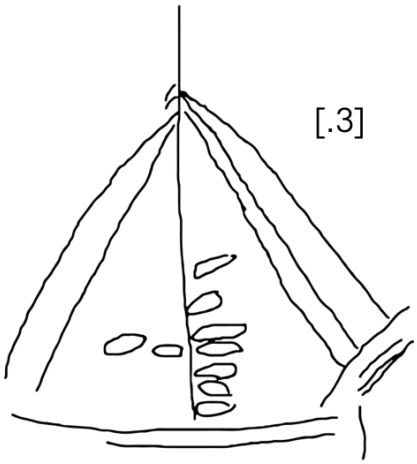
[.1]





[.2]





[.3]

B4 Models

B4.1

Anon. c.1830

Arab Nowree

B4.2

Anon. c.1850a

Arab Baggala

B4.3

Anon. c.1850b

Joasamee Pirate Vessel

B4.4

Anon. 1871–1880

Zaruka

B4.5

Anon. c.1873

Badan seyad

B4.6

Anon. before

1897 *Baghla*

Removed due to copyright restrictions

B4.7

Anon. before

1898a *Bugla*

B4.8

Anon. before

1898b *Baggarah*

B4.9

Anon. c.1850–1899 *Battīl*

B4.10

Anon. before 1927 *Ghanja*

B4.11

Anon. before 1946 *Ghanja*

B4.12

Anon. before 1954 *Sanbūq*

B4.13

Anon. n.d. a *Baghla*

B4.14

Anon. n.d. b

Baghla

B4.15

Anon. n.d. c

Battīl

B4.16

Anon. n.d. d

Badan

B4.17

Anon. n.d. e

Ghanja

B4.18

Anon. n.d. f

Kūtiyya

B4.19

Anon. n.d. g

Sanbūq

B4.20

Baude 1873a

Badan safar

B4.21

Baude 1873b

Baggala

B4.22

Baude 1874

Dungiyah

B4.23

Hamelin 1876

Garookuh

B4.24

Merwanjee

c.1842–1851

Battīl

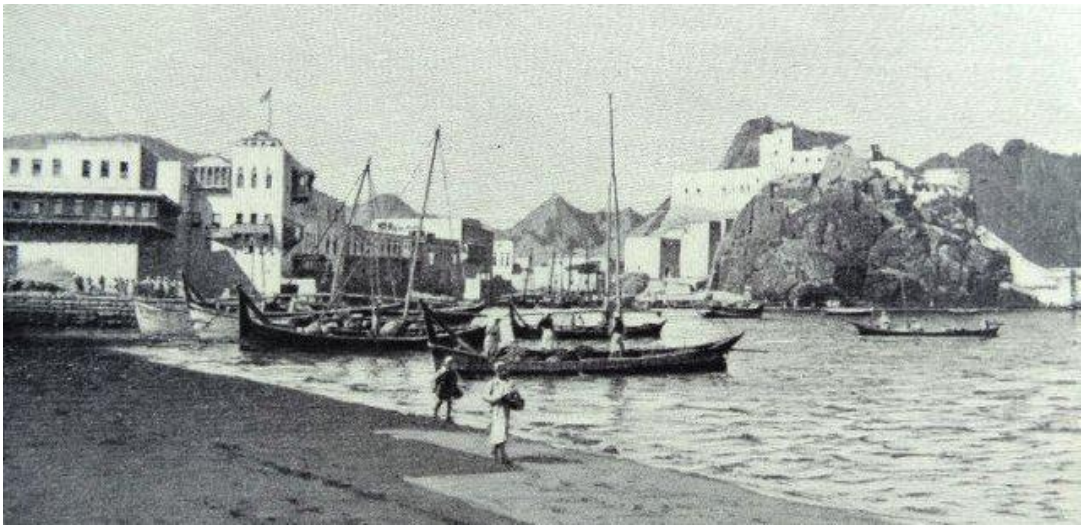
B5 Photographs

B5.1

Alleman 1898:fig.17

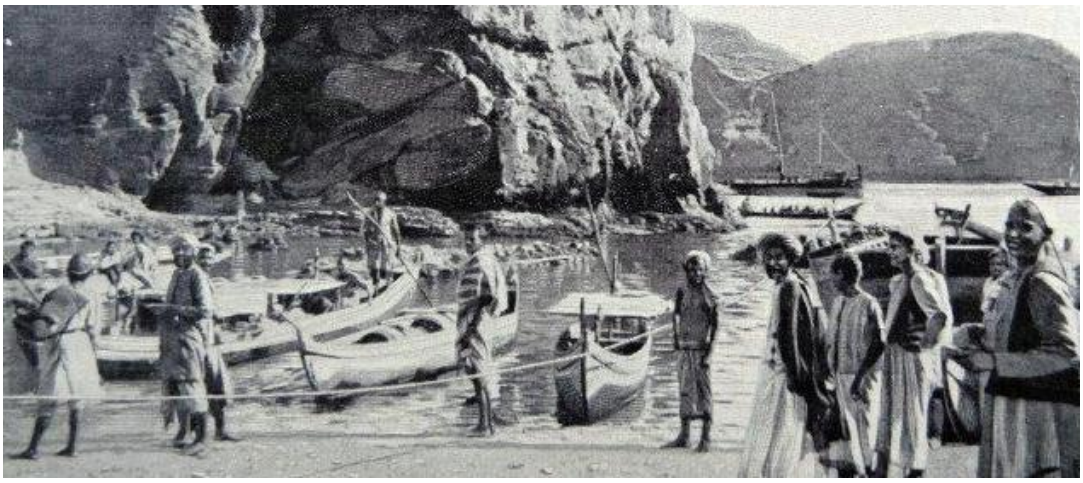
B5.2

Alleman 1898:fig.11



B5.3

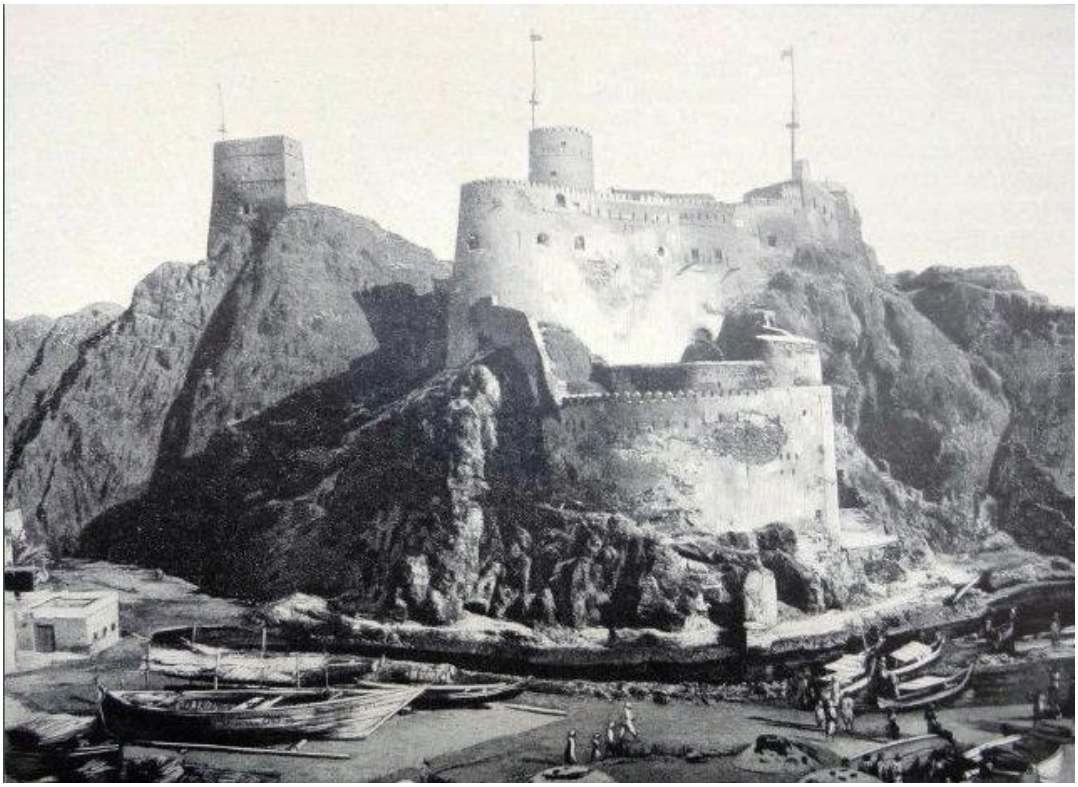
Alleman 1898:fig.10



B5.4

Alleman

1898:fig.13



B5.5

Anon.

c.1870a

B5.6

Anon.

c.1870b

B5.7

Anon. c.1890

B5.8

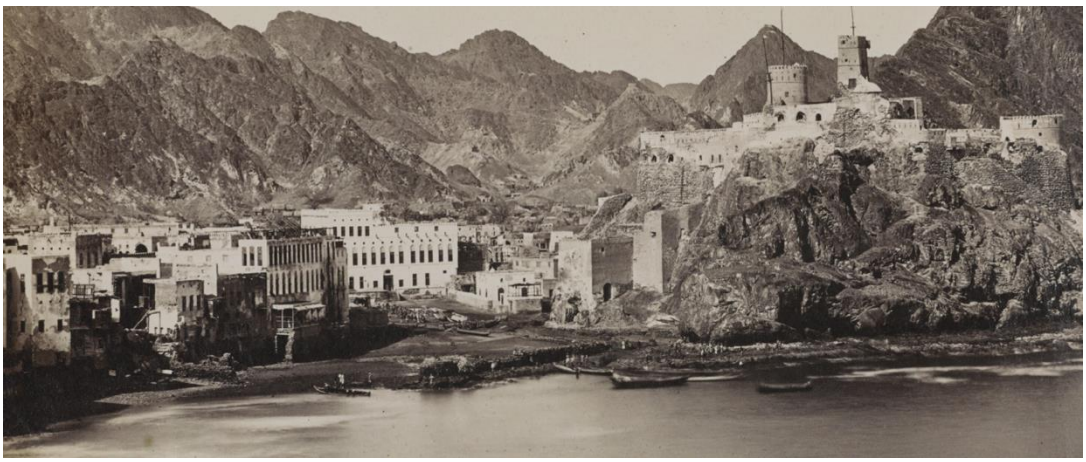
BL Photo
355/1(42)
c.1870

B5.9

BL Photo
355/1(43)
c.1870

B5.10

BL Photo
355/1(45)
c.1870



B5.11

BL Photo
355/1(46)
c.1870

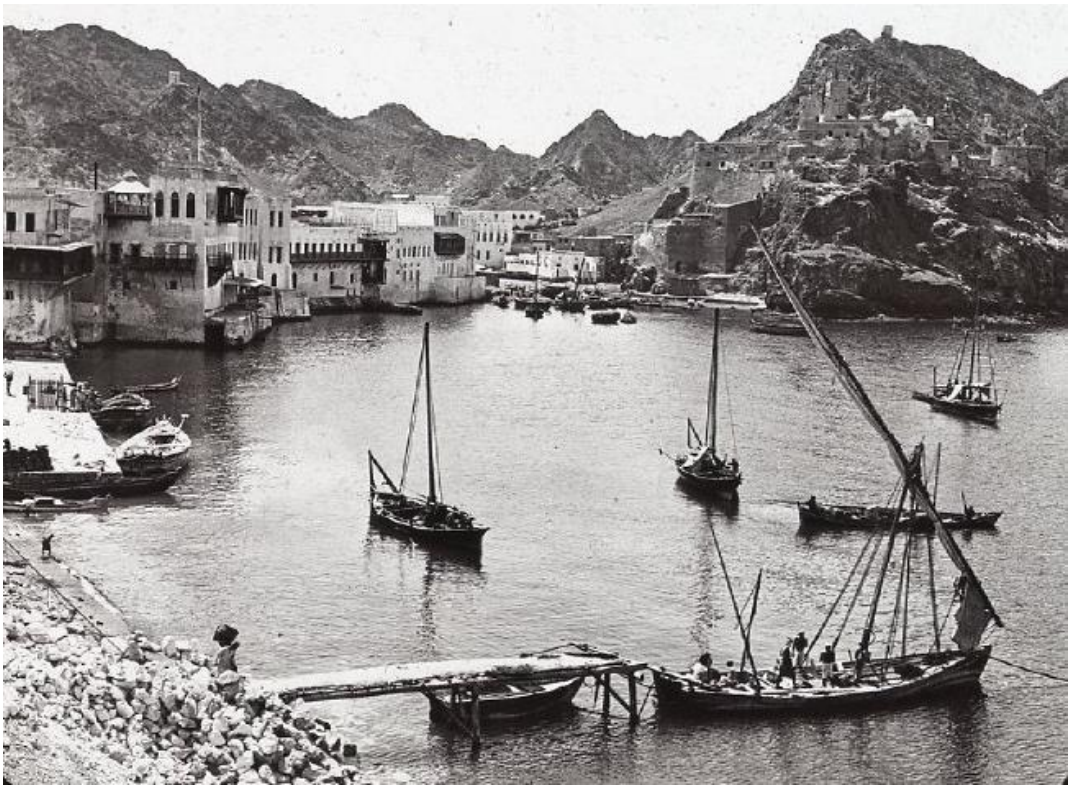
B5.12

Sykes
c.1900a

B5.13

Sykes

c.1900b



B5.14

Thompson

1891a

B5.15

Thompson

1891b

B5.16

Thompson

1891d

B5.17

Winterton

c.1890a

B5.18

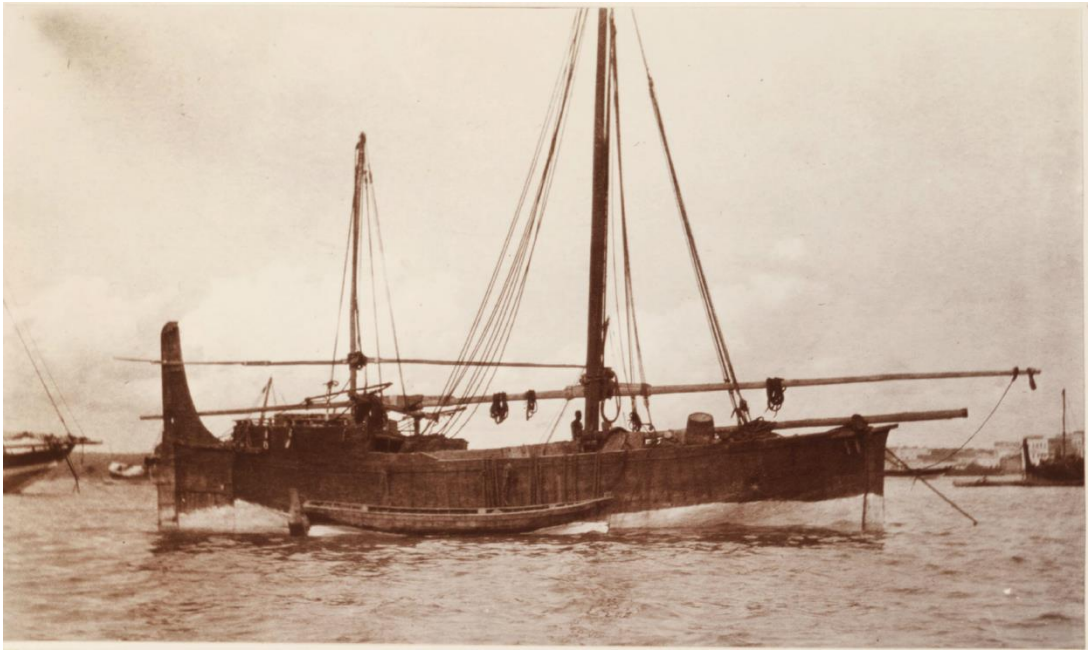
Winterton

c.1890b

B5.19

Winterton

c.1890c



B6 Missing visual sources

B6.1 Anon. c.1820. *An eye draft of Ras al Khyma* [drawing], from David 2005:147.

