

## THE HISTORY AND PREHISTORY OF PEARLING IN THE PERSIAN GULF

BY

ROBERT CARTER\*

### *Abstract*

The paper presents an analysis and synthesis of historical and archaeological data on pearl fishing in the Persian Gulf. The history of pearling in the region is reviewed, from the earliest possible references to the mid 20th century. Economic data from the 18th-20th centuries CE is analysed in detail, to define the economic course of the pearling industry during that time, and assess the impact on human settlement in the region. The archaeological data for pearl fishing are then examined, from the 6th millennium BCE onwards, and compared to the historical evidence. The results of archaeological survey in the Abu Dhabi islands region are then taken as a case study, and changes in settlement patterns are related to the historical trajectory of the pearling industry. It is observed that the regional economy became overwhelmingly dependent on the pearl trade in recent centuries, and was increasingly subject to the demands of the global market.

Cette étude présente une analyse et une synthèse des données historiques et archéologiques sur la pêche des perles dans le Golfe arabo-persique. L'histoire de la pêche des perles dans la région est passée en revue, depuis les plus anciennes références connues qui remontent au milieu du 20<sup>e</sup> siècle. Les données économiques du 18<sup>e</sup> au 20<sup>e</sup> siècle sont analysées en détail pour définir l'évolution de l'industrie perlière pendant cette période et évaluer son incidence sur le peuplement de la région. Les données archéologiques sur la pêche des perles, examinées depuis le 6<sup>ème</sup> millénaire avant J.-C., ont été comparées aux données historiques. Les résultats des reconnaissances archéologiques dans les îles de la région d'Abu Dhabi sont alors présentées comme étude de cas et les modifications de configuration de l'habitat sont reliées à l'évolution historique de l'industrie perlière. On remarque que l'économie de cette région est devenue presque entièrement dépendante du commerce des perles dans les siècles récents, et qu'elle était de plus en plus assujettie à la demande du marché mondial.

*Keywords:* pearls, pearl fishing, Persian Gulf, Abu Dhabi

### INTRODUCTION

*“Pearl fishing is the premier industry of the Persian Gulf; it is, besides being the occupation most peculiar to that region, the principal or only source of wealth among the residents of the Arabian side. Were the supply of pearls to*

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\* Robert Carter, Gerald Avery Wainwright Research Fellow in Near Eastern Archaeology, University of Oxford, University of Durham, racbahr@hotmail.com

*fail, the trade of Kuwait would be severely crippled, while that of Bahrain might—it is estimated—be reduced to about one-fifth of its present dimensions and the ports of Trucial Oman, which have no other resources, would practically cease to exist”* (Lorimer 1915: 2220).

This statement underlines the Persian Gulf’s overwhelming reliance on pearl fishing during the early years of the 20th century. Shortly after it was made, the development of cultured pearl farming in Japan precipitated a catastrophic collapse in the pearl industry, and therefore the regional economy. The industry lingered, much-reduced, throughout the 20th century, its final demise being marked by the official closure of Kuwait’s pearl-oyster market in the year 2000, which brought to an end over 7000 years of pearling in the region.

This paper sets forth the archaeological evidence for pearling, and correlates it with the better-known literary and historical sources, including the abundant economic data provided by British and Indian government reports, East India Company records and Lorimer’s *Gazetteer* (Burdett 1995; Hughes Thomas 1985; Saldanha 1908; Lorimer 1908; Lorimer 1915). The significance of the industry at different times is assessed, and the recent historical pearling industry of the Persian Gulf (17th-20th century CE) is characterized with regard to its integration into the regional and global economies.

This is not intended to be a global survey of pearling. It is outside the scope of this paper to examine the industries of other regions, such as South Asia and the Pacific. Neither is there any mention of fresh-water pearls. This study comprises an examination of the harvesting of, use of and trade in marine pearls in the Persian Gulf. The impact of the pearling industry and its changing configuration is assessed, with regard to regional settlement patterns, economic specialisation and social organisation. The Abu Dhabi islands region is used as an archaeological case study to analyse changes in site distribution, morphology and frequency, which are taken to reflect developments in the pearling industry.

#### OVERVIEW OF PEARLING PRACTICES IN THE GULF

Many aspects of the pearl industry in the Gulf are fully covered by existing historical and anthropological publications, particularly the practicalities and micro-economics of pearl fishing (see e.g. Pelly 1868; Lorimer 1915: Appendix C; Heard-Bey 1996: 110-115; Vine and Elders 1998; Al-Shamlan 2000). A brief overview is all that is given here.

Three species were gathered for pearls and mother-of-pearl: *Pinctada radiata*, *Pinctada margaritifera*, and *Pteria macroptera*. The latter was mainly gathered for mother-of-pearl. The pearl banks are situated in shallow waters, mainly off the Arabian shore of the Persian Gulf. Figure 1 shows the Gulf, with Lorimer’s