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B6.2 Anon. c.1840 *Ormus und seine Ruinen* [lithograph]. Philographikon.com MIDDLEEAST252950.

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B6.3 Anon. c.1850 *A View of Muscat on the Coast of Arabia* [painting]. Christie's sale 9399, Lot 122, London, 30 May 2002.

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B6.4 Anon. c.1850 *A View of the Island of O[rmuz]Persian Golph* [painting]. Christie's sale 9399, Lot 122, London, 30 May 2002.

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B6.5 Anon. 1857a *Ruins of the Portuguese church of St Lucia, Ormuz* [coloured print]. *Illustrated Times.* The Map House MEASTp1379.

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B6.6 Anon. 1857b *The Town and Fort of Ormuz* [coloured print]. *Illustrated Times.* The Map House MEASTp1382.

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B6.7 Anon. c.1859–1865 *Muscat. No.2. General view of the Harbour* [photograph]. Southeby's sale 13 November 2008, Lot 101, London.

No image available

B6.8 Anon. c.1859–1865 *Muscat, view of the harbour* [photograph]. Southeby's sale 13 November 2008, Lot 101, London.

No image available

B6.9 Anon. c.1859–1865 *Muscat, Entrance to Eastern Point of Harbour. H.M.S. Steamer Punjaub at anchor* [photograph]. Southeby's sale 13 November 2008, Lot 101, London.

No image available

B6.10 Anon. c.1859–1865 *Muscat. Western Point of Harbour* [photograph]. Southeby's sale 13 November 2008, Lot 101, London.

No image available

B6.11 Anon. c.1865–1875 Travel album including views of Muscat, India and Scotland. Approximately 80 prints. Christie's sale 9087, Lot 185, London, 11 May 2001.

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B6.12 Anon. c.1880 Model of an Omani ‘sewn double-ender Sambuk’ [model]. Eyemouth International Sailing Craft Association EISCA-22 (*395). Cited in Dixon 2018:Appendix A:15.

No image available

B6.13 Anon. 1883 *The recent siege of Muscat* [coloured print]. *Illustrated London News.* The Map House MEASTp1679.

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B6.14 Anon. 1897 Historical view of Muscat [wood engraving after photograph]. iStock Photo/Getty Images 1141455535.

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B6.15 Dalrymple, A. c.1807 *Plan of the Road of Jasques on the Coast of Persia* [chart]. Dalrymple's charts: a collection in 3 volumes of charts, maps and plans for navigation. Volume 1. MAP Ra29:146. National Library of Australia.

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B6.16 Dalrymple, A. c.1807 *Plan of Bushire in the Persian Gulph* [chart]. Dalrymple's charts: a collection in 3 volumes of charts, maps and plans for navigation. Volume 1. MAP Ra29:147. National Library of Australia.

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B6.17 Daniell, W. c.1790–1837 *Sea Piece: Arab Dhow and Brig, becalmed* [painting]. Victoria and Albert Museum, London, 459-1875.

No image available

B6.18 FCMN Sygn.1800 Z, Isfahan, 1618, f.309r. Fundacja XX Czartoryskich przy Muzeum Narodowym [Princes Czartoryski Foundation Museum], Warsaw.

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B6.19 Heathcote, H. c.1808–1812 Three views of Muscat and Oman. Christie's sale 6284, Lot 18, London, 18 April 2000.

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B6.20 Heathcote, H. c.1808–1812 *A Trankey of the King of Muscat's Dominions* [painting]. Christie's sale 6284, Lot 18, London, 18 April 2000.

No image available

B6.21 Igglesden, W. c.1819 *Muscat Cove* [painting]. Christie's sale 4071, Lot 276, London, 13 April 2006.

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B6.22 Igglesden, W. c.1819 *East Indiamen engaging dhows off the Trucial Coast* [painting]. Christie's sale 4071, Lot 276, London, 13 April 2006.

No image available

B6.23 Igglesden, W. c.1819 *A Qawasim Baghlah off the Trucial Coast* [painting]. Christie's sale 4071, Lot 276, London, 13 April 2006.

No image available

B6.24 Kempthorne, J. c.1688 Muscat harbour [chart], from Facey and Martin 1991:70.

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B6.25 Loch, F.E. c.1819 *Abushire Persia* [drawing], National Records of Scotland, Edinburgh, Sketchbook of Francis Erskine Loch, GD1/633/9–34.

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B6.26 Loch, F.E. c.1819 *On the left hand going in to Muscat* [drawing], National Records of Scotland, Edinburgh, Sketchbook of Francis Erskine Loch, GD1/633/9–36.

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B6.27 Loch, F.E. c.1819 *Remarkable rock near fishermans cut Muscat Cove …* [drawing], National Records of Scotland, Edinburgh, Sketchbook of Francis Erskine Loch, GD1/633/9–39.

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B6.28 Loch, F.E. c.1819 *Muscat Cove looking between Fishers cut outside of the anchorage* [drawing], National Records of Scotland, Edinburgh, Sketchbook of Francis Erskine Loch, GD1/633/9–40.

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B6.29 Loch, F.E. c.1819 *The state prision at Muscat …* [drawing], National Records of Scotland, Edinburgh, Sketchbook of Francis Erskine Loch, GD1/633/9–41.

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B6.30 Millar (?) 1782 *A view of the Pearl Fishery* [coloured print]. The Map House MEASTp1497.

Removed due to copyright restrictions

B6.31 Pasini, A. 1855 View of the sunset in Bauchir [drawing]. Artprice.com 1822507.

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B6.32 Pocock, N. c.1740–1821 *Town of Muscat, Capital of Oman, Arabia* [drawing]. Doyle's New York sale 13CN02, 22 May 2013, Lot 70.

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B6.33

Stiffe, A.W. c.1872 *The Fort of Ormuz* [print]. Danvers, F. C. 1894 (2003) *The Portuguese In India: Being a History of the Rise and Decline of Their Eastern Empire*. London, New Delhi:Asian Educational Services, 1894: 2003 Vol.1 after p.330.

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B6.34

Van der Aa c.1715 Bander Abbas, Iran [coloured print]. The Map House MEASTp1263.

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APPENDIX C: CODED DATA OF VISUAL SOURCES

C1 Graphic sources

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.001	Graphic	1375	Year	Persian Gulf	Coastal	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.002	Graphic	1400	Range +50 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
1.003	Graphic	1507	Range +100 years	Iran	Coastal	Interdiction	OMV present	2	2	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Awning	First instance
1.004	Graphic	1564	Year	Oman	Coastal	Interdiction	OMV present	15	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Awning	First instance
1.005	Graphic	1564	Year	Oman	Coastal	Interdiction	OMV present	19	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Awning	Sequential
1.006	Graphic	1600	Range +100 years	Iraq	Harbour	None	No OMV visible	5	5	0	0	Undetermined	None	No deck	Undetermined	First instance
1.007	Graphic	1600	Range +100 years	Iran	Harbour	None	No OMV visible	11	11	0	0	Undetermined	None	No deck	Undetermined	First instance
1.008	Graphic	1600	Range +100 years	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.009	Graphic	1600	Range +100 years	Iran	Harbour	None	No OMV visible	3	1	0	2	Undetermined	None	Full deck	Fixed enclosed	First instance
1.010	Graphic	1600	Range +100 years	Iran	Coastal	None	No OMV visible	4	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.011	Graphic	1645	Year	Iran	Harbour	None	No OMV visible	3	3	0	0	Undetermined	None	No deck	Undetermined	Copy
1.012	Graphic	1704	Year	Oman	Harbour	None	OMV implied	12	6	3	1	Undetermined	Broadside guns in ports	Full deck	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.013	Graphic	1704	Year	Iraq	Harbour	None	No OMV visible	3	2	0	1	Undetermined	None	Undetermined	Raised platform	First instance
1.014	Graphic	1713	Year	Iran	Harbour	None	No OMV visible	14	9	0	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
1.015	Graphic	1716	Year	Oman	Harbour	None	OMV implied	4	0	4	0	Undetermined	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
1.016	Graphic	1809	Year	UAE	Inshore	Interdiction	OMV present	1	0	1	0	Metal fastened	Broadside guns in ports	Full deck	Undetermined	First instance
1.017	Graphic	1810	Year	Oman	Inshore	Assault	OMV present	6	6	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.018	Graphic	1846	Year	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.019	Graphic	1849	Year	Arabian Seas	Coastal	Coercion	OMV implied	2	1	1	0	Metal fastened	Broadside guns in ports	Undetermined	Undetermined	First instance
1.020	Graphic	1850	Year	Oman	Harbour	None	OMV implied	2	0	2	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	First instance
1.021	Graphic	1856	Year	Iran	Harbour	None	No OMV visible	10	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.022	Graphic	1857	Year	Iran	Harbour	None	No OMV visible	4	3	0	0	Undetermined	None	No deck	Undetermined	First instance
1.023	Graphic	1857	Year	Iran	Harbour	None	No OMV visible	4	2	0	0	Undetermined	None	No deck	Undetermined	First instance
1.024	Graphic	1857	Year	Iran	Harbour	None	No OMV visible	3	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.025	Graphic	1857	Year	Iran	Harbour	None	No OMV visible	6	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.026	Graphic	1857	Year	Iran	Harbour	Destruction	OMV present	1	0	0	1	Undetermined	None	Full deck	Undetermined	First instance
1.027	Graphic	1865	Year	Oman	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
1.028	Graphic	1868	Year	Oman	Coastal	Destruction	OMV present	1	0	1	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	First instance
1.029	Graphic	1869	Year	Qatar	Coastal	Interdiction	OMV implied	2	0	0	1	Undetermined	None	Undetermined	Fixed enclosed	First instance
1.030	Graphic	1869	Year	Qatar	Harbour	Destruction	OMV present	4	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.031	Graphic	1870	Year	Oman	Harbour	None	No OMV visible	2	2	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
1.032	Graphic	1873	Year	Arabian Seas	Open sea	Coercion	OMV implied	1	1	0	0	Undetermined	None	Undetermined	Fixed enclosed	First instance
1.033	Graphic	1873	Year	Arabian Seas	Open sea	Coercion	OMV implied	1	1	0	0	Undetermined	None	Undetermined	Fixed enclosed	Copy
1.034	Graphic	1873	Year	Arabian Seas	Open sea	Coercion	OMV implied	1	0	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.035	Graphic	1873	Year	Iran	Coastal	None	No OMV visible	3	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.036	Graphic	1880	Circa	Arabian Seas	Open sea	None	OMV implied	1	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.037	Graphic	1881	Year	Persian Gulf	Open sea	None	No OMV visible	14	14	0	0	Undetermined	None	No deck	Undetermined	First instance
1.038	Graphic	1882	Year	Iran	Harbour	None	No OMV visible	3	0	1	0	Undetermined	None	No deck	Undetermined	Copy
1.039	Graphic	1686	Year	Iran	Harbour	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.040	Graphic	1746	Year	Iran	Harbour	None	No OMV visible	10	10	0	0	Undetermined	None	Partial deck aft	Undetermined	Copy
1.041	Graphic	1690	Year	Oman	Harbour	None	OMV implied	19	8	6	0	Undetermined	Broadside guns in ports	Undetermined	Fixed semi-enclosed	First instance
1.042	Graphic	1690	Year	Iran	Harbour	None	No OMV visible	6	1	4	1	Undetermined	None	Undetermined	Awning	First instance
1.043	Graphic	1874	Year	Iran	Harbour	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.044	Graphic	1811	Year	Oman	Harbour	None	No OMV visible	5	5	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.045	Graphic	1836	Year	Oman	Harbour	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Awning	First instance
1.046	Graphic	1836	Year	Oman	Coastal	None	No OMV visible	6	1	0	0	Undetermined	None	Partial deck fore and aft	Fixed enclosed	First instance
1.047	Graphic	1836	Year	Oman	Harbour	None	No OMV visible	4	2	0	0	Undetermined	None	Undetermined	Awning	First instance
1.048	Graphic	1410	Circa	Iran	Harbour	None	No OMV visible	1	1	0	0	Metal fastened	None	Partial deck fore and aft	Undetermined	First instance
1.049	Graphic	1850	Year	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.050	Graphic	1850	Year	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
1.051	Graphic	1630	Circa	Iran	Harbour	None	No OMV visible	4	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.052	Graphic	1820	Year	Oman	Coastal	None	No OMV visible	7	0	2	1	Undetermined	None	Undetermined	Awning	First instance
1.053	Graphic	1790	Range +50 years	Oman	Coastal	Coercion	OMV present	1	0	0	1	Undetermined	Melee personal weapons	Undetermined	Awning	First instance
1.054	Graphic	1793	Year	Oman	Harbour	None	No OMV visible	6	6	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.055	Graphic	1793	Circa	Oman	Harbour	None	No OMV visible	3	2	0	1	Undetermined	None	Undetermined	Awning	First instance
1.056	Graphic	1793	Year	Oman	Harbour	None	No OMV visible	9	8	0	1	Undetermined	None	Undetermined	Undetermined	First instance
1.057	Graphic	1870	Year	Persian Gulf	Coastal	None	No OMV visible	6	6	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.058	Graphic	1704	Year	Iran	Harbour	None	No OMV visible	10	7	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
1.059	Graphic	1714	Year	Iran	Coastal	None	No OMV visible	11	0	0	0	Undetermined	None	Undetermined	Undetermined	Copy
1.060	Graphic	1599	Year	Iran	Coastal	Interdiction	OMV present	7	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Awning	First instance
1.061	Graphic	1665	Range +25 years	Iran	Harbour	None	No OMV visible	20	0	6	0	Undetermined	None	Undetermined	Awning	First instance
1.062	Graphic	1883	Year	Oman	Harbour	None	No OMV visible	7	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.063	Graphic	1883	Year	Iraq	Riverine or lacustrine	None	No OMV visible	3	3	0	0	Undetermined	None	Partial deck aft	Undetermined	First instance
1.064	Graphic	1883	Year	Iraq	Harbour	None	No OMV visible	3	2	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.065	Graphic	1883	Year	Iraq	Harbour	None	No OMV visible	2	0	1	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
1.066	Graphic	1832	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.067	Graphic	1832	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	Sequential
1.068	Graphic	1832	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Awning	First instance
1.069	Graphic	1700	Range +100 years	Persian Gulf	Coastal	None	OMV implied	1	0	0	1	Undetermined	Swivels or guns over gunwale	Undetermined	Undetermined	First instance
1.070	Graphic	1851	Year	Iran	Harbour	None	No OMV visible	8	3	4	0	Undetermined	None	Partial deck fore and aft	Fixed enclosed	First instance
1.071	Graphic	1637	Year	Persian Gulf	Coastal	None	No OMV visible	4	4	0	0	Undetermined	None	No deck	Undetermined	First instance
1.072	Graphic	1823	Year	Qatar	Harbour	None	No OMV visible	8	0	0	1	Undetermined	None	Undetermined	Undetermined	First instance
1.073	Graphic	1873	Year	Arabian Seas	Open sea	Interdiction	OMV present	2	1	1	0	Undetermined	None	Partial deck aft	Raised platform	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.074	Graphic	1735	Circa	Iran	Harbour	None	No OMV visible	3	3	0	0	Undetermined	None	No deck	Undetermined	First instance
1.075	Graphic	1680	Circa	Oman	Harbour	None	No OMV visible	15	2	1	4	Undetermined	None	Undetermined	Undetermined	Copy
1.076	Graphic	1840	Circa	Iran	Coastal	Interdiction	OMV present	4	4	0	0	Undetermined	Other ranged personal weapons	Undetermined	Awning	First instance
1.077	Graphic	1840	Circa	Oman	Inshore	Assault	OMV present	5	5	0	0	Undetermined	None	Undetermined	Undetermined	Duplicate
1.078	Graphic	1840	Circa	Oman	Harbour	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Awning	First instance
1.079	Graphic	1840	Circa	UAE	Coastal	Interdiction	OMV present	4	2	1	1	Undetermined	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
1.080	Graphic	1825	Year	UAE	Coastal	None	No OMV visible	9	0	1	1	Undetermined	None	Undetermined	Undetermined	First instance
1.081	Graphic	1825	Year	UAE	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.082	Graphic	1825	Year	UAE	Coastal	None	OMV implied	5	3	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.083	Graphic	1825	Year	UAE	Coastal	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.084	Graphic	1819	Year	UAE	Coastal	None	OMV implied	3	1	0	2	Undetermined	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
1.085	Graphic	1650	Range +50 years	Iran	Harbour	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.086	Graphic	1682	Year	Oman	Harbour	None	No OMV visible	20	1	2	0	Undetermined	None	Undetermined	Awning	First instance
1.087	Graphic	1832	Year	Oman	Coastal	None	OMV implied	1	0	0	1	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.088	Graphic	1787	Year	Oman	Harbour	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
1.089	Graphic	1819	Circa	Iran	Coastal	Destruction	OMV present	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.090	Graphic	1819	Circa	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.091	Graphic	1819	Circa	Iran	Coastal	Coercion	OMV implied	3	2	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.092	Graphic	1682	Year	Persian Gulf	Coastal	None	No OMV visible	3	0	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.093	Graphic	1689	Year	Persian Gulf	Coastal	None	No OMV visible	10	5	0	0	Undetermined	None	Partial deck aft	Undetermined	Duplicate
1.094	Graphic	1847	Year	Oman	Coastal	None	No OMV visible	2	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.095	Graphic	1847	Circa	Oman	Harbour	None	No OMV visible	12	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.096	Graphic	1840	Circa	Iran	Harbour	None	No OMV visible	3	3	0	0	Undetermined	None	No deck	Undetermined	First instance
1.097	Graphic	1632	Circa	Iran	Harbour	None	No OMV visible	4	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.098	Graphic	1785	Year	Oman	Harbour	None	No OMV visible	6	0	0	1	Undetermined	None	Undetermined	Undetermined	First instance
1.099	Graphic	1826	Year	Oman	Harbour	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.100	Graphic	1870	Circa	Persian Gulf	Coastal	None	OMV implied	9	1	5	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	Duplicate
1.101	Graphic	1870	Circa	Persian Gulf	Coastal	None	No OMV visible	2	2	0	0	Metal fastened	None	Full deck	Fixed enclosed	Duplicate
1.102	Graphic	1870	Circa	Persian Gulf	Coastal	None	OMV implied	4	0	4	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	Duplicate
1.103	Graphic	1898	Year	Oman	Harbour	None	No OMV visible	4	4	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.104	Graphic	1812	Year	Iran	Coastal	None	OMV implied	2	0	0	1	Undetermined	Broadside guns in ports	Full deck	Fixed semi-enclosed	First instance
1.105	Graphic	1812	Year	Iran	Coastal	None	No OMV visible	2	1	0	1	Undetermined	None	Partial deck aft	Undetermined	First instance
1.106	Graphic	1812	Year	Oman	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.107	Graphic	1812	Year	Oman	Coastal	None	No OMV visible	4	2	1	1	Undetermined	None	Undetermined	Undetermined	First instance
1.108	Graphic	1895	Year	Bahrain	Coastal	Destruction	OMV present	11	0	9	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
1.109	Graphic	1846	Year	Persian Gulf	Coastal	None	No OMV visible	15	5	2	0	Undetermined	None	Undetermined	Undetermined	First instance
1.110	Graphic	1846	Year	Iran	Harbour	None	No OMV visible	2	0	2	0	Undetermined	None	Partial deck aft	Awning	First instance
1.111	Graphic	1838	Year	Oman	Display	None	No OMV visible	1	1	0	0	Metal fastened	None	Partial deck fore and aft	Undetermined	First instance
1.112	Graphic	1838	Year	Oman	Display	None	No OMV visible	1	1	0	0	Laced	None	Partial deck aft	Undetermined	First instance
1.113	Graphic	1838	Year	Oman	Display	None	OMV implied	1	0	1	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	First instance
1.114	Graphic	1838	Year	Oman	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance
1.115	Graphic	1841	Year	Oman	Display	None	OMV implied	3	2	1	0	Metal fastened	Broadside guns in ports	Full deck	Undetermined	Duplicate
1.116	Graphic	1841	Year	Oman	Coastal	None	No OMV visible	7	3	4	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.117	Graphic	1841	Year	Oman	Coastal	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Undetermined	Duplicate
1.118	Graphic	1841	Year	Oman	Display	None	No OMV visible	2	2	0	0	Undetermined	None	Full deck	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.119	Graphic	1841	Year	Oman	Coastal	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Fixed enclosed	First instance
1.120	Graphic	1841	Year	Oman	Coastal	None	No OMV visible	2	2	0	0	Metal fastened	None	Undetermined	Undetermined	Duplicate
1.121	Graphic	1841	Year	Oman	Coastal	None	OMV implied	7	6	1	0	Undetermined	Broadside guns in ports	Partial deck fore and aft	Undetermined	Duplicate
1.122	Graphic	1879	Year	Oman	Display	None	OMV implied	1	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
1.123	Graphic	1859	Year	Oman	Harbour	None	No OMV visible	5	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.124	Graphic	1677	Circa	Oman	Harbour	None	No OMV visible	3	1	1	0	Undetermined	None	Undetermined	Awning	First instance
1.125	Graphic	1895	Year	Iran	Harbour	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Awning	First instance
1.126	Graphic	1839	Circa	Oman	Harbour	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.127	Graphic	1839	Circa	Oman	Harbour	None	No OMV visible	2	1	0	1	Undetermined	None	Undetermined	Undetermined	First instance
1.128	Graphic	1819	Circa	UAE	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.129	Graphic	1822	Circa	Oman	Harbour	None	No OMV visible	4	2	0	0	Undetermined	None	Undetermined	Awning	Copy
1.130	Graphic	1822	Circa	Oman	Harbour	None	No OMV visible	6	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.131	Graphic	1822	Circa	Oman	Coastal	None	No OMV visible	2	1	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.132	Graphic	1822	Circa	Oman	Harbour	None	No OMV visible	10	5	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.133	Graphic	1840	Circa	Iran	Harbour	None	No OMV visible	3	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.134	Graphic	1840	Circa	Iran	Harbour	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.135	Graphic	1648	Circa	Iran	Harbour	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.136	Graphic	1813	Year	Oman	Harbour	None	No OMV visible	2	1	0	1	Undetermined	None	Undetermined	Fixed enclosed	First instance
1.137	Graphic	1813	Year	Oman	Harbour	None	No OMV visible	5	1	0	2	Undetermined	None	Undetermined	Fixed enclosed	First instance
1.138	Graphic	1813	Year	Oman	Harbour	None	OMV implied	1	0	0	1	Undetermined	Broadside guns in embrasures	Full deck	Fixed enclosed	First instance
1.139	Graphic	1813	Year	UAE	Inshore	Assault	OMV present	9	9	0	0	Undetermined	Broadside guns in embrasures	Undetermined	Undetermined	Duplicate
1.140	Graphic	1813	Year	UAE	Inshore	Assault	OMV present	7	7	0	0	Undetermined	Other ranged personal weapons	Undetermined	Undetermined	Duplicate
1.141	Graphic	1813	Year	UAE	Ashore	Destruction	OMV present	5	3	0	2	Undetermined	Broadside guns in embrasures	Undetermined	Undetermined	First instance
1.142	Graphic	1813	Year	Iran	Inshore	Destruction	OMV present	16	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.143	Graphic	1813	Year	Iran	Display	Destruction	OMV present	6	3	2	0	Undetermined	Broadside guns in embrasures	Partial deck aft	Undetermined	First instance
1.144	Graphic	1575	Year	Iran	Harbour	None	No OMV visible	2	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.145	Graphic	1575	Year	Bahrain	Coastal	None	No OMV visible	3	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.146	Graphic	1809	Year	UAE	Inshore	Assault	OMV present	9	9	0	0	Undetermined	None	Undetermined	Undetermined	Duplicate
1.147	Graphic	1822	Year	Iran	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.148	Graphic	1820	Circa	Oman	Harbour	None	No OMV visible	3	1	2	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
1.149	Graphic	1820	Circa	Oman	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
1.150	Graphic	1863	Year	Iran	Coastal	None	No OMV visible	1	0	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.151	Graphic	1725	Year	Iran	Ashore	None	No OMV visible	1	0	1	0	Laced	None	Undetermined	Undetermined	First instance
1.152	Graphic	1594	Circa	Persian Gulf	Coastal	None	No OMV visible	8	1	1	0	Undetermined	None	Undetermined	Undetermined	First instance
1.153	Graphic	1596	Year	Persian Gulf	Coastal	None	No OMV visible	10	3	3	0	Metal fastened	None	Partial deck aft	Undetermined	Copy
1.154	Graphic	1682	Year	Oman	Harbour	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance