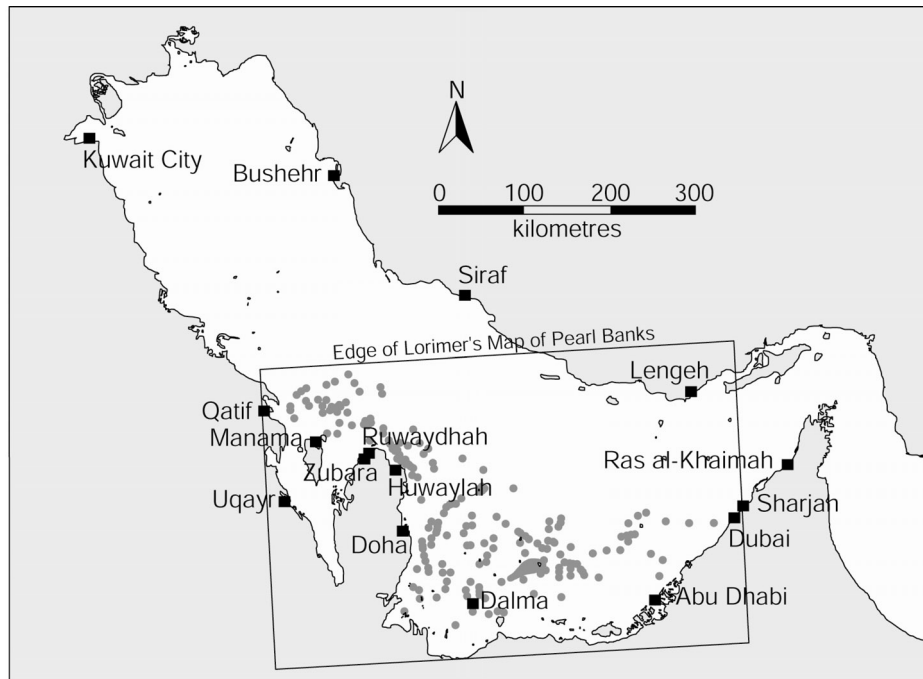


Figure 1. Map of Gulf showing Lorimer's map of pearl banks in the Lower Gulf in the early 20th century, with major towns and sites. Traced from "Chart showing Pearl Banks along Arabian Shore of the Persian Gulf, between Ras Tanura and Dabai" (Lorimer 1915: Volume 1, Part III, Pocket 25).

(1915) map of the pearl banks superimposed. Lorimer's map does not cover the whole region, but does include the richest areas off the coasts of Bahrain, Qatar and Abu Dhabi.

Pearling fleets were mustered seasonally at the various pearling centres of the Gulf, each under the command of an "admiral" appointed by the local emir (Lorimer 1915: 2223). These sailed annually to the banks, which were the communal property of the native inhabitants of the shores of the Gulf (Lorimer 1915: 2247). The different fleets could freely choose which banks to fish. When on the banks, divers would descend to 8 fathoms (ca. 15m) or more, with the aid of weights, place oysters in a bag, and then be hauled by other crew members back to the surface (Lorimer 1915: 2229). The oysters were left overnight to weaken or die before being opened first thing in the morning (Villiers 1969: 364). Although pearls were the main target, some oyster shells were kept for the mother-of-pearl market.

Diving occurred in the months when the waters were warm enough to allow prolonged immersion. By the early 20th century the diving season was divided into three. The main dive was the *ghaus al-kabir*, starting between mid May and early June, and ending between mid September and early October (Lorimer 1915: 2228; Le Baron Bowen 1951: 170). The main dive was preceded by a 40 day “cold dive”, starting in mid April (*ghaus al-barid*), and followed “a few weeks” later by a three week return, *al-raddah*.<sup>1</sup> According to Rentz, the hardier or more desperate divers then returned for a brief season even later, the *rudaidah* (Rentz 1951: 399). There were breaks between these events, to allow the pearl-fishers to return to their home ports to rest and reprovision. Pearls were also gathered in the winter in an untaxed practice known as the *mujannah* (Lorimer 1915: 2229). This involved wading and gathering oysters from the shallows, it being too cold to dive at that time of year.

At the industry’s peak, tens of thousands of men were involved in pearl harvesting during the summer months: Lorimer’s estimate for the early 20th century is 74,000 men, comprising over a quarter of the total population of the Arabian littoral of the Persian Gulf (Lorimer 1915: 2220). The quotation given at the head of the Introduction indicates how completely the settlements of the Arabian littoral depended on revenues from pearling at this time.

The industry operated on borrowed capital. Pearl-divers, captains and crew were advanced money to equip the boats and provide for themselves until the proceeds of the dive were allocated at the end of the season, when they were expected to repay the debts (Lorimer 1915: 2232). A bad season inevitably led to the debts being carried forward. Various types of financier, agent and merchant were involved at different levels of the industry (see e.g. Lorimer 1915: 2227, 2236), active at various levels of market. The lowest level of market comprised the boats themselves, which some merchants would visit to purchase pearls (Le Baron Bowen 1951: 177; Villiers 1969: 357). Above this there were temporary markets and supply centres set up near the pearl banks. Dalma is the best known of these, an island in the heart of the pearl banks which had a small permanent population, which was boosted during the pearling season, when it became an important centre. The Hawar Islands, located 14 miles to the south-

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<sup>1</sup> The oldest sources do not divide the season in this way. Al-Masudi (10th c.) states that pearl fishing occurred from the beginning of April to the end of September (al-Shamlan 2000: 34). This would cover the *ghaus al-barid* and the *ghaus al-kabir*; perhaps *al-raddah* had not yet been instituted. Ibn Battuta (14th c.) said that pearl-fishing occurred in April and May (al-Shamlan 2000: 36; Ibn Battuta 1995 vol. II: 408), which appears to be a very short season. He was not native to the Gulf, and may be referring only to the preliminary season, the *ghaus al-barid*.

east of Bahrain, may have been visited seasonally, judging from Dutch investigations in 1643, which state that pearling vessels paid regular visits to “a certain island which is situated about 10 to 12 miles from Bahrain” (Floor 1982: 211). Jussasiyah, on the east coast of Qatar, may have been another such seasonal site (Facey 1987: 205). The next tier includes the permanent pearling centres of the Gulf, i.e. the coastal towns established before and during the 18th century CE. These were dominated by Manama (Bahrain), with Dubai recognised as the Gulf’s secondary pearling emporium by the early 20th century (Lorimer 1908: 1439). From the permanent centres in the Gulf, the bulk of the pearls went to Bombay (Mumbai), whence they were redistributed to the global markets.

#### HISTORICAL REFERENCES TO PEARLING

The most significant literary references are discussed below, while Table 1 provides a summary.