C2 Islamic manuscript images

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.001	Islamic Manuscript Image	1550	Circa	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Partial deck aft	Raised platform	First instance
2.002	Islamic Manuscript Image	1400	Range +100 years	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.003	Islamic Manuscript Image	1525	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Raised platform	First instance
2.004	Islamic Manuscript Image	1582	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.005	Islamic Manuscript Image	1492	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	Copy
2.006	Islamic Manuscript Image	1513	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.007	Islamic Manuscript Image	1550	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.008	Islamic Manuscript Image	1580	Circa	Persian Gulf	Riverine or lacustrine	None	No OMV visible	3	1	0	0	Undetermined	Archery	Partial deck fore and aft	Undetermined	First instance
2.009	Islamic Manuscript Image	1697	Year	Iran	Coastal	Interdiction	OMV present	2	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.010	Islamic Manuscript Image	1697	Year	Iran	Coastal	Transport	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.011	Islamic Manuscript Image	1536	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Full deck	Raised platform	First instance
2.012	Islamic Manuscript Image	1468	Year	Iraq	Riverine or lacustrine	None	No OMV visible	10	10	0	0	Undetermined	None	No deck	Undetermined	First instance
2.013	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance
2.014	Islamic Manuscript Image	1486	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.015	Islamic Manuscript Image	1566	Circa	Persian Gulf	Coastal	Coercion	OMV present	1	0	0	0	Undetermined	Melee personal weapons	Undetermined	Fixed semi-enclosed	First instance
2.016	Islamic Manuscript Image	1590	Circa	Persian Gulf	Open sea	None	OMV implied	2	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Raised platform	First instance
2.017	Islamic Manuscript Image	1590	Circa	Persian Gulf	Coastal	None	OMV implied	2	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Undetermined	First instance
2.018	Islamic Manuscript Image	1590	Circa	Persian Gulf	Open sea	None	OMV implied	2	0	0	0	Undetermined	Swivels or guns over gunwale	Full deck	Fixed semi-enclosed	First instance
2.019	Islamic Manuscript Image	1630	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.020	Islamic Manuscript Image	1533	Year	Persian Gulf	Open sea	Escort	OMV present	3	1	0	0	Undetermined	Archery	Full deck	Fixed semi-enclosed	First instance
2.021	Islamic Manuscript Image	1465	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	2	2	0	0	Undetermined	None	No deck	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.022	Islamic Manuscript Image	1580	Year	Persian Gulf	Open sea	None	No OMV visible	2	0	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.023	Islamic Manuscript Image	1624	Circa	Persian Gulf	Open sea	None	OMV implied	1	0	0	1	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.024	Islamic Manuscript Image	1552	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.025	Islamic Manuscript Image	1438	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.026	Islamic Manuscript Image	1490	Circa	Persian Gulf	Coastal	None	No OMV visible	2	1	0	0	Undetermined	None	Partial deck aft	Fixed semi-enclosed	First instance
2.027	Islamic Manuscript Image	1580	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.028	Islamic Manuscript Image	1390	Range +50 years	Iran	Inshore	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.029	Islamic Manuscript Image	1494	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.030	Islamic Manuscript Image	1201	Range +100 years	Iraq	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.031	Islamic Manuscript Image	1236	Circa	Iraq	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.032	Islamic Manuscript Image	1236	Circa	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Laced	None	Full deck	Fixed semi-enclosed	First instance
2.033	Islamic Manuscript Image	1236	Circa	Persian Gulf	Inshore	None	No OMV visible	1	0	0	0	Laced	None	Undetermined	Undetermined	Sequential
2.034	Islamic Manuscript Image	1702	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	1	0	Undetermined	None	Partial deck aft	Undetermined	First instance
2.035	Islamic Manuscript Image	1222	Year	Iraq	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.036	Islamic Manuscript Image	1527	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	3	1	0	0	Metal fastened	Archery	Undetermined	Raised platform	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.037	Islamic Manuscript Image	1581	Year	Persian Gulf	Ashore	None	No OMV visible	1	0	0	0	Laced	None	Undetermined	Undetermined	First instance
2.038	Islamic Manuscript Image	1581	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.039	Islamic Manuscript Image	1604	Year	Persian Gulf	Coastal	Interdiction	OMV present	1	0	0	0	Undetermined	Archery	Undetermined	Fixed semi-enclosed	First instance
2.040	Islamic Manuscript Image	1388	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.041	Islamic Manuscript Image	1388	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.042	Islamic Manuscript Image	1388	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.043	Islamic Manuscript Image	1388	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.044	Islamic Manuscript Image	1560	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	Body armour	Undetermined	Fixed semi-enclosed	First instance
2.045	Islamic Manuscript Image	1600	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	Copy
2.046	Islamic Manuscript Image	1430	Circa	Iran	Riverine or lacustrine	Assault	OMV present	1	1	0	0	Undetermined	Archery	No deck	Undetermined	First instance
2.047	Islamic Manuscript Image	1595	Circa	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.048	Islamic Manuscript Image	1595	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.049	Islamic Manuscript Image	1540	Circa	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.050	Islamic Manuscript Image	1560	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.051	Islamic Manuscript Image	1560	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.052	Islamic Manuscript Image	1483	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.053	Islamic Manuscript Image	1550	Range +50 years	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.054	Islamic Manuscript Image	1550	Range +50 years	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.055	Islamic Manuscript Image	1550	Range +25 years	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.056	Islamic Manuscript Image	1550	Range +25 years	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Metal fastened	Body armour	Undetermined	Raised platform	First instance
2.057	Islamic Manuscript Image	1550	Range +25 years	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.058	Islamic Manuscript Image	1427	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	1	0	Undetermined	None	Undetermined	Fixed enclosed	First instance
2.059	Islamic Manuscript Image	1427	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.060	Islamic Manuscript Image	1478	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.061	Islamic Manuscript Image	1545	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.062	Islamic Manuscript Image	1550	Range +50 years	Persian Gulf	Riverine or lacustrine	None	OMV implied	2	1	0	0	Undetermined	Broadside guns in ports	Undetermined	Raised platform	First instance
2.063	Islamic Manuscript Image	1480	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.064	Islamic Manuscript Image	1485	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.065	Islamic Manuscript Image	1500	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.066	Islamic Manuscript Image	1600	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.067	Islamic Manuscript Image	1587	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.068	Islamic Manuscript Image	1500	Range +50 years	Persian Gulf	Riverine or lacustrine	Assault	OMV present	2	0	0	0	Undetermined	Body armour	Undetermined	Undetermined	First instance
2.069	Islamic Manuscript Image	1500	Range +50 years	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	No deck	Undetermined	First instance
2.070	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Coastal	Coercion	OMV present	1	1	0	0	Undetermined	Melee personal weapons	Undetermined	Fixed semi-enclosed	First instance
2.071	Islamic Manuscript Image	1400	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.072	Islamic Manuscript Image	1430	Circa	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	Copy
2.073	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.074	Islamic Manuscript Image	1600	Range +100 years	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Full deck	Raised platform	First instance
2.075	Islamic Manuscript Image	1393	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.076	Islamic Manuscript Image	1224	Year	Iraq	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Laced	None	Full deck	Fixed enclosed	First instance
2.077	Islamic Manuscript Image	1425	Circa	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance
2.078	Islamic Manuscript Image	1600	Circa	Persian Gulf	Coastal	None	OMV implied	1	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.079	Islamic Manuscript Image	1400	Range +100 years	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed enclosed	First instance
2.080	Islamic Manuscript Image	1493	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.081	Islamic Manuscript Image	1548	Year	Iran	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	No deck	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.082	Islamic Manuscript Image	1496	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.083	Islamic Manuscript Image	1556	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.084	Islamic Manuscript Image	1341	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.085	Islamic Manuscript Image	1550	Range +50 years	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.086	Islamic Manuscript Image	1800	Range +50 years	Iran	Coastal	None	No OMV visible	2	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.087	Islamic Manuscript Image	1435	Circa	Persian Gulf	Open sea	None	No OMV visible	2	0	0	0	Metal fastened	None	Undetermined	Raised platform	First instance
2.088	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Metal fastened	None	Undetermined	Fixed enclosed	First instance
2.089	Islamic Manuscript Image	1550	Range +50 years	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.090	Islamic Manuscript Image	1612	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.091	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Ashore	None	No OMV visible	1	0	0	0	Laced	None	Undetermined	Undetermined	Copy
2.092	Islamic Manuscript Image	1817	Year	Persian Gulf	Open sea	None	No OMV visible	2	0	0	0	Undetermined	Body armour	No deck	Undetermined	First instance
2.093	Islamic Manuscript Image	1500	Range +100 years	Iran	Riverine or lacustrine	None	OMV implied	1	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.094	Islamic Manuscript Image	1525	Range +25 years	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.095	Islamic Manuscript Image	1496	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.096	Islamic Manuscript Image	1496	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.097	Islamic Manuscript Image	1620	Circa	Persian Gulf	Open sea	None	OMV implied	1	0	0	1	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.098	Islamic Manuscript Image	1599	Year	Persian Gulf	Coastal	None	No OMV visible	2	2	0	0	Metal fastened	None	No deck	Undetermined	First instance
2.099	Islamic Manuscript Image	1519	Year	Persian Gulf	Coastal	None	No OMV visible	2	2	0	0	Metal fastened	None	Undetermined	Raised platform	First instance
2.100	Islamic Manuscript Image	1539	Circa	Persian Gulf	Coastal	None	No OMV visible	3	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.101	Islamic Manuscript Image	1550	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	2	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.102	Islamic Manuscript Image	1550	Year	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.103	Islamic Manuscript Image	1230	Circa	Iraq	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.104	Islamic Manuscript Image	1230	Circa	Iraq	Harbour	None	No OMV visible	1	1	0	0	Laced	None	Full deck	Fixed semi-enclosed	Copy
2.105	Islamic Manuscript Image	1594	Year	Persian Gulf	Coastal	Interdiction	OMV implied	4	0	0	0	Undetermined	Swivels or guns over gunwale	Undetermined	Awning	First instance
2.106	Islamic Manuscript Image	1594	Year	Persian Gulf	Harbour	Transport	OMV implied	1	0	1	0	Undetermined	Body armour	Undetermined	Awning	First instance
2.107	Islamic Manuscript Image	1594	Year	Persian Gulf	Open sea	Coercion	OMV implied	3	3	0	0	Undetermined	Broadside guns in ports	Undetermined	Awning	First instance
2.108	Islamic Manuscript Image	1632	Year	Persian Gulf	Open sea	None	No OMV visible	5	4	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.109	Islamic Manuscript Image	1632	Year	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.110	Islamic Manuscript Image	1632	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.111	Islamic Manuscript Image	1570	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	None	Full deck	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.112	Islamic Manuscript Image	1570	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.113	Islamic Manuscript Image	1626	Year	Persian Gulf	Open sea	None	OMV implied	1	0	0	0	Undetermined	Body armour	Undetermined	Awning	First instance
2.114	Islamic Manuscript Image	1313	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.115	Islamic Manuscript Image	1800	Range +100 years	Iran	Coastal	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.116	Islamic Manuscript Image	1400	Range +100 years	Persian Gulf	Display	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.117	Islamic Manuscript Image	1480	Circa	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.118	Islamic Manuscript Image	1527	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.119	Islamic Manuscript Image	1527	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	No deck	Undetermined	First instance
2.120	Islamic Manuscript Image	1476	Circa	Persian Gulf	Coastal	None	OMV implied	1	0	0	0	Undetermined	Melee personal weapons	Undetermined	Undetermined	First instance
2.121	Islamic Manuscript Image	1400	Range +100 years	Iran	Inshore	Transport	OMV implied	1	0	0	0	Undetermined	None	Full deck	Undetermined	First instance
2.122	Islamic Manuscript Image	1504	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	Copy
2.123	Islamic Manuscript Image	1607	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.124	Islamic Manuscript Image	1523	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	Body armour	Undetermined	Undetermined	Copy
2.125	Islamic Manuscript Image	1525	Circa	Persian Gulf	Coastal	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.126	Islamic Manuscript Image	1525	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.127	Islamic Manuscript Image	1476	Circa	Persian Gulf	Coastal	Interdiction	OMV present	1	1	0	0	Undetermined	Melee personal weapons	Undetermined	Undetermined	Copy
2.128	Islamic Manuscript Image	1450	Range +50 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	Copy
2.129	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	3	1	0	0	Metal fastened	Archery	Undetermined	Fixed semi-enclosed	Copy
2.130	Islamic Manuscript Image	1700	Range +50 years	Persian Gulf	Display	Interdiction	OMV present	1	1	0	0	Undetermined	Firearms	Undetermined	Fixed semi-enclosed	First instance
2.131	Islamic Manuscript Image	1850	Range +50 years	Persian Gulf	Open sea	None	OMV implied	6	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.132	Islamic Manuscript Image	1550	Year	Persian Gulf	Open sea	None	No OMV visible	2	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.133	Islamic Manuscript Image	1450	Range +50 years	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.134	Islamic Manuscript Image	1837	Year	Iran	Coastal	None	No OMV visible	8	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.135	Islamic Manuscript Image	1577	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	Copy
2.136	Islamic Manuscript Image	1580	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	Copy
2.137	Islamic Manuscript Image	1530	Circa	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.138	Islamic Manuscript Image	1616	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	Body armour	Undetermined	Raised platform	First instance
2.139	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Metal fastened	None	Undetermined	Undetermined	First instance
2.140	Islamic Manuscript Image	1550	Range +50 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	Archery	Undetermined	Undetermined	Copy
2.141	Islamic Manuscript Image	1589	Circa	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Raised platform	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.142	Islamic Manuscript Image	1674	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	0	1	0	Undetermined	Broadside guns in ports	Undetermined	Fixed semi-enclosed	First instance
2.143	Islamic Manuscript Image	1576	Year	Iran	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.144	Islamic Manuscript Image	1475	Year	Persian Gulf	Inshore	Assault	OMV present	1	0	0	0	Undetermined	Archery	Undetermined	Undetermined	First instance
2.145	Islamic Manuscript Image	1575	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.146	Islamic Manuscript Image	1572	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.147	Islamic Manuscript Image	1848	Circa	Persian Gulf	Coastal	Interdiction	OMV present	1	0	0	0	Metal fastened	Archery	Undetermined	Fixed enclosed	First instance
2.148	Islamic Manuscript Image	1430	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.149	Islamic Manuscript Image	1475	Range +25 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	Copy
2.150	Islamic Manuscript Image	1590	Circa	Persian Gulf	Open sea	None	No OMV visible	2	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.151	Islamic Manuscript Image	1590	Circa	Iran	Riverine or lacustrine	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.152	Islamic Manuscript Image	1520	Circa	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.153	Islamic Manuscript Image	1857	Circa	Persian Gulf	Coastal	None	No OMV visible	8	5	0	0	Undetermined	Broadside guns in embrasures	Undetermined	Undetermined	First instance
2.154	Islamic Manuscript Image	1437	Year	Persian Gulf	Open sea	Interdiction	OMV present	2	0	0	0	Undetermined	Archery	Undetermined	Undetermined	First instance
2.155	Islamic Manuscript Image	1400	Range +100 years	Iraq	Riverine or lacustrine	Transport	OMV implied	4	4	0	0	Undetermined	Melee personal weapons	Undetermined	Undetermined	First instance
2.156	Islamic Manuscript Image	1400	Range +50 years	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
2.157	Islamic Manuscript Image	1400	Range +50 years	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.158	Islamic Manuscript Image	1450	Range +50 years	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	No deck	Undetermined	First instance
2.159	Islamic Manuscript Image	1575	Range +25 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	Copy
2.160	Islamic Manuscript Image	1200	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.161	Islamic Manuscript Image	1500	Range +50 years	Persian Gulf	Coastal	None	OMV implied	1	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.162	Islamic Manuscript Image	1800	Range +50 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.163	Islamic Manuscript Image	1850	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.164	Islamic Manuscript Image	1560	Circa	Persian Gulf	Coastal	None	No OMV visible	2	0	1	0	Metal fastened	Body armour	Undetermined	Raised platform	First instance
2.165	Islamic Manuscript Image	1605	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Metal fastened	Body armour	Undetermined	Raised platform	First instance
2.166	Islamic Manuscript Image	1489	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Awning	First instance
2.167	Islamic Manuscript Image	1550	Range +50 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	Copy
2.168	Islamic Manuscript Image	1800	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	Body armour	Undetermined	Undetermined	Copy
2.169	Islamic Manuscript Image	1242	Circa	Iraq	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Fixed semi-enclosed	Copy
2.170	Islamic Manuscript Image	1550	Circa	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	Archery	Undetermined	Undetermined	Copy
2.171	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Full deck	Fixed semi-enclosed	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.172	Islamic Manuscript Image	1535	Circa	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.173	Islamic Manuscript Image	1565	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Undetermined	Copy
2.174	Islamic Manuscript Image	1550	Year	Persian Gulf	Coastal	None	OMV implied	1	1	0	0	Undetermined	Archery	Undetermined	Undetermined	First instance
2.175	Islamic Manuscript Image	1451	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.176	Islamic Manuscript Image	1493	Year	Persian Gulf	Riverine or lacustrine	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.177	Islamic Manuscript Image	1800	Range +100 years	Persian Gulf	Display	None	No OMV visible	1	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Undetermined	First instance
2.178	Islamic Manuscript Image	1600	Range +100 years	Persian Gulf	Display	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.179	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.180	Islamic Manuscript Image	1478	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Raised platform	Copy
2.181	Islamic Manuscript Image	1497	Year	Persian Gulf	Open sea	None	OMV implied	1	0	1	0	Metal fastened	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
2.182	Islamic Manuscript Image	1497	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Metal fastened	None	Undetermined	Raised platform	First instance
2.183	Islamic Manuscript Image	1530	Year	Persian Gulf	Coastal	None	No OMV visible	2	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
2.184	Islamic Manuscript Image	1530	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	Copy
2.185	Islamic Manuscript Image	1530	Year	Persian Gulf	Coastal	Interdiction	OMV implied	1	0	0	0	Undetermined	None	Undetermined	Raised platform	Copy
2.186	Islamic Manuscript Image	1526	Year	Iran	Inshore	Assault	OMV present	2	0	0	0	Undetermined	Firearms	Undetermined	Undetermined	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
2.187	Islamic Manuscript Image	1428	Circa	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Undetermined	None	Full deck	Undetermined	Copy
2.188	Islamic Manuscript Image	1544	Year	Persian Gulf	Open sea	None	No OMV visible	1	0	0	1	Undetermined	None	Undetermined	Raised platform	First instance
2.189	Islamic Manuscript Image	1575	Circa	Persian Gulf	Ashore	None	OMV implied	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
2.190	Islamic Manuscript Image	1463	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Partial deck aft	Undetermined	First instance
2.191	Islamic Manuscript Image	1599	Year	Persian Gulf	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.192	Islamic Manuscript Image	1840	Range +25 years	Persian Gulf	Coastal	None	OMV implied	1	0	0	0	Undetermined	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
2.193	Islamic Manuscript Image	1576	Year	Persian Gulf	Open sea	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance
2.194	Islamic Manuscript Image	1618	Circa	Persian Gulf	Coastal	None	No OMV visible	3	0	0	0	Undetermined	Body armour	Undetermined	Fixed semi-enclosed	First instance
2.195	Islamic Manuscript Image	1500	Range +100 years	Persian Gulf	Open sea	None	No OMV visible	1	0	0	0	Undetermined	None	Full deck	Raised platform	First instance
2.196	Islamic Manuscript Image	1609	Year	Iran	Coastal	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance
2.197	Islamic Manuscript Image	1476	Year	Persian Gulf	Coastal	None	No OMV visible	1	0	0	0	Metal fastened	None	Undetermined	Raised platform	First instance
2.198	Islamic Manuscript Image	1613	Year	Persian Gulf	Coastal	None	No OMV visible	2	0	0	0	Undetermined	None	Undetermined	Fixed semi-enclosed	First instance

C3 Glyphs and graffiti

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
3.001	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
3.002	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	3	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
3.003	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Raised platform	First instance
3.004	Glyphic	1800	Range +100 years	Saudi Arabia	Display	None	No OMV visible	12	3	3	0	Undetermined	None	Undetermined	Raised platform	First instance
3.005	Glyphic	1800	Range +100 years	Qatar	Display	None	No OMV visible	10	0	3	0	Undetermined	None	Full deck	Raised platform	First instance
3.006	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	1	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
3.007	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	4	0	0	0	Undetermined	None	Undetermined	Undetermined	First instance
3.008	Glyphic	1800	Range +100 years	Qatar	Display	None	No OMV visible	61	48	1	7	Undetermined	None	Undetermined	Undetermined	First instance
3.009	Glyphic	1800	Range +100 years	Oman	Display	None	OMV implied	33	7	6	1	Undetermined	Broadside guns in ports	Undetermined	Fixed enclosed	First instance
3.010	Glyphic	1800	Range +100 years	Oman	Display	None	No OMV visible	3	0	0	3	Undetermined	None	Undetermined	Undetermined	First instance

C4 Models

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Superstructures	Duplication
4.001	Model	1830	Circa	Persian Gulf	Display	None	OMV implied	1	1	0	0	Metal fastened	Broadside guns in ports	Full deck	Fixed enclosed	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
4.002	Model	1850	Circa	Oman	Display	None	OMV implied	1	0	1	0	Metal fastened	Broadside guns in ports	Full deck	Undetermined	First instance
4.003	Model	1850	Circa	UAE	Display	Coercion	OMV implied	1	0	0	1	Metal fastened	Broadside guns in ports	Full deck	Fixed enclosed	First instance
4.004	Model	1871	Circa	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Metal fastened	None	Full deck	Fixed enclosed	First instance
4.005	Model	1873	Circa	Oman	Display	None	No OMV visible	1	1	0	0	Laced	None	Partial deck aft	Undetermined	Copy
4.006	Model	1897	Before	Persian Gulf	Display	None	OMV implied	1	0	1	0	Laced	Broadside guns in ports	Undetermined	Undetermined	First instance
4.007	Model	1898	Before	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Undetermined	Undetermined	First instance
4.008	Model	1898	Before	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Laced	None	Full deck	Raised platform	First instance
4.009	Model	1850	Range +50 years	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Metal fastened	None	Full deck	Fixed semi-enclosed	First instance
4.010	Model	1899	Range +25 years	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Undetermined	None	Full deck	Undetermined	First instance
4.011	Model	1899	Range +50 years	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Undetermined	None	Full deck	Awning	First instance
4.012	Model	1899	Range +50 years	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Metal fastened	None	Full deck	Undetermined	First instance
4.013	Model	1899	n.d. estimate	Persian Gulf	Display	None	OMV implied	1	0	1	0	Metal fastened	Broadside guns in ports	Full deck	Undetermined	First instance
4.014	Model	1899	n.d. estimate	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Laced	None	Partial deck fore and aft	Undetermined	First instance
4.015	Model	1899	n.d. estimate	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance
4.016	Model	1899	n.d. estimate	Oman	Display	None	No OMV visible	1	1	0	0	Laced	None	Partial deck fore and aft	Undetermined	Copy

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
4.017	Model	1899	n.d. estimate	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Metal fastened	None	Undetermined	Undetermined	First instance
4.018	Model	1899	n.d. estimate	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Metal fastened	None	Undetermined	Undetermined	First instance
4.019	Model	1899	n.d. estimate	Persian Gulf	Display	None	No OMV visible	1	0	1	0	Metal fastened	None	Full deck	Undetermined	First instance
4.020	Model	1873	Year	Oman	Display	None	No OMV visible	1	1	0	0	Laced	None	Partial deck fore and aft	Undetermined	Copy
4.021	Model	1873	Year	Oman	Display	None	OMV implied	1	0	1	0	Undetermined	Broadside guns in ports	Full deck	Undetermined	Copy
4.022	Model	1874	Year	Oman	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Partial deck aft	Fixed enclosed	Copy
4.023	Model	1876	Year	Oman	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	Copy
4.024	Model	1842	Circa	Persian Gulf	Display	None	No OMV visible	1	1	0	0	Undetermined	None	Full deck	Undetermined	First instance

C5 Photographs

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
5.001	Photograph	1898	Year	Oman	Harbour	None	No OMV visible	9	5	1	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
5.002	Photograph	1898	Year	Oman	Harbour	None	No OMV visible	6	5	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.003	Photograph	1898	Year	Oman	Harbour	None	No OMV visible	7	5	0	0	Undetermined	None	Undetermined	Awning	First instance
5.004	Photograph	1898	Year	Oman	Harbour	None	No OMV visible	4	4	0	0	Undetermined	None	No deck	Awning	First instance

B no.	Source	Date	Date type	Modern location	Environment	OMV type	OMV	WC	DE	SQ	CS	Construction	Armament	Platforms	Super-structures	Duplication
5.005	Photograph	1870	Circa	Bahrain	Harbour	None	No OMV visible	12	6	1	0	Undetermined	None	Undetermined	Undetermined	First instance
5.006	Photograph	1870	Circa	Iran	Harbour	None	No OMV visible	10	3	3	0	Metal fastened	None	Undetermined	Undetermined	First instance
5.007	Photograph	1890	Circa	Oman	Harbour	None	No OMV visible	6	4	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.008	Photograph	1870	Circa	Oman	Harbour	None	No OMV visible	7	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.009	Photograph	1870	Circa	Oman	Harbour	None	No OMV visible	4	3	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.010	Photograph	1870	Circa	Oman	Harbour	None	No OMV visible	5	4	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.011	Photograph	1870	Circa	Oman	Harbour	None	No OMV visible	8	4	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.012	Photograph	1899	Circa	Iran	Ashore	None	No OMV visible	3	2	1	0	Metal fastened	None	Partial deck aft	Undetermined	First instance
5.013	Photograph	1899	Circa	Oman	Harbour	None	No OMV visible	9	5	2	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
5.014	Photograph	1891	Year	Iran	Harbour	None	No OMV visible	18	4	5	0	Metal fastened	None	Partial deck aft	Awning	First instance
5.015	Photograph	1891	Year	Iraq	Harbour	None	No OMV visible	4	4	0	0	Undetermined	None	Partial deck fore and aft	Undetermined	First instance
5.016	Photograph	1891	Year	Iran	Ashore	None	No OMV visible	4	2	0	0	Undetermined	None	Undetermined	Undetermined	First instance
5.017	Photograph	1890	Circa	Arabian Seas	Harbour	None	No OMV visible	1	0	1	0	Metal fastened	None	Undetermined	Undetermined	First instance
5.018	Photograph	1890	Circa	Arabian Seas	Harbour	None	No OMV visible	1	1	0	0	Metal fastened	None	Undetermined	Fixed enclosed	First instance
5.019	Photograph	1890	Circa	Arabian Seas	Harbour	None	No OMV visible	2	1	1	0	Metal fastened	None	Undetermined	Fixed enclosed	Duplicate

APPENDIX D: ARCHAEOLOGICAL SIGNATURES OF ORGANISED VIOLENCE

D1. Select incidents of maritime violence and resultant potential archaeological signatures

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.1	1498, Jolfar **assault**	Lari forces (Persian) tried to take Hormuz with 60 vessels under Abu bakr Lari, with troops, repulsed by Khvajeh 'Ata, a slave, with 60 men by surprise	Unknown	Floor 2006:89
D1.2	1507, Ras al Hadd **interdiction**	Albuquerque (Portuguese) burnt 30 to 40 indigenous fishing vessels 'to send a message throughout the Gulf of Oman and the Persian Gulf'	30–40 indigenous fishing vessels **destroyed**	Floor 2006:91; Wilson 1928:113
D1.3	1507, Quryat, **interdiction**	Albuquerque (Portuguese) burnt 14 vessels at anchor	14 vessels **destroyed**	Floor 2006:92; Wilson 1928:113
D1.4	1507, Muscat **assault**	Albuquerque (Portuguese) bombarded and sacked the city and burnt 34 ships ‘large and small’	34 vessels **destroyed**	Floor 2006:92; Wilson 1928:114 n3
D1.5	1507, Hormuz **assault**	Portuguese forces under Albequerque; Hormuzi forces of ‘400 vessels, 60 of considerable bulk, with 2,500 men’, land forces up to 30,000 men with 4,000 'Persian archers'; fishing boats were used to delay the advance of the Portuguese	60 large and 340 small Hormuzi vessels **destroyed**, town later short of water because so many vessels lost in 1507	Birch 1875:105; Floor 2006:92–93
D1.6	1508, Kalhat **interdiction**	Portuguese forces sacked the town and burnt the vessels in the harbour	Several vessels **destroyed**	Wilson 1928:118 n1
D1.7	1508, Larek **assault, interdiction**	Hormuzi fleet of newly built vessels arrived from Jolfar to attack Portuguese while watering at wells on island, Hormuzi forces included 150 archers, and 500 Safavid archers in red helmets, and boats from Julfar built to attack the Portuguese fleet, Hormuzi vessels fled immediately when counter-attacked by Portuguese ships	Unknown	Floor 2006:97

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.8	1508, Hormuz **assault**	Lar attempt to invade Hormuz using vessels from Julfar, attempt repulsed	Unknown	Floor 2006:39
D1.9	1509, Muscat **interdiction**	Duarte de Lemos, on passage from Socotra to Hormuz, burnt several Muslim vessels in Muscat harbour.	Unknown	Monteiro 2017:310
D1.10	1515, near Bushehr, **interdiction**	Mir Abu Eshaq, Safavid governor of Reyshahr, took 20 Hormuzi *tarārīd* as prize, the Portuguese retaliated in order to deter further violence or smuggling	Unknown	Floor 2006:43, 100
D1.11	c.1515, Makran coast, **coercion**	Hormuz maintained a flotilla as guard vessels against piracy, cruising 'to guard the coast of the Nautaques', later supplemented by Portuguese vessels	Unknown	Floor 2006:43
D1.12	1515, coast of Gwadar **coercion**	Joint Hormuzi Portuguese operation against Nautaques, without success	Unknown	Floor 2006:43–44
D1.13	1521, Bahrain **assault**	Joint Hormuzi / Safavid / Portuguese attempt to reduce rebellion by governor of Hasa and Bahrain, Portuguese 1 galley, 2 *fustas*, 120 men; Turan Shah IV 40 *tarārīd*, 1,200 men	Unknown, force scattered by contrary winds and only one *tarrāda* reached Bahrain	Floor 2006:108
D1.14	1521, Bahrain **assault, interdiction**	Portuguese and Hormuzi forces attacked Bahrain and established Hormuzi garrison, Portuguese 500 men; Hormuzi 3,000 men; Bahraini (Emir Moqren) '12,000 foot, 300 Arab horsemen, 400 Persian archers and 20 to 40 Ottoman arquebusiers', Bahraini terrada and trankis; Portuguese 2 galleys, 1 galeota, 1 brigantine, and 4 *fustas*	147 *tarārīd* **destoyed**; vessels engaged at sea with many deaths, Portuguese captured a galeota at Bahrain that had been built by the Turks	Floor 2006:42, 108
D1.15	1521, Hormuz **interdiction**	Revolt of Turan Shah IV and vizier Sharaf al Din, 200 terradas arrived from mainland; *tarārīd*, cannon from Cambay and archers attempted to fire Portuguese ships in roadstead but failed; Portuguese 1 caravel, 1 galliote, 3 *fustas*	Portuguese galliote and one other vessel **destroyed** in roads, one vessel with dates captured by Portuguese	Floor 2006:110–111
D1.16	1522, Muscat **assault**	Hormuzi force from Qeshm attacked Muscat in retribution for loyalty to Portuguese; Muscati 'with the help of the crew of two ships from Basra and some Portuguese'	Unknown, Hormuzi forces repulsed	Floor 2006:111

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.17	1529, Bahrain **assault**	Joint Portuguese Hormuzi attack on Bahrain in response to revolt by governor, Portuguese flotilla 7 ships, 400 men, another 4 brigantines on patrol, supported by 50 *tarārīd* 'with good archers'; Bahrain forces 800 troops, 6 brigantines and ‘caturs’	Unknown, Portuguese force repulsed with more than 25% casualties, many from poisoned water	Floor 2006:124–125
D1.18	1531–1534, Bushehr **interdiction**	Shah 'Ali Soltan was building vessels and had captured some Bahraini ‘jalbehs’, and armed 12 *fustas* each with 20 men with arquebuses, rebelled and preyed on shipping	Possible **building site**	Floor 2006:126
D1.19	1532, Shihr **interdiction**	The Portuguese raided the harbour, but several merchants scuttled their vessels rather than have them captured, although they were possibly refloated	Unknown	Serjeant 1963:63–64
D1.20	1535, Qeshm **interdiction**	A Portuguese ‘grab’ attacked a number of Arab vessels with gunfire and powder pots, setting some alight	Some vernacular craft **destroyed**	Serjeant 1963:71
D1.21	1539, Bushehr **denial**	Portuguese vessels used to blockade town while Safavid laid siege ashore; blockaded forces attempted to bribe entry of two *tarārīd* with food, but surrendered when refused	Unknown, two *tarārīd* captured	Floor 2006:128–129
D1.22	1540, Strait of Hormuz **interdiction**	Nautaques reported inactive 1538–1540 at sea ‘because their chiefs had burnt their boats (*jalbatha*)’	Some ‘jalbatha’ **destroyed**	Floor 2006:44
D1.23	1544, Qatif **assault, interdiction**	Ottoman governor of Basra attacked Qatif and burnt 100–150 small and large vessels there	100–150 small and large watercraft **destroyed**	Floor 2006:158
D1.24	1546, Basra **denial, interdiction, logistics**	Sheikh Yahya sent 100 boats to lay siege to the Ottoman fort, Ottoman forces reinforced by 60 vessels of six oars, called ‘danecas’ or ‘daneq’, and closed the Shatt al-Arab with *fustas*, some ‘danacas’ were used to transport artillery	Unknown	Floor 2006:160–161
D1.25	1546, Basra **interdiction**	Ottoman forces under Ayash Pasha took 5 or 6 barks and 3 heavy cannons from the 'chief of the Jazeyer' (March Arabs)	Unknown	Floor 2006:162
D1.26	1546, Qatif **assault, interdiction**	Portuguese and Hormuzi forces attacked Qatif and burnt 'all Ottoman vessels with their goods'	Some Ottoman flagged vessels (not identified by type) **destroyed**	Floor 2006:169