##### *Pre-Islamic and Early Islamic references*

The earliest possible references to pearls consist of allusions to exotic items known as “fish-eyes,”<sup>2</sup> dating to the early 2nd millennium BCE (Oppenheim 1954: 7; Ratnagar 1981: 138). Some believe instead that the term refers to “eye-stones”: banded stones which were polished to resemble eyes (Howard-Carter 1986; Moorey 1994). The identification of pearls with fish-eyes, however, is also made in ancient India, the Classical West and Japan (Donkin 1998: 11, 49).

The next literary allusion is indirect, and is found in the Gilgamesh Epic. This recounts how Gilgamesh dived to the bottom of the sea, assisted by weights tied to his feet. This technique is strongly associated with pearl diving in later centuries. The account is from 7th century BCE tablets from Nineveh, comprising copies of a version which was standardised in the late 2nd millennium BCE (George 1999: xxiv-xxv). Some authors speculate that the “flower of immortality” that he was diving to collect is a reference to the pearl oyster (see e.g. Donkin 1998: 48).

Brief references to pearling in the Gulf during the late 4th/3rd-1st century BCE are reported, mostly cited by later classical writers. Theophrastus was aware that pearls were produced in India and the “Red Sea,” which is thought to refer in this case to the Persian Gulf (Caley and Richards 1956: 53, 135:

<sup>2</sup> When cooked, the lens of a fish-eye is circular, white and opaque.

Theophrastus, *De Lapidibus* 36). Arrian and Pliny cite Alexander's admiral Nearchus, while Athenaeus quotes Chares of Mitylene and Isidorus of Charax (Arrian, *Indica* 38; Pliny, *Natural History* VI. 26; Athenaeus, *The Deipnosophists* III: 45; Donkin 1998: 51; Potts 1990: 148). Isidorus mentions pearling at "a certain island in the Gulf," which is thought to refer to Bahrain, while Pliny also identifies Tylos (Bahrain) as a place famous for its pearls. Charax Spasinou, probably located near modern Basra, may have been a major pearl market (Raschke 1978: 841). Direct references to pearling are then not found until the 1st century CE, after which mentions of pearls or pearling in the Gulf increase in frequency. The *Periplus of the Erythraean Sea* notes that many important pearl fisheries were found in the Gulf (Hansman 1985: 94). Pliny attests that pearls were the most highly rated valuable in Roman society, and that those from the Persian Gulf were specially praised (Potts 1998a: 53; Pliny, *Natural History* IX, 54-8).

Late Roman, Byzantine, Early Islamic, Talmudic and Nestorian sources make it clear that pearling continued to be practised during the following centuries, and that pearls were extremely highly valued (see Table 1). The Babylonian Talmud, which was compiled between ca. 250 and 550 CE, specifically names Masmahig as a port where pearls are found (Simon 1938: 99); Masmahig is identified with the modern village of Samahij on Muharraq, an island immediately north of the main island of Bahrain (Simpson 2003: 67; Potts 1990: 124, 150). The Sasanian/early Islamic town of Ubulla, near Basra, was reported to be a market for pearls from Bahrain (Naji 1993: 425).<sup>3</sup> At least two pre-Islamic Arabic poets, Al-Musaib bin 'Adas and Al-Mukhabbal al-Sa'di, refer to pearling and the hazards faced by the divers (Al-Shamlan 2000: 33-34). The latter states that the Emperor of Persia's throne was adorned by pearls (Al-Shamlan 2000: 34), a reference to the important Persian market at this time. The prominence of pearls in the jewellery of Persia and other regions is supported by abundant other contemporary sources, including Byzantine, Syriac and other Christian texts, as well as iconographic and archaeological evidence (Simpson 2003: 66-67; see also summaries in Table 1).

Pearls at that time may have been directed through the Sasanians' leading port city at Rishahr, on the Bushehr Peninsula, where excellent pearls were found and could be purchased (Marquart 1901: 138; Williamson 1972: 106).

<sup>3</sup> Naji does not give a reference for this statement, and the exact date of this remains uncertain. Ubulla was a Sasanian foundation, identified with the port of Vanishtabadh Ardashir, and flourished until around the 13th c. CE (Bearman et al. 2000 Vol. X: 766; Williamson 1972: 98).

Economic data is sparse for the Sasanian period, but Williamson (1971: 29-30) believes that large-scale pearling first occurred under the Sasanians,<sup>4</sup> and ascribes to pearling a “crucial role in the in the capital formation which encouraged the growth of large scale commerce.” Thus, the early development of the Persian Gulf towns which were engaged in long distance maritime trade during the Sasanian and Early Islamic periods may have been dependent upon the growth of the pearling industry. Some kind of official involvement is suggested by a reference in the *Chronicle of Seert* to the Sasanian monarch Khusrau sending the Nestorian bishop Ezekiel, with divers, to fish for pearls in the Gulf (Colless 1969/70: 29; Yousif 2002: 320; *Chronicle of Seert* II: 86).

Pearling continued into the Islamic period. In the 7th century CE, the beauty and value of pearls is attested to in the Holy Qur’an, where they are especially associated with Paradise (Al-Shamlan 2000: 29-31). There is little specific information in the texts of the first three centuries of Islam. According to Williamson, Siraf, which took over from Rishahr as the Persian Gulf’s leading port during the Early Islamic period, was “the principal market for pearls” in the region (Williamson 1972: 97). It is likely that some disruption to the industry occurred during the 9th century CE, at least on the Arabian shore, as a result of political instability. The Abbasid state lost control of eastern Arabia, first to Zanj rebels, and then to the Qarmathians (Bearman et al. 2000 Vol. XI: 445-446; van Donzel et al. 1978 Vol. IV: 661-662; Larsen 1983: 64). The latter are said to have taxed Bahrain’s trade highly during the late 9th and 10th centuries, as well as that of the nearby mainland port of Al-Uqair (Kervran et al. 1982: 61; Rougeulle 1996: 164).

The early historical sources therefore indicate that pearls may have been gathered from the early 2nd millennium BCE or before; this is confirmed by the archaeological evidence (see below). Pearling was certainly an established industry by the time of Alexander, which came to be tapped by the Roman market, and subsequently by the Byzantine, Persian (Sasanian) and Early Islamic ruling elites. Some sources specifically mention the Bahrain archipelago in connection with pearling.

#### *Mid Islamic References (10th-16th centuries CE)*

The evidence available from the 10th century onwards is more specific. Bahrain maintained its reputation as the leading pearling centre. According to

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<sup>4</sup> Williamson bases this belief on archaeological survey evidence, which is discussed below.

Ibn Battuta (14th century CE), boats with divers and merchants from Bahrain fished the banks in April and May, along with others from Persia and Al-Qatif (Ibn Battuta 1962 vol. 2: 408; Al-Shamlan 2000: 36). Some kind of taxation existed: Ibn Battuta stated that one fifth of the pearl yield was taken “by the Sultan,” though the identity of this ruler is not made clear. In the late 15th century CE, Bahrain’s pearling industry was of great size: Ahmed ibn Majid claimed that approximately 1000 ships had been used “for centuries” for pearl diving (Tibbetts 1971: 213, 222; Kunitzsch 1993: 387). Bahrain’s industry had therefore reached a considerable size prior to the disruption caused by the arrival of Portuguese in the early 16th century.

A couple of centuries prior to this, a second pearling centre had appeared in the historical texts, though it did not rival Bahrain in terms of scale. This was Julfar, located just to the north of the modern town of Ras al-Khaimah. Al-Idrisi (12th century CE) refers to Julfar as a pearling area, along with the island of Qays (Vine and Elders 1998: 114; Al-Idrisi 1836 vol. I: 153, 157). Julfar was still important in the era of Portuguese control, being described as a pearling centre by two different visitors, Duarte Barbosa (early 16th c.) and Pedro Teixeira (early 17th c.), while Gasparo Balbi, the Venetian court jeweller, declared that in 1580 the best pearls were to be found at Bahrain and Julfar (Vine and Elders 1998: 114; Sinclair 1902: 175-177; Barbosa 1866: 34; Pinto 1962: 120, i.e. Balbi Ch. XIII). Julfar is also mentioned by at least four other 16th century western authors, including da Empoli, Orta, van Linschoten and Arthus (Donkin 1998: 127 and 164, Note 270). The emergence of Julfar as a pearling centre, albeit one of lesser importance than Bahrain, may relate to its geographical location between the pearl banks and Hormuz, the dominant political centre in the Gulf at that time. A third pearling centre, Qatif in eastern Saudi Arabia, is mentioned in the 12th century by Benjamin of Tudela (Asher 1900: 137), as well as by Ibn Battuta during the 14th century, and by Orta and van Linschoten in the 16th century (Ibn Battuta 1962 vol. 2: 408; Donkin 1998: 146, Note 264). According to Naji (1993: 435), the “sultans” of Al-Hasa, the oasis whose outlet to the sea was traditionally Qatif, claimed half of the pearls collected by those diving around Bahrain in the 11th century.

It is significant that two of the named pearling centres, Bahrain and Julfar, were also highly populated areas, with comparatively abundant water supplies and consequently high agricultural output. The same is true of Qatif, which had access to the Al-Hasa oasis. As Figure 1 shows, Ras al-Khaimah/Julfar is a considerable distance from the banks, being nearly 300km from the clusters in the middle of the Lower Gulf, and over 400km from the dense belt of pearl banks off the coast of Qatar. This shows that during this period, the pearling centres



were not necessarily located close to the densest clusters of pearl banks. Instead, the industry was dominated by the two coastal areas which could provide the manpower and resources to equip large pearling fleets.

The north coast of Qatar is most advantageously located with regard to proximity to the banks, and according to Al-Masudi, its waters were known to be rich in pearls as early as the 10th century CE (Hardy-Guilbert 1998: 89; Al-Shamlan 2000: 34). Qatar itself was not described as a pearling centre until the 18th century CE, and it seems that underpopulated regions did not support large or permanent pearling centres until around that time. Compared to Bahrain and Julfar, Qatar is very poor in water resources, which inhibited settlement and would have complicated the provisioning of visiting fleets.

Certain lesser centres of population were, however, involved in the industry by the middle of the Islamic period, as well as uninhabited places which were visited only during the pearling season. This is stated by Ibn Majid (15th c.): "around Bahrain are a number of other islands, inhabited or not, with pearl fisheries" (Tibbetts 1971: 213). Around a century later Balbi provided a list of places visited or inhabited by pearl-fishers. This includes small islands in Abu Dhabi emirate, including Sir Bani Yas, Zirku, Qarnein, Das, Dalma and others (Pinto 1962: 120-122; Slot 1993: 37-39; Elders 1998: 92), as well as coastal settlements which were to become permanently established (including Dubai, Sharjah, Ajman, Umm al-Quwain and Ras al-Khaimah). Over four centuries earlier, Al-Idrisi described this region, the area between Julfar and Bahrain, as having a great number of desert islands, frequented only by birds (Al-Idrisi 1836: 157). In contrast to Balbi, he does not associate pearling with this region, and it is possible that these parts of the banks were not fished in his time. Balbi also notes the presence of temporary pearling encampments all along the coast (Slot 1993: 37), but does not specify whether which, if any, of his listed places supported permanent habitation.