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.27	1547, Masirah Island **interdiction**	Portuguese *nao* grounded on a reef on Masirah Island and 'pirates' from Qalat 'ransacked all the cargo and killed all aboard'	Unknown, Portuguese *nao* assumed destroyed	Floor 2006:44; Monteiro 2017:310
D1.28	1547, Strait of Hormuz **interdiction**	Nautaques attack a Muslim vessel and those who resisted were wounded	Unknown	Floor 2006:44
D1.29	1547, Basra **assault, interdiction, logistics**	Safavid and Jazeyer Arab forces combined to attack Ottoman forces in southern Iraq, Jazeyer Arabs brought 500 'danaks' with artillery and many arquebusiers, archers and horsemen	Unknown, Persian forces repulsed, then blockaded Ottomans	Floor 2006:183
D1.30	1547–1562, Basra **denial**	Ottoman Turkish government defences of Basra included eight 'barks' with an iron chain and wooden deck allowing continuous crossings on horseback, opened for passage of galleys, from their yard	Possible remains of chain defences or **building site**	Floor 2006:139–141
D1.31	1550, Qatif **assault**	The town was attacked and the fortress razed by Portuguese forces	Unknown, damage to the fortress	Wilson 1928:125
D1.32	1554, Muscat harbour **interdiction**	Battle between Portuguese forces of Francisco Meneses and Ottoman forces under Piri Reis at the entrance to Muscat harbour.	At least five Portuguese galleys and one galleon, and five Ottoman *aghriba* with Arab crews were sunk or **destroyed**, some by fire	Monteiro 2017:310–311
D1.33	1559, Manamah **assault**	Ottoman force of 2 galleys, 1 brigantine, 70 light craft and 1,200 soldiers assaulted Portuguese fortress and fleet of 22 *aghriba*	Some Ottoman supply vessels burnt and **destroyed**; two galleys captured	Floor 2006:178–179
D1.34	1566, Basra **denial**	Banu 'Ulayan Arabs attacked Basra by using reed boats as fire rafts 'which they set fire to, and then floated them to Fort Rahmaniyeh.' The smoke forced the defenders out of the citadel.	Expended fire rafts, reed boats **destroyed**	Floor 2006:185
D1.35	1577, Qatif assault	Huwala forces raided Qatif with watercraft and caused 'so much damage that the merchants had moved to Bahrain'	**Damage** to settlement	Floor 2006:46
D1.36	1581, Makran coast **assault**	A Portuguese punitive expedition burnt 50 Nautaque *tarārīd* at Pesani and also attacked Gwadar and Teis	At least 50 *tarārīd* **destroyed**	Floor 2006:46

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.37	1583, Lara **interdiction**	Huwala Arabs captured a Portuguese galliot with its guns, and later seized many *tarārīd*	Unknown	Floor 2014:6
D1.38	1586, Nakhilu **assault, interdiction**	Huwala Arabs routed a Portuguese punitive expedition at the point of landing, killing hundreds, and presumedly capturing some of their vessels	Unknown	Floor 2014:7
D1.39	1602, Bahrain **assault, interdiction**	Safavid expedition to take the island, followed by Hormuzi-Portuguese response, including several engagements 'fought on land and sea'	Unknown	Floor 2006:202
D1.40	1610, Persian littoral **interdiction**	Safavid forces estimated at 1,200 vessels, 'of which 800 were the Shah's and his allies', with 100 permanently based in Bushehr to attack Portuguese shipping going to Basra	Unknown	Floor 2006:213
D1.41	1614, Hormuz **interdiction**	Portuguese massacre the crews of several Nikhilu *tarārīd* as revenge and anti-piracy measure	Unknown, 70 men killed	Floor 2006:215
D1.42	1614, Bandar Abbas **assault, interdiction**	In response to the massacre of tarrāda crews, Safavid forces of 14,000 foot, 150 tarrādas and 'four large ships equipped with rams (de esporao)', 4,000 soldiers and Arab rowers attacked a Portuguese force of 300 men in seven vessels who fled when pursued by *tarārīd*	Unknown, but fort was captured by Safavid forces	Floor 2006:215–216
D1.43	1615, Persian Gulf and Gulf of Oman **interdiction**	Safavid attacks on Portuguese shipping using 300 *tarārīd* of Niquilus and Nautaques	Unknown	Floor 2006:222
D1.44	1621, Bramim (Bandar Abbas) **assault, interdiction**	Portuguese attacked and burnt two galliots and more than 300 *tarārīd* on the beach	Two galliots and more than 300 *tarārīd* burnt and **destroyed**	Floor 2006:228
D1.45	1621, Laft **assault, interdiction**	Portuguese attacked Safavid fort and destroyed three galliots and 300 *tarārīd* on the beach	Three galliots and 300 *tarārīd* burnt and **destroyed**	Floor 2006:228
D1.46	1621, Bandar e-Kong (Lengeh) **assault, interdiction**	Portuguese raid set fire to three galliots and more than 300 *tarārīd*	Three galliots and more than 300 *tarārīd* burnt and **destroyed**	Floor 2006:229

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.47	1622, Hormuz **assault, denial**	A combined Persian-English force took Hormuz from the Portuguese after a two-month siege	Unknown, some Portuguese vessels probably destroyed	Kelly 1968:51
D1.48	1623, Dibba **assault**	A Safavid force of 4,000 infantry and 600 cavalry disembarked from ships supplied by Soharis to attack the Portuguese	Unknown	Floor 2006:326–327
D1.49	1623, Bramim (Bandar Abbas) **assault, interdiction**	Portuguese force under Rui Freire attacked and destroyed the port and 400 *tarārīd* and six galliots were burnt	400 *tarārīd* and six galliots **destroyed**	Floor 2006:328
D1.50	1652, Khasab (Musandam) **interdiction**	Battle between Portuguese forces building a fortress at Khasab and Omani forces.	One Portuguese ship and one Omani 'galley' **destroyed**	Monteiro 2017:311
D1.51	1667, Muscat **interdiction**	Three tarrādas with archers embarked but no artillery were sunk by Portuguese forces in Muscat harbour	Three *tarārīd* **destroyed**	Monteiro 2017:311
D1.52	1674, Bandar Riq **assault**	A Hawala force of around 400 vessels attacked Bandar Riq and carried out a general massacre	Unknown	Al-Qasimi 2013:102; Floor 2014:24
D1.53	1714, Bandar e-Kong (Lengeh) **assault**	Town sacked by Omani maritime forces	Unknown	Axworthy 2011:32
D1.54	1718, Bahrain **assault**	Omani forces captured the island of Bahrain, displacing Persian forces	Unknown	Axworthy 2011:32; Floor 1987:35; Kelly 1968:28
D1.55	1734, Qeysh **assault**	Dutch and English ships supporting Persian forces bombarded rebel forces on the island and destroyed some fortifications and trankeys	Some trankeys and fortifications **destroyed**	Floor 2014:31
D1.56	1735, Basra **assault**	Persian maritime forces, including 2 *aghriba*, one brigantine and 40 other vessels, made an attempt at Basra but were beaten off by Ottoman forces in 2 commandeered English ships and 14 galleys	Unknown	Axworthy 2011:35; Floor 1987:40
D1.57	1736, Bahrain **assault**	A Persian force, including a commandeered Indiaman, retook Bahrain from Huwala Arabs	Unknown	Axworthy 2011:35; Floor 1987:41–42

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.58	1737, Oman **assault, transport**	A Persian army landed in northern Oman in an attack on Omani forces; maritime forces included two former English ships, two large vessels and 'a number of smaller ones', with 5,000 troops and 1,500 horses	Unknown	Axworthy 2011:36; Floor 1987:43; Kelly 1968:9
D1.59	1737, Musandam **interdiction**	'Sea battle' between loyalist Persian forces and rebel forces, including Huwala Arabs near Khasab, coinciding with a storm, the leading mutinous Arab vessel *Malik* being destroyed by explosion	One vessel at least **destroyed**	Axworthy 2011:36; Floor 1987:45
D1.60	1738, Oman **assault, transport, interdiction**	A second Persian expedition to Oman in commandeered Dutch and English ships, with others in support; resulted in a naval battle between Omani and Persian forces with the Persians retiring with casualties	Unknown	Axworthy 2011:36; Floor 1987:44–45
D1.61	1738, Bandar Taheri **interdiction**	Huwala Arabs captured a *ghurāb* and a *kalbā* from Persian forces	Unknown	Floor 2014:33
D1.62	1739, Makran **transport, assault**	A Persian force in 7 'big and small ships' and 100 smaller vessels sailed from Bandar Abbas to Makran, but was defeated	Unknown	Floor 1987:46
D1.63	1740, Qeysh **interdiction**	A Dutch-Persian fleet engaged mutinous elements of the Persian fleet, including Huwala Arabs, in which the Arab trankeys were effective	Unknown	Floor 1987:47
D1.64	1741, Qeysh **interdiction**	A Dutch-Persian fleet of 3 large ships, 2 gallivats and 40 smaller vessels engaged an Arab force that 'put up fierce resistance', with at least one cannon burst in the Dutch-Persian fleet	Unknown	Floor 1987:49
D1.65	1742, Ras al Khaimah **assault, transport**	A Persian fleet, including many newly built vessels from Surat, landed forces including 8,000 cavalry and many supplies	Unknown	Axworthy 2011:37
D1.66	1743, Bandar Abbas **interdiction**	A Persian fleet of 3 ships and 2 *aghriba* engaged an Omani fleet of 7 ships, capturing 2 ships and 2 *aghriba*	Unknown	Floor 1987:51
D1.67	1747, Bandar Abbas **assault**	A force of rebel troops from Oman raided Bandar Abbas with 40 trankeys and sacked and burnt the town	Unknown, **damage** to settlement	Floor 2007:40–41

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.68	1748, Qeshm **assault**	A force of 20 trankeys from Charak supported operations on Qeshm	Unknown	Floor 2007:46
D1.69	1751, Charak **interdiction, assault**	The Sheikh of Charac captured 7 trankeys from the Huwala, who retaliated by attacking Charak and Bandar Abbas with 100 trankeys, and captured a *kalbā*	Unknown	Floor 2014:35
D1.70	1755, Bahrain **assault**	A Persian force from Badar Riq and Bushehr attacked the Huwala Arabs on Bahrain and captured the island	Unknown	Kelly 1968:28
D1.71	1757, near Bandar Riq **interdiction**	A ship on passage to Basra lost its escort of Dutch gallivats and was boarded and robbed by three *kalbāt* belonging to Mir Muhanna	Unknown	Al-Qasimi 2013:117
D1.72	1758, near Basra **interdiction**	Mir Muhanna captured two ships with a force of three *kalbāt*, but could not approach a Qasimi fleet as the ships were concentrated together for mutual support	Unknown, two cargo vessels captured	Al-Qasimi 2013:118–119
D1.73	1760, Bandar Abbas **assault, interdiction**	A Qasimi force from Ras al Khaimah besieged Bandar Abbas and captured all watercraft, 'including fishing boats'	Unknown	Floor 2014:43
D1.74	1759, off Bandar Riq **interdiction**	Engagement between Mir Muhanna's *kalbāt* with a captured trankey and two Dutch gallivats, in which the Mir's forces attempted to tow a Dutch gallivat by swimming over shallows	Unknown, but the Dutch captured a gallivat and the trankey	Al-Qasimi 2013:119
D1.75	1761, Hormuz and Qeshm **interdiction**	A Qasimi fleet 30 'gallivats, dhows and trankeys' and 2,000 men engaged the fleet of the Banu Ma'in that had five *kalbā*t and four other ships in separate battles near Larak Island	Unknown, but at least one Qasimi trankey was captured	Al-Qasimi 2013:84–85
D1.76	1771, Bandar e-Kong (Lengeh) **interdiction**	Huwala Arabs captured *Britannia Galley*, two ketches 'and sundry boats' from Muscat using three gallivats	Unknown	Floor 2014:47
D1.77	1775, Basra **interdiction, denial**	Basra held under siege by Persian forces from 1775 to 1776, including the use of maritime forces from the Ka'ab Arabs	Unknown	Kelly 1968:26, 39
D1.78	1780, al-Zubārah **raid, interdiction**	Persian forces from Bahrain mounted a series of attacks on al-Zubārah from 1780	Unknown	Kelly 1968:26

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.79	1782, Manamah **raid**	Forces from al-Zubārah raided Manamah in Bahrain	Unknown	Kelly 1968:27
D1.80	1783, al-Zubārah **raid**	Persian and Qasimi forces raided al-Zubārah but were repulsed	Unknown	Kelly 1968:27
D1.81	1783, Manamah **assault, denial**	The Al Khalifah tribe assaulted Manamah and laid siege for two months before taking Bahrain from Persian forces	Unknown	Kelly 1968:27
D1.82	1778, Ras al Khaimah **interdiction**	Company brig fought running three-day duel with 6 Qasimi vessels before being captured and ransomed	Unknown	Kelly 1968:106
D1.83	1779, Persian Gulf **interdiction**	The ketch *Success* attacked by 8 to 10 watercraft, but beaten off	Unknown	Kelly 1968:106
D1.84	1797, Bushehr harbour **interdiction**	EIC cruiser *Viper* attacked by a Qasimi force of 4 large *dāwāt* and a *battīl*; Arab vessels sheared off having suffered significant damage and casualties	Unknown, probably damage to Arab vessels	Davies 1997:92–93
D1.85	1801, Qeshm **interdiction**	A ‘botella’ called *Akaub* was boarded and detained by Omani forces with one killed and several wounded	Unknown, but the Omanis captured the botella	Davies 1997:77
D1.86	1804, near Musandam **interdiction**	Merchant *baghla* in transit to Bombay captured by two Qasimi *dāwāt* whose crews boarded by swimming	Unknown, *baghla* captured	Loane 1805:6–10
D1.87	1804, near Qeysh **interdiction**	Merchant *dāw* from Basra boarded and captured by Qasimi *dāw* after exchange of small arms fire	Unknown, merchant *dāw* captured	Loane 1805:33–35
D1.88	1804, Qeysh **assault**	Qasimi fleet raided island and burnt a ‘few’ boats	A few boats **destroyed**	Loane 1805:39–43
D1.89	1804, Qeysh **interdiction**	Engagement between four vessels with guns of the Qasimi fleet and three of Sheikh ‘Berkat’, two of the Sheikh’s craft destroyed by fire and explosion and third captured	Two or three craft **destroyed** by fire and explosion, a third captured	Davies 1997:97; Loane 1805:41–42
D1.90	1804, Charak Bay **assault**	Qasimi fleet attacked and took Charac town and committed ‘the most dreadful depredations’	Unknown, probably damage to settlement	Loane 1805:59

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.91	1804, Lavan (Busheab Island) **interdiction**	Sheikh Ramah of Busheab plundered the wrecks of country ship *Hector* and cruiser *Alert* in 1803, removing freight, stores and guns that were later established in battery ashore	Two plundered **shipwrecks** and guns removed ashore	Loane 1805:109–110
D1.92	1804, near Farur **interdiction**	East India Company cruiser *Mornington* attacked by Qasimi fleet of 40 *dāwāt* and trankeys, but beaten off by gunfire (Kelly gives the date as January 1805)	Unknown	Davies 1997:91; Kelly 1968:106
D1.93	1804, Ras al-Husaini **interdiction**	The brig *Trimmer* was captured and plundered by a Qasimi fleet of 29 *dāwāt* after an exchange of gunfire	Unknown, *Trimmer* later released	Davies 1997:94–96
D1.94	1804, near Charak **interdiction**	Two trading *dāwāt* captured, two *dāwāt* and two *batātīl* burnt by the same fleet that captured Trimmer	Two *dāwāt* and two *batātīl* **destroyed** by fire	Davies 1997:95
D1.95	1804, near Farur **interdiction**	The vessel *Shannon* captured by Qasimi *dāwāt* after exchange of gunfire; plundered of guns, naval stores and cargo, and released	Unknown, probably some damage caused to attacking vessels	Davies 1997:3–4
D1.96	1805, Makran **interdiction**	A Qasimi force of 8 craft plundered 2 vessels off Makran	Unknown	Davies 1997:297
D1.97	1805, Bandar Abbas **assault, interdiction**	A combined EIC and Omani force including the ship *Gunjava* and a dāw, attacked Bandar Abbas and Hormuz, Qasimi fleet of 30 vessels attempted to intervene	Unknown, probably damage at Bandar Abbas	Al-Qasimi 1995:40–43; Kelly 1968:108
D1.98	1806, Ras al Khaimah **interdiction**	An Omani convoy from Basra to Sur was intercepted by Qasimi forces and 9 vessels were plundered	Unknowns	Davies 1997:76
D1.99	1807, Sur **assault**	A Qasimi force assaulted the Janaba at Sur, Oman ‘in furtherance of their feud’	Unknown	Davies 1997:77
D1.100	1807, Shaikh Shu’aib Island **interdiction**	The vessel *Shannon* from Bombay, under British colours, was captured by three vernacular craft that had followed it along the coast from Bandar Abbas. Nine of the crew were killed and the vessel taken to Hormuz then Ras al Khaimah (separate to 1804 incident)	Unknown	Davies 1997:79–80

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.101	1808, near Muscat **interdiction**	The merchant 'grab ketch' *Darya Daulat* was captured by a 12-gun 250-man Qasimi *dāw* and taken to Ras al Khaimah	Unknown	Davies 1997:99–100
D1.102	1808, near Hengam Island **interdiction**	EIC cruiser *Nautilus* attacked by two 'great' *dāwāt* and two large trankeys	Unknown	Davies 1997:100, 103
D1.103	1808, Strait of Hormuz **interdiction**	EIC cruiser Sylph attacked and temporarily captured by two *dāwāt*; EIC cruiser *Nereid* drove them off sinking one and leaving the other in a sinking condition	One or two *dāwāt* **sunk**	Davies 1997:100–102
D1.104	1809, Strait of Hormuz **interdiction**	Bombay country ship *Minerva* attacked by Qasimi fleet of up to 55 'large and small' vessels, 16 or which were said to have been sunk, taken to Ras al Khaimah and subsequently recaptured and burnt in the British raid	Up to 16 vernacular fighting craft **sunk**	Davies 1997:104–
D1.105	1809, Qasimi ports **raid, interdiction**	British forces, with Omani watercraft in company, attacked Ras al Khaimah, Rams, Laft, Lingeh and Shinas	103 watercraft reported **destroyed**, including 11 burnt at anchor at Laft	Davies 1997:190, 227 (includes dependent ports); Kelly 1968:117–119
D1.106	1809, Persian Gulf **interdiction**	A force under Rahma ibn Jabir captured 20 Kuwaiti craft sailing from Muscat and massacred the crews	Unknown	Kelly 1968:122
D1.107	1810, al-Zubārah **assault**	A Wahabi force including Rahma ibn Jabir with a fleet of 40 watercraft attacked al-Zubārah	Unknown	Davies 1968:122
D1.108	1811, off Farur **interdiction**	British vessel *Macaulay* attacked by 4 large and 17 small vessels	Unknown	Davies 1997:139
D1.109	1811, Bahrain **assault**	Omani forces with allied tribes attacked Bahrain and took it from the Wahabi; al-Zubārah was also attacked and burnt	Unknown, damage to the settlement at al-Zubārah	Davies 1968:126
D1.110	1813, off Karachi **interdiction**	A Qasimi fleet of 11 vessels captured 5 merchant vessels	Unknown	Davies 1997:108
D1.111	1814, Karachi **interdiction**	A Qasimi fleet of 6 to 10 vessels captured 5 *dangiyyāt*, one *baghla* and one other vessel	Unknown	Davies 1997:108–109

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.112	1814, off Ras al Hadd **interdiction**	A Jalahima fleet of 5 to 6 vessels captured two *baghāla*, one of which sank	One baghla **sunk**	Davies 1997:111
D1.113	1814, Hengam Island **interdiction**	The *baghla Sultana* belonging, to a Basra merchant, was taken by two *batātīl* and other vessels of Rahma bin Jabir's fleet	Unknown, although some plunder later offered for sale in Muscat	Davies 1997:80–81
D1.114	1815, Mughu **interdiction**	Two Qasimi vessels boarded the *baghla Darabiya* at anchor and took it to Ras al Khaimah	Unknown	Davies 1997:78
D1.115	1815, Lengeh **interdiction**	A British *baghla* was captured at Lingeh and taken to Sharjah	Unknown	Davies 1997:84
D1.116	1815, Shihr, Yemen **interdiction**	A Qasimi force of 6 vessels captured two *dāwāt* and a merchant vessel, one of the *dāwāt* being destroyed by fire	One dāw **destroyed** by fire	Davies 1997:115
D1.117	1816, Luhayya, Red Sea **interdiction**	Rahma bin Jabir captured two *dāwāt*, one Abyssinian vessel and later a merchant *ghurāb*	Unknown	Davies 1997:116
D1.118	1816, Ras al Khaimah **bombardment**	A British squadron bombarded four Qasimi *dāwāt* in shallow water with 'a few hundred or so' shot, all of which fell short; Qasimi forces returned fire with little effect	Unknown, probably iron round shot	Davies 1997:118
D1.119	1816, Bab al Mandab, Red Sea **interdiction**	Three merchant vessels from Surat were captured by an Qasimi force of 4 *baghāla*, 2 *dāwāt* and 2 trankeys, were plundered and released	Unknown	Davies 1997:112–114
D1.120	1816, Kharg **interdiction**	A British baghla was plundered off Kharg by a force with at least one *battīl*	Unknown	Davies 1997:84
D1.121	1816, Kutch, India **interdiction**	A Qasimi force of 8 to 11 *dāwāt* and 'jymers' captured 14 vessels, including at least 3 'botellas' and a large *dangiyya* with 8 guns	Unknown	Davies 1997:118–119
D1.122	1816, off Dwarka, India **interdiction**	A Qasimi squadron of 3 *baghāla* took the armed pattamar *Darya Daulat*, stripped it of arms and powder, and sank it; later took an Arab *dāw*	One pattamar **sunk**	Davies 1997:120–121

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.123	1817, off Ras al Hadd **interdiction**	A Qasimi force of 6 vessels, including at least one *baghla*, attempted to take two Muscati *baghāla*, but were beaten off	Unknown	Davies 1997:122–123
D1.124	1817, Bahrain **interdiction**	Rahma bin Jabir's fleet intercepted 12 Qasimi vessels off Bahrain, sinking four, breaking another four up and taking the rest.	4 Qasimi vessels **sunk** and 4 broken up	Davies 1997:81
D1.125	1818, Kathiawar, India **interdiction**	A Qasimi force of 2 *baghāla* and 2 *batātīl* with 11 guns and 550 men captured 4 Indian vessels	Unknown	Davies 1997:87
D1.126	1818, South Arabia **interdiction**	A Qasimi force of 6 dhows and 2 *batātīl* took 6 Arab dhows sailing from India to Mocha	Unknown	Davies 1997:89
D1.127	1818, South Arabia **interdiction**	The Indian schooner *Mary* was captured by a force of 10 Qasimi vessels and taken to Ras al Khaimah	Unknown	Davies 1997:88–89
D1.128	1819, Hengam Island (Qeshm) **interdiction**	HMS Eden (28 guns) attacked a force of 7 to 8 Qasimi craft; a *baghla* and one other vessel burnt onshore and two *batātīl* sunk	One baghla and one other vessel **destroyed** onshore by fire, two *batātīl* **sunk**	Davies 1997:147
D1.129	1819, Musandam **interdiction**	HMS *Eden* (28 guns) engaged three *baghāla* and a *battīl* armed with 14 guns and 650 men; at least two vessels damaged by gunfire and possibly sunk	Two vessels damaged and possibly **sunk**	Davies 1997:89
D1.130	1819, Ras al Khaimah **assault**	A British force assaulted Ras al Khaimah and other Qasimi ports, occupying Ras al Khaimah for a period	60 large fighting craft and 117 small fighting craft **destroyed**	Davies 1997:227 (includes dependent ports); Kelly 1968:152–155
D1.131	1819, Aseluyeh **interdiction**	Two armed watercraft from Charac burnt by HMS *Eden*	Two craft **destroyed**	Kelly 1968:161
D1.132	1819, Bandar e-Kong (Lengeh) **interdiction**	Two armed watercraft from Lengeh burnt by HMS *Eden*	Two craft **destroyed**	Kelly 1968:161
D1.133	1820, Manamah **interdiction**	10 reportedly Qasimi watercraft burnt by HMS *Eden*	10 craft **destroyed**	Kelly 1968:165
D1.134	1825, Hengam Island **interdiction**	A Bahraini vessel was attacked and robbed by 3 Qasimi dhows	Unknown	Kelly 1968:207

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.135	1825, Huwaidah **interdiction**	A *battīl* from Dubai was plundered off Qatar	Unknown	Kelly 1968:214
D1.136	1828, Persian Gulf **interdiction**	A Suri *battīl* was captured by a Qasimi dhow	Unknown	Al-Qasimi 2015:20–21Kelly 1968:208
D1.137	1828, Dammam (Qatif) **interdiction**	Rahma bin Jabir's *baghla* and a similar Bahraini vessel destroyed by explosion	Two *baghāla* **destroyed**	Kelly 1968:213
D1.138	1828, Manamah **assault, denial**	A combined force from Oman and Abu Dhabi bombarded Manamah and attacked Sitra Island and then laid siege, one Omani baghla and a brig lost but fate not recorded	Unknown	Kelly 1968:222
D1.139	1829, Persian Gulf **interdiction**	A Bahraini squadron captured and sank an Omani vessel	One vessel **sunk**	Kelly 1968:222
D1.140	1832, Musandam **assault**	Qasimi forces took Dibba, Kaur Fakkan and Ghalbah by assault, and captured more than a dozen Omani vessels	Unknown	Kelly 1968:227
D1.141	1833, Ajman **interdiction**	British forces sank a *battīl* by gunfire in the entrance to the creek at Ajman	One *battīl* **destroyed**	Al-Qasimi 2015:29
D1.142	1833, Abu Dhabi **interdiction**	A Qasimi force attacked the Bani Yas and allied tribes, but 66 of 102 Qasimi vessels were captured; the captured vessels were later restored	Unknown	Kelly 1968:247
D1.143	1834, pearl banks **interdiction**	Qasimi forces captured 10 pearling boats from Abu Dhabi, after which pearling vessels from both sides retired from the grounds for three seasons	Unknown	Kelly 1968:247–248
D1.144	1834, Suar **interdiction**	A Bani Yas battīl plundered a *baqqāra* and a *baghla* from Suar	Unknown	Kelly 1968:354
D1.145	1835, Strait of Hormuz **interdiction**	A Bani Yas squadron of two *baghāla*, one battīl and three *baqāqīr* captured 17 Omani and Persian vessels, later engaged by a British cruiser	Articles **jettisoned** from the Bani Yas fighting craft under pursuit	Kelly 1968:355–356
D1.146	1839, Qatar **raid**	An Egyptian-led force from Qatif raided Qatar	Unknown	Kelly 1968:328

Number	Date, Location and Type of Incident	Description of Incident	Potential Archaeological Signatures	Sources
D1.147	1856, Dibba **raid**	Dibba was ‘looted and burned’ in a tribal dispute involving watercraft, with a battīl captured in Khor Fakkan	Unknown	Al-Qasimi 2015:119
D1.148	1850, Khor Fakkan **assault**	Emirati forces, including some transported by sea, attacked and retook the town from Omani forces	Unknown	Al-Qasimi 2015:66
D1.149	1856, Bushehr **assault**	A British force attacked Bushehr during the Anglo-Persian war of 1856–1857	Unknown, significant damage to fortifications	Kelly 1968:472–473
D1.150	1857, Muhammarah **assault**	A British force attacked Muhammarah during the Anglo-Persian war of 1856–1857	Unknown, significant damage to fortifications	Kelly 1968:494–495
D1.151	1866, Qatif **raid**	British forces destroyed a dhow and a small fort in the channel	One vessel and a small fort **destroyed**	Kelly 1968:649
D1.152	1866, Sur **raid**	British forces destroyed ‘the craft moored in Sur creek’ and damaged the fortifications	Several vessels **destroyed** and fortifications damaged	Kelly 1968:649
D1.153	1867, Qatar **assault, interdiction, blockade**	Combined force from Bahrain and Abu Dhabi (70 boats) blockaded Qatari coast and assaulted settlements	**Damaged** settlements	BL IOR/R/15/1/722:14; Kelly 1968:672–673
D1.154	1867, Qatar **interdiction**	Bahraini force of 500 men in 24 boats captured 40 Qatari boats; 60 vessels were said to have been sunk off the north coast of Qatar	60 vessels **sunk**	BL IOR/R/15/1/722:14; Kelly 1968:674
D1.155	1868, Bahrain **assault**	British forces destroyed the fort of ‘Mohharag’ and burnt an unspecified number of ‘war craft’	Fort and fighting craft **destroyed**	BL IOR/R/15/1/722:18
D1.156	1871, Qatif **assault**	A combined Turkish and Kuwaiti fleet attacked Qatif	Unknown	Kelly 1968:726–727
D1.157	1878, Dammam (Qatif) **raid**	British forces destroyed one dhow and four small vessels ashore	One dhow and four small vessels **destroyed**	Kelly 1968:789–790
D1.158	1895, al-Zubārah **interdiction**	British forces destroyed 44 dhows of the Al Bu Ali tribe	44 watercraft **destroyed**	Busch 1967:135