Balbi's visit may have been an attempt to forge direct links between the pearl production areas and the western European markets. Brief mentions by various western authors between the 12th and 15th centuries show awareness of an association between pearls and the Gulf, while Gonzalez de Clavijo specifically states that most of the pearls reaching Spain originated in Hormuz (Donkin 1998: 123,135). Prior to Balbi's time, pearls reached Europe through intermediate markets and merchants, frequently Jewish or Armenian, in the eastern and southern Mediterranean, i.e. North Africa, the Levant and Asia Minor (Donkin 1998: 137-8). 14th to mid-15th century Venetian, Genoese and Florentine sources record pearl markets in Damascus, Aleppo, Acre, Cairo, Alexandria, Constantinople, the Black Sea region (Crimea, Tana), and Tabriz (Northern

Iran) (Donkin 1998: 137-8), and Catalan merchants visited the ports of Syria and Egypt. Although Balbi may have hoped to circumvent these intermediaries, significant direct trade with Europe was not established for over four centuries.<sup>5</sup>

De Clavijo's mention of Hormuz, which controlled territories on both sides of the Gulf, highlights the involvement of merchants and divers from the Iranian side. Donkin (1998: 124) speculates that the banks on the Persian side, around Qays and Kharg were more important in medieval times than the modern period.<sup>6</sup> Pearling was certainly associated with both islands (Le Strange 1905: 257, 261; Al-Idrisi 1836: 153), though there is no indication that the scale of their industries approached that of Bahrain or even Julfar. Certainly, whatever banks were most productive, political considerations could dictate control of the trade and its revenues, and the Kingdom of Hormuz was quick to channel and exploit the pearls collected at centres such as Julfar and Bahrain. Until the late 14th century, Baghdad seems to have been a major pearl market, judging from the *Catalan Atlas of the Year 1375* (Elders 1998: 72). By the 15th and 16th centuries, however, western observers noted that the king and merchants of Hormuz, based at the other end of the Gulf on the Iranian side, derived great revenue from the pearl trade (Donkin 1998: 135-136). According to Barbosa, writing around 1517 of his travels in 1514, Hormuzi merchants travelled to both Julfar and Bahrain to buy pearls for redistribution to India and elsewhere (Barbosa 1866: 34, 37-8). The activities of Hormuzi pearl merchants therefore survived the subjugation of the kingdom of Hormuz by the Portuguese in 1507; indeed, it appears that Hormuzi trade positively flourished during the century or so of Portuguese rule (Milburn 1813 vol. I: 130; Steensgaard 1973: 196). According to the English merchant Ralph Fitch,<sup>7</sup> large quantities of pearls were making their way from Bahrain to Hormuz as late as 1583 (Le Baron Bowen 1951: 161; Hughes Thomas 1985: 31), while Chardin states that the Persians had been obliged to pay a tax on their pearl fishery to the Portuguese (Chardin 1724: 85).

<sup>5</sup> Dutch attempts to harvest pearls directly in the mid 18th century failed (Floor 1982) while Wilson noted the unprofitability in circumventing traditional mercantile arrangements in the late 1820s (Wilson 1833: 286). Direct European access to Persian Gulf pearls does not appear to have been economically important until the first decade of the 20th century, when the British Political Agent in Bahrain, Captain MacKenzie remarked to his superiors that a Parisian jewellery firm had been sending representatives to Bahrain to buy pearls, with considerable returns (600,000 Rupees profit in 1909) (Burdett 1995 vol. 2: 83).

<sup>6</sup> Note also Williamson's theory that pearling activities were concentrated along the Persian coastline between Siraf and Bandar-e Lengeh during the Sasanian period (Williamson 1971: 29-30; Williamson 1972: 106).

<sup>7</sup> Captain Robert Taylor, cited in Hughes Thomas 1985, gives his name as Ralf Filch.

*Recent Historical References and Economic Sources (17th-19th centuries CE)*

A substantial industry existed in the late 17th and early-to-mid 18th centuries, notwithstanding disruptions and evidence for possible fluctuations or decline since the 16th century. After the mid 18th century, a boom in the value of pearls began which continued through the 19th century.

Sources are scanty for the early 17th century. William Robbins, a jeweller, was resident in Isfahan in 1616 and 1617 (Saldanha 1908 Vol. 1: vi, x), but there is no explicit mention of whether he was dealing in pearls. Most of the mercantile correspondence of that era concerned the exchange of Persian silk for western textiles, and pearls are not mentioned in the East India Company's lists of goods being directly exported from the region during the 17th century. The industry certainly existed: Dutch records of 1632 show that Rishahr was still a centre for pearling (Slot 1993: 16); it was not a focus of western interests at this time, however. Most likely the pearl trade was mainly directed towards India though local and Indian merchants, and those pearls that reached Europe travelled through multiple intermediaries and a variety of overland and marine routes, as they had in previous centuries. The configuration of Asian trade was in the process of change at this time, however, with such "peddler trade" steadily being supplanted by the activities of the East India Company and its Dutch rival, both forging direct links with the European markets (Steensgaard 1973).

The first explicit mention of pearls in the records of the East India Company, according to Saldanha (1908 Vol. 1: xviii), comes in 1675, when Captain John Weddell remarked upon the richness of the pearl fishery of the Gulf, and named Bahrain as the chief place. A little later, John Chardin estimated that Bahrain yielded one million pearls annually, implying a considerable industry (Chardin 1724 vol. 2: 85; Donkin 1998: 124). John Ovington provides some figures, claiming that the Shah of Iran won revenues of 50,000 ducats from the pearl banks of Bahrain in 1689, with another 100,000 being pocketed by his servants, which presumably included his representative in Bahrain and his tax collectors (Floor 1984: 123). Note, however, that if Teixeira is to be trusted, pearling in the Gulf was said to have yielded the very much larger sum of 600,000 ducats per annum a century before, during the late 16th century (Sinclair 1902: 176). Either the industry as a whole had suffered a marked decline in the early-mid 17th century, for which there is no corroborative evidence, or the figures are unreliable.<sup>8</sup> Alternatively, a much larger slice of the trade was taking place elsewhere, for example at Julfar or other unidentified centres. This is also unlikely:

<sup>8</sup> It is tempting to connect the putative slump in the pearl trade of the Gulf during the

between the mid and late 17th century, the Dutch explicitly recognised Bahrain as the centre of the trade, rather than Julfar or elsewhere. Between 1643 and 1690, the Dutch East India Company (VOC) sent three fact-finding expeditions to Bahrain from their trading posts in Persia, to explore the conduct and profitability of the trade (Floor 1982: 210-212). None of the missions led to sustained Dutch interest: local interests and ancient harvesting and mercantile traditions were firmly entrenched, and attempts to circumvent these interests by gathering pearls directly were deemed insufficiently profitable.

There is a dearth of sources for the early and mid 18th century, but there are numerous late 18th century sources which indicate a reorganisation of the industry into a configuration that lasted until the 20th century. While Bahrain retained its central importance, and the adjacent banks remained the most important in the Gulf, several rival pearling centres emerged, which continue to exist today as cities along the Arabian shore of the Persian Gulf. The short-term trigger for this process was the declining power and eventual collapse of the Safavid state during the early-to-mid 18th century, which ultimately allowed the emergence of new regional centres of power and wealth. After the death of Nadir Shah in 1747, control over Bahrain and its pearl market swung between the Persians and various Arab rulers from both sides of the Gulf, until the Al-Khalifa consolidated power in 1783. This eroded Bahrain's monopoly on the pearl trade, and other parties were able to take advantage. According to Justamond's translation of Abbé Raynal, tolls paid by the pearlers visiting the banks around Bahrain could no longer be raised by the ruler of Bahrain (Hughes Thomas 1985: 25), then the Sheikh of Bushehr. Niebuhr also recounts that the Sheikh of Abooshahar (Bushehr?) was unable to tax the fishery, and that Bahrain had been depopulated by decades of instability (Niebuhr 1792 vol. II: 152ff.). In a letter to the Governor General of the VOC in 1754, Baron von Kniphausen, the VOC representative on Kharg Island, reports that the Bahrainis were suffering from marauding "Arab" pearl fishers (Floor 1984: 139).

These sources indicate the growing economic and military strength of various tribes which had been settling or seizing control of the Gulf coast, and would continue to do so, directly attracted by and supported by pearling revenues. Population movements were being undertaken with the express purpose of exploiting the pearl industry. According to Captain Robert Taylor, writing in 1818, the Al-Khalifa moved to Qatar and then Bahrain "to procure a share of

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17th century with the opening of New World sources during the 16th century, but Donkin's study mostly indicates that the new source areas were exhausted before the start of the 17th century (Donkin 1998: 321, 325, 329).

that fishery for themselves, instead of continuing to purchase from other hands” (Hughes Thomas 1985: 28). They urged their fellow Utubi families, the Al-Sabah and Jalahama, to accompany them and devote themselves to pearl fishing (Al-Khalifa 1993: 341). New settlements during the 18th century included Kuwait, the town of which was founded in 1710 and declared an independent sheikhdom in 1756; Abu Dhabi, founded 1761 (Heard-Bey 1996: 44); and Zubara (Qatar), founded 1766 (Lorimer 1915: 787). The new towns grew quickly: already by 1763 Kuwait boasted a fishing and pearling fleet of 800 vessels, while Abu Dhabi had 400 houses in the same year, just two years after its foundation (Le Baron Bowen 1951: 167; Hughes Thomas 1985: 463).

It is argued therefore that the weakness of the Persian state and its successors, and the consequent failure to collect tax revenues, gave rise to new economic opportunities for the Arab communities of the Gulf, who settled and founded new pearling centres. Long-term economic processes connected to the growth of western markets also played a role in the foundation and florescence of the new towns: the revival of the pearling industry that they heralded marked the beginnings of a boom that lasted until the advent of the cultured pearl. The very location of some of these towns indicates that previous restrictions on settlement, enforced by the arid climate and sparse water supplies of much of the region, were overridden by new economic forces. In the case of Zubara, lesser towns had existed nearby which were eclipsed by the new foundation (Huwaitlah and Ruwaidhah: de Cardi 1978: 191; Lorimer 1908: 1515; Lorimer 1915: 787; Facey 1987). In the case of Kuwait City and Abu Dhabi, no previous centres had existed locally, though their localities were known and they perhaps supported temporary encampments in previous centuries.<sup>9</sup> Both are in extremely arid and marginal areas, with poor water supplies and with little or no potential for agriculture; both were forced to import fresh water to provide for their growing populations. This indicates that, by the 18th century, the possession of an agricultural hinterland and local water resources were no longer prerequisite for importance in the pearl trade. The profitability of the industry was now such that specialist pearling centres could exist, which could afford to import the necessary food, water, manpower and other resources. The historical sources show that it was recognised by the first quarter of the 19th century that the pearling centres existed beyond the carrying capacity of their subsistence base, and that their populations depended on pearling for food. In 1823, Captain McLeod

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<sup>9</sup> Balbi refers to a pearling encampment named “Cherizan,” which may refer to Qirqishan, a lagoon on southwest part of the island of Abu Dhabi (Slot 1993: 40). A site with Abbasid pottery is also known from Abu Dhabi island (Carter 2000).

reported on the Al-Qasimi “pirates,” and noted that “they possess no articles of export, since their pearls are generally purchased by merchants on the spot, and the produce of their country is not even sufficient for their maintenance” (Hughes Thomas 1985: 92-93). This suggests that even the Julfar area, part of the Al-Qasimi domains, no longer possessed an agricultural hinterland sufficient to support its pearling population. In 1844, Lieutenant Kemball remarked of the Arab tribes that they depended on the pearl trade, as “the barrenness and infertility of the soil of their country, [was] producing not sufficient for the maintenance of the inhabitants” (Hughes Thomas 1985: 71).