D2. Watercraft population surveys

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.1	1507	Al-Hadd							40		2	Floor 2006:91
D2.2	1507	Quriyat					14				1	Floor 2006:92
D2.3	1507	Hormuz						60	340		2	Birch 1875:105; Floor 2006:92–93
D2.4	1515	Hormuz	20								3	Floor 2006:43, 100
D2.5	1521	Bahrain					147				2	Floor 2006:42, 108
D2.6	1521	Bandar Abbas	200								2	Floor 2006:110–111
D2.7	1544	Qatif					150				2	Floor 2006:158
D2.8	1546	Basra	160								3	Floor 2006:160–161
D2.9	1547	Basra	500								2	Floor 2006:183
D2.10	1581	Gwadar					50				2	Floor 2006:46
D2.11	1610	Persian Coast	1,100								2	Floor 2006:213, 2014:9
D2.12	1610	Bushehr			100						2	Floor 2006:213, 2015:9
D2.13	1614	Bandar Abbas			150	4					2	Floor 2006:215–216
D2.14	1614	Nokhaylo	400								2	Fawcett and Burns 1947:103
D2.15	1615	Nokhaylo	300								2	Floor 2006:222
D2.16	1621	Bahrain					300			3	2	Floor 2006:228

[1] count = 1, estimate = 2, at least = 3

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.17	1621	Laft					300			3	2	Floor 2006:228
D2.18	1621	Bandar e-Kong					300			3	2	Floor 2006:229
D2.19	1623	Bahrain					400			6	2	Floor 2006:328
D2.20	1645	Khark			150						2	Floor 2007:111, n61
D2.21	1651	Muscat				15					3	Floor 2006:371
D2.22	1665	Muscat				18					3	Floor 2006:383
D2.23	1692	Muscat		24	28						3	Floor 2006:377
D2.24	1736	Bandar Abbas				12					1	Floor 2007:11 (Safavid Navy)
D2.25	1748	Charak	20								3	Floor 2007:46
D2.26	1756	Gwadar	12								3	Floor 2007:26
D2.27	1756	Lengeh	50								2	Floor 2007:27
D2.28	1756	Charak	60								2	Floor 2007:28
D2.29	1756	Hendorabi	20								2	Floor 2007:28
D2.30	1756	Nokhaylo	60								2	Floor 2007:28
D2.31	1756	Aseluyeh	40								2	Floor 2007:28
D2.32	1756	Shilaw	50			1					2	Floor 2007:29
D2.33	1756	Kangan	60								2	Floor 2007:29
D2.34	1756	Bushehr	12			1					2	Floor 2007:32
D2.35	1756	Bandar Riq	30			2				1	2	Floor 2007:33

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.36	1756	Bandar Deylam	40								2	Floor 2007:34
D2.37	1756	Kuwait	300								2	Floor 2007:35
D2.38	1756	Muscat				5					1	Floor 2007:37–38
D2.39	1756	Ras al Khaimah	60								2	Davies 1997:174
D2.40	1761	Ras al Khaimah	30								3	Al-Qasimi 2013:84–85
D2.41	1765	Kuwait	800								2	Agius 2005:99
D2.42	1765	Gheban			70	10					2	Niebuhr 1776:187
D2.43	1765	Muscat		72	50						1	Kelly 1968:15
D2.44	1778	Muscat				112					3	Davies 1997:178
D2.45	1778	Ras al Khaimah	100			4					3	Davies 1997:178
D2.46	1807	Ras al Khaimah		40	300	30					2	Davies 1997:226–227 (includes dependent ports)
D2.47	1809	Ras al Khaimah					103				1	Davies 1997:190, 227 (includes dependent ports)
D2.48	1810	Qasimi confederacy		63	810						2	Kelly 1968:111
D2.49	1816	Muscat		70							3	Buckingham 1829:510
D2.50	1816	Ras al Khaimah	70								2	Davies 1997:198
D2.51	1817	Qasimi ports	300								2	Davies 1997:196
D2.52	1818	Khasab			250						2	Taylor 1856:14 (includes dependent ports)

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.53	1818	Hendorabi		30	+						2	Taylor 1856:19
D2.54	1818	Charak			500						2	Taylor 1856:19 (includes dependent ports)
D2.55	1818	Bahrain		700	700	7					2	Taylor 1856:22
D2.56	1819	Ras al Khaimah							60	117	1	Davies 1997:227 (includes dependent ports)
D2.57	1822	Sharjah	400								2	Brucks 1856:544
D2.58	1822	Al-Biddah	+	2							3	Brucks 1856:559 (many boats used for pearling but no number given)
D2.59	1823	Ras al Khaimah		30							2	Davies 1997:213; Kelly 1968:201 (gives Sharjah as port)
D2.60	1824	Bahrain		120	2,430	5					2	Brucks 1856:566–568
D2.61	1824	Kuwait		35	150						2	Brucks 1856:575 (approximate date)
D2.62	1824	Kangan		4							3	Brucks 1856:591 (approximate date)
D2.63	1824	Taurie		4							3	Brucks 1856:592 (approximate date)
D2.64	1824	Aseluyeh	+	4							3	Brucks 1856:592 (approximate date)
D2.65	1824	Charak		6	20						2	Brucks 1856:597 (approximate date)
D2.66	1824	Lengeh		4	30						2	Brucks 1856:600 (approximate date)
D2.67	1825	Persian Gulf		600	3,000						2	Brucks 1856:612–613 (small craft employed in pearling only)
D2.68	1826	Ras al Khaimah		20	25						1	Agius 2005:98
D2.69	1826	Umm al Quwain		8	30						1	Agius 2005:98

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.70	1826	Ajman		15	50						1	Agius 2005:98
D2.71	1826	Sharjah		67	237						1	Agius 2005:98
D2.72	1826	Ajman	140								2	Horsburgh 1826:308
D2.73	1826	Dubai	90								2	Horsburgh 1826:309
D2.74	1827	Dibba		3							3	Brucks 1856:623 (approximate date)
D2.75	1827	Khor Fakkan		3							3	Brucks 1856:624 (approximate date)
D2.76	1827	Shinas		3							3	Brucks 1856:624 (approximate date)
D2.77	1827	Sohar		40	+						2	Brucks 1856:625 (approximate date)
D2.78	1827	Muttrah	50								2	Brucks 1856:629
D2.79	1827	Muscat		214		19					2	Brucks 1856:631
D2.80	1830	Ras al Khaimah		13	30						1	Al-Qasimi 2015:48–51
D2.81	1830	Al-Rams		8	30						1	Al-Qasimi 2015:49–51
D2.82	1830	Al-Jazirah al-Hamra		3	41						1	Al-Qasimi 2015:49–51
D2.83	1830	Al-Hamriya		3	36						1	Al-Qasimi 2015:50–51
D2.84	1830	Sharjah		8	425						1	Al-Qasimi 2015:50–51
D2.85	1830	Al-Hira		8	50						1	Al-Qasimi 2015:50–51
D2.86	1830	Khor Fakkan		1	55						1	Al-Qasimi 2015:50–51
D2.87	1831	Ras al Khaimah		40	49						1	Agius 2005:98

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.88	1831	Umm al Quwain		14	55						1	Agius 2005:98
D2.89	1831	Ajman		19	65						1	Agius 2005:98
D2.90	1831	Sharjah		80	290						1	Agius 2005:98; Al-Qasimi 2015:56 (number includes Al-Fisht)
D2.91	1831	Al-Khan			17						1	Al-Qasimi 2015:56 (number includes Al-Lira)
D2.92	1831	Al-Hira		7	35						1	Al-Qasimi 2015:56
D2.93	1836	Ras al Khaimah	350								2	Agius 2005:99 (includes Sharjah)
D2.94	1836	Abu Dhabi	350								2	Agius 2005:99 (includes other towns)
D2.95	1836	Persian Coast	100								3	Agius 2005:99
D2.96	1840	Kangan		20							2	Floor 2014:114
D2.97	1841	Abu Dhabi	700								2	Kelly 1968:30
D2.98	1867	Abu Dhabi	70								2	BL IOR/R/15/1/722:14
D2.99	1875	Kangan		12	11						1	Floor 2014:114
D2.102	1900	Kangan		8	12						1	Floor 2014:114
D2.101	1900	Persian Gulf	4,473								2	Floor 2014:136 (number engaged in pearling)
D2.102	1905	Bahrain		1,034	694						1	Agius 2005:100–101, 104
D2.103	1907	Trucial Oman (UAE)	1,215								1	Agius 2005:102 (number engaged in pearling)
D2.104	1907	Bahrain	917								1	Agius 2005:102 (number engaged in pearling)

Number	Year	Port	Total extant	Large extant	Small extant	Fighting craft extant	Total destr'd	Large destr'd	Small destr'd	Fighting craft destr'd	Count quality[1]	Sources (and notes)
D2.105	1907	Qatar	817								1	Agius 2005:102 (number engaged in pearling)
D2.106	1907	Kuwait	461								1	Agius 2005:102 (number engaged in pearling)
D2.107	1907	Qatif	167								1	Agius 2005:102 (number engaged in pearling, Hasa in original)
D2.108	1907	Persian Coast	924								1	Agius 2005:102 (number engaged in pearling)
D1.109	1915	Qatar	1,350								1	Agius 2005:101

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CNL *Aja'ib al-Mukhlukat*, Iran, 1500–1599. Cairo National Library, Cairo.

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DCC 5/1997, *Kitab al-hashaish*, Baghdad, 1224. The David Collection, Copenhagen.

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FLP Lewis O.51, *Shāhnāmah*, Iran, 1550–1599. Free Library of Philadelphia, Philadelphia.

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FM Cambridge Ms 22-1948, *Shāhnāmah*, Shiraz, c. 1435. Fitzwilliam Museum, Cambridge.

GPM Tehran Ms.2189 S&R 2005, *Bustān*, Iran, 1500–1599. Gulistan Palace Museum, Tehran.

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MGP Alamy HN2MB6, Serefid school, 1500–1599. Musée Guimet, Paris.

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ONB Vienna A.F.103, *Bustan*, Tabriz, c.1530–1540. Osterreichische Nationalbibliothek Bildarchiv, Vienna.

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RAS MS 178, *'Aja'ib al-Makhluqat*, Qazvin, 1475. Russian Academy of Sciences Library, St Petersburg.

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SBB Diez A fol. 70, 1400–1499. Staatsbibliothek zu Berlin, Berlin.

SBB Diez A fol. 71, Tabriz, 1400–1449. Staatsbibliothek zu Berlin, Berlin.

SBB Diez A fol. 72, Tabriz, 1400–1449. Staatsbibliothek zu Berlin, Berlin.

SBB Diez A fol. 73, Iran, 1450–1499. Staatsbibliothek zu Berlin, Berlin.

SBB Diez A fol.3, *Qiṣaṣ al-anbiyāʾ*, Shiraz, 1575–1599. Staatsbibliothek zu Berlin, Berlin.

SBB Hs. Or.2371, Mesopotamia, 1200–1299. Staatsbibliothek zu Berlin, Berlin.

SBB Hs. Or.14071, *Bustān*, Shiraz, 1500–1549. Staatsbibliothek zu Berlin, Berlin.

SBB Minutoli 154, Kurdistan, 1800–1849. Staatsbibliothek zu Berlin, Berlin.

SBB Minutoli 184, Qajar school, c. 1850. Staatsbibliothek zu Berlin, Berlin.

SBB MS or.fol.359, *Shāhnāmah*, Shiraz, 1560–1570. Staatsbibliothek zu Berlin, Berlin.

SBB MS or.fol.4251, *Garshaspnama*, Khurasan, 1605. Staatsbibliothek zu Berlin, Berlin.

SBB MS or.fol.4255, *Shāhnāmah*, Shiraz, 1489. Staatsbibliothek zu Berlin, Berlin.

SBB MS or.quart.1665, *Khamsa*, Shiraz, 1550–1599. Staatsbibliothek zu Berlin, Berlin.

SBB Sprenger 1420, Herat, 1800–1899. Staatsbibliothek zu Berlin, Berlin.

SL Esad Efendi 2916, *Maqāmāt*, Baghdad, 1242–1258. Süleymaniye Library, Istanbul.

Sotheby's AIW 22, 22 Apr 2015 Lot 120, Bukhara, c. 1550. Sotheby's, London.

Sotheby's AIW Lot 84 London 9 Oct 2013, *Bustān*, Shiraz, 1500–1599. Sotheby's, London.

TIEM Istanbul Ms.1945, *Shāhnāmah*, Yazd, 1451. Turk ve Islam Eserleri Muzesi, Istanbul.

TIEM Istanbul Ms.1978, *Shāhnāmah*, Lahijan, 1493. Turk ve Islam Eserleri Muzesi, Istanbul.

TPL Ms.196 AKG1723808, *Kitab suwar al-kawakib*, Qajar school, 1800–1899. Tehran Parliament Library, Tehran.

TPL Ms.197 AKG1723806, *Kitab suwar al-kawakib*, Iran, 1600–1699. Tehran Parliament Library, Tehran.

TSK Istanbul H.788, *Khamsa*, Iran, 1500–1599. Topkapı Sarayı Kütüphanesi, Istanbul.

TSK Istanbul H.795, *Khamsa*, Turkman school, 1478. Topkapı Sarayı Kütüphanesi, Istanbul.

TSK Istanbul H.801, *Khamsa*, Yazd, 1497. Topkapı Sarayı Kütüphanesi, Istanbul.

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TSK Istanbul H.1370, *Zafarnama*, Shiraz, 1526. Topkapı Sarayı Kütüphanesi, Istanbul.

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V&A AL.8290:2, Tehran, c. 1840–1870. Victoria and Albert Museum, London.

VWL OR130, Qazvin, 1576. Collection of Vidin's Waqf Library, St. Cyril and St. Methodius National Library, Sofia.

Walters Ms. W.602, *Shāhnāmah*, Herat, 1618–1619. Walters Art Museum, Baltimore.

Walters Ms. W.618, *Kulliyat*, Safavid style, 1500–1599. Walters Art Museum, Baltimore.

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