As well as Bahrain, many of the older pearling centres continued to exist, including Julfar (now reconfigured as Ras al-Khaimah town and surrounding coastal settlements), as well as Qatif and the lesser centres mentioned by Balbi in the late 16th century (Dubai, Sharjah, Ajman, Umm al-Quwain). These and the new establishments were not the only places involved in the trade, merely the most prominent. By 1810, Captain John Wainwright was able to report of the Arabian coast that “along its whole extent a valuable Pearl Fishery is carried on by the Arabs” (David 1998: 140).

During the late 18th and 19th centuries, the flow of pearls became increasingly unidirectional. In 1790, Manesty and Jones listed a variety of markets to which pearls were directed from Bahrain, including Surat (in Gujarat), Scindy (Sind), Calcutta, Bushehr, and Mocha (Yemen) via Muscat. From Bushehr and the Indian ports they were said to go on to “Kandahar, Multan, India, Tartary and China” (Saldanha 1908 vol. 1: 408). Issawi (1971: 264) states that Persia imported 2 lakhs of rupees (i.e. Rs 200,000) worth of pearls from the southern shores of the Gulf in 1800; this was presumably directly from Bahrain. Three decades later, three-quarters of the yield is estimated to have gone to India, with the rest entering Persia, Arabia and Turkey (Whitelock 1836: 45). By the time of Pelly (1868: 33), almost all pearls were said to be sent to Bombay. The same was true in Lorimer’s day (Lorimer 1915: 2236). Connections with other markets and older trade routes still existed: a large number of seed pearls were said by both Pelly and Lorimer to go directly to Baghdad, while pearls were among the goods moved by Armenian merchants in the overland trade to Istanbul and the Mediterranean as late as 1840 (Issawi 1971: 100, 108). Nonetheless, Bombay became the world’s leading pearl market. Bahrain remained the chief intermediate market between the pearl-banks and Bombay, but the significance of other Gulf ports as intermediate pearl markets increased, particularly Bandar-e Lengeh on the Persian side, and Dubai on the Arabian. Pelly notes that Lengeh was on the rise in 1870-71 (Saldanha 1908 Vol. 8: 38). It maintained a prominent position until the early 20th century, but was in steep decline by the time of Lorimer’s survey.

The families who founded or came to rule the new pearling centres retain power to the present day. Their exploitation of the central and growing economic importance of the pearl trade was the foundation of their historical influence. In some cases, leading families and their tribal dependents were specifically attracted to certain locations on the coast because of the profits that could then be made through pearling (as noted with regard to the Al-Khalifa above). Although not all were directly involved in pearling, at least initially, these families eventually benefited from the pearl trade through taxation.

The boom in the pearling industry was demand-led, and there is evidence that the resulting intensification of pearl-fishing led to overexploitation of the banks early on in the boom period. As early as 1770, the beds in the eastern part of the Gulf were described by Justamond as being over-fished, with a resulting focus of activities around Bahrain: "this island, famous for its pearl fishery, even at a time when pearls were found at Ormus, Karel, Kishn and other places in the Gulf, is now become of much greater consequence, the other banks having been exhausted, while those near it have suffered no sensible diminution" (Hughes Thomas 1985: 25). By 1790, the beds around Bahrain appear to have been suffering in consequence, judging from a document by Samuel Manesty and Harford Jones reporting that the pearl fishery of Bahrain "has latterly not proved so productive as in former Times" (Saldanha 1908 Vol. 1: 407). Nonetheless, the vast distribution of oyster beds allowed scope for regeneration, and the industry continued to thrive: in 1818 Captain Robert Taylor stated that the Gulf still possessed "beds of the richest pearls in the universe" (Hughes Thomas 1985: 15). Further concerns about depletion are noted by Durand in 1878, who stated that the yield had decreased in recent years (Burdett 1995 Vol. 1: 69), though he remarks that this problem was offset by a doubling of prices over the previous 25 years. This piece of evidence is highly significant, as it suggests that, from at least the 1850s, supply could not match demand, with a resultant increase in prices.

*The Pearling Industry at the time of Lorimer (early 20th century)*

A detailed examination of the industry is provided by Lorimer's *Gazetteer of the Persian Gulf, Oman and Central Arabia* (Lorimer 1908; Lorimer 1915), which contains an unprecedented quantity of qualitative and statistical data relating to the pearl trade. The *Gazetteer* shows that not only was the economy of the region almost entirely based on pearling by the early 20th century, but that the industry had been and was still experiencing a period of remarkable growth in the marketplace. Numerous quotations from Lorimer reveal that by the early 20th century, the economy of every single emirate on the Arabian side

of the Gulf was dependent on the pearl industry.<sup>10</sup> Lorimer's figures for the population of each district, and for the number of those employed in pearling can be used to calculate the proportion of the population engaged in the industry (Table 3). This shows that around half or more of the population of Ajman, Dubai, Abu Dhabi and Qatar were involved in the pearl trade.<sup>11</sup> If one assumes an approximate 50/50 ratio of men and women, it implies that the entire male population of these places was employed in pearling. In fact, the sex ratio may have been different: in the case of Ajman and Dubai there appears to have been a gender imbalance. This hints at the seasonal aspect of pearl fishing, whereby the men of neighbouring regions and inland Bedouin tribes would move to the coast during the pearling season, leaving their families behind. Between 50% and 70% of the male populations of Umm al-Quwain, Sharjah and Kuwait relied on the pearl fishery, again assuming a notional 50/50 sex ratio. Bahrain, despite its pre-eminent position in the industry, had a smaller percentage, owing to its plentiful water supplies and the corresponding importance of its agricultural sector. In total, 25% of the population of the Arabian littoral of the Persian Gulf relied on pearling, perhaps equating to 50% of the entire male population.

The statistical information on the pearl industry provided in Lorimer's Appendix C (Lorimer 1915: 2220-2293) indicates that the Gulf pearl market had been undergoing a boom since at least the start of the fourth quarter of the 19th century. Chart 1 and Table 4 show the value of pearl exports between 1873/4 and 1904/5 for Trucial Oman (modern UAE), Bahrain and the Persian Coast,

<sup>10</sup> Bahrain: "the principal pearl market of the Persian Gulf . . . if the pearl beds were to fail, the Shaikhdom would shortly be reduced to comparative insignificance" (Lorimer 1908: 245); Qatar: "the principal and almost exclusive source of livelihood in Qatar is pearl-fishing, supplemented in some places by the breeding of camels" (Lorimer 1908: 1532); Abu Dhabi: "the inhabitants of Abu Dhabi live almost entirely by pearl-diving and fishing" (Lorimer 1908: 408, 410); Dubai: "the revenues of the principality are said to amount to \$51,400 a year, largely derived from the pearl fisheries" (Lorimer 1908: 454); Kuwait: "were the supply of pearls to fail, the trade of Kuwait would be severely crippled" (Lorimer 1915: 2220); Sharjah (including Ras al-Khaimah): the Sheikh's main source of income is from taxation of the pearl industry, yielding ca. Rs. 23,400 per year, compared to just Rs. 10,000 from other sources (Lorimer 1908: 1761); Ajman: "all the inhabitants are pearl divers and fishermen" (Lorimer 1908: 53); Umm al-Quwain: "the inhabitants of Umm al-Qaiwain are chiefly pearl divers and fishermen" (Lorimer 1908: 1475).

<sup>11</sup> Lorimer enumerates the population in terms of numbers of "souls," implying that women and children are included. It is hard to know how the number of children would have been accurately assessed at that time, however, especially given the high rate of infant mortality and lack of census data. Lorimer's totals may in fact refer to adult souls.



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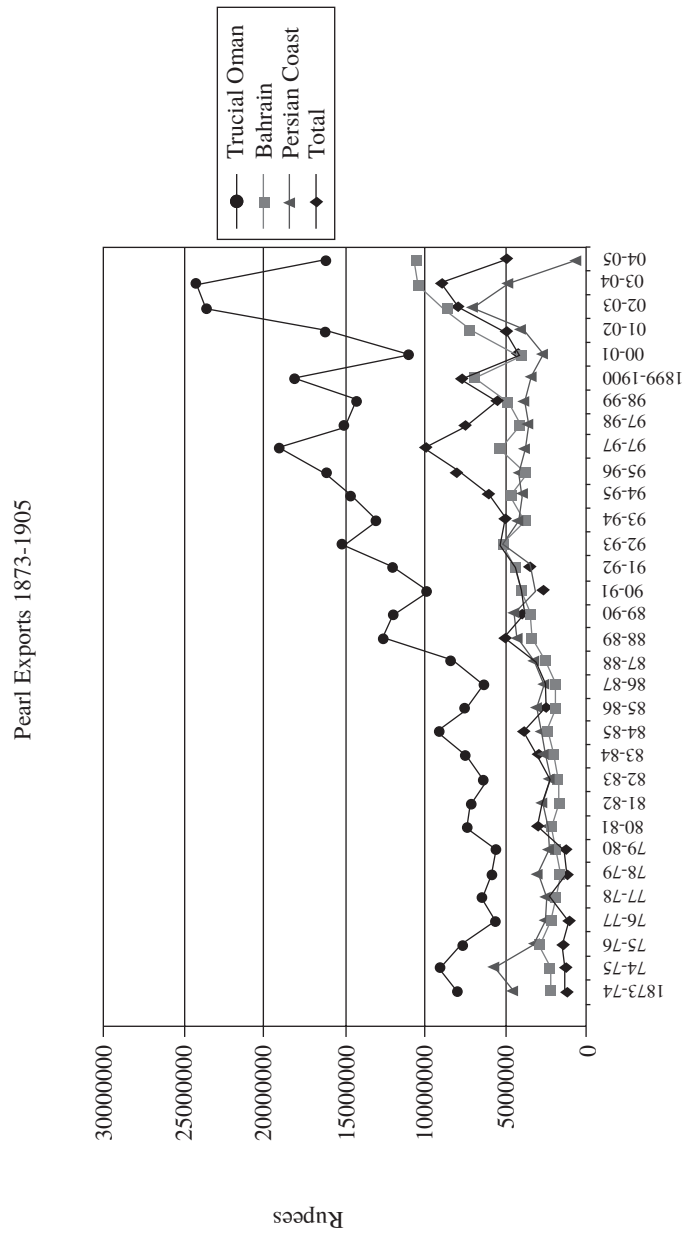


Chart 1. Pearl exports from Trucial Oman, Bahrain and the Persian Coast, 1873-1905 (derived from Table 4).

derived from Lorimer’s summary figures.<sup>12</sup> Notwithstanding fluctuations which reflect poor pearling seasons, caused by bad weather or epidemics, all three areas saw a significant increase in the value of exports over the three decades, which is especially evident in the first years of the 20th century. Chart 2 shows the combined value of exports per decade for these areas, i.e. the whole Gulf except Kuwait and Saudi, giving an idea of how much the industry increased in scale in just 30 years: the total value of exports in the final decade (1893/4-1902/3) is over twice (2.3 times) the total value of exports for the decade 1873/4-1882/3.<sup>13</sup>

Total Pearl Exports per Decade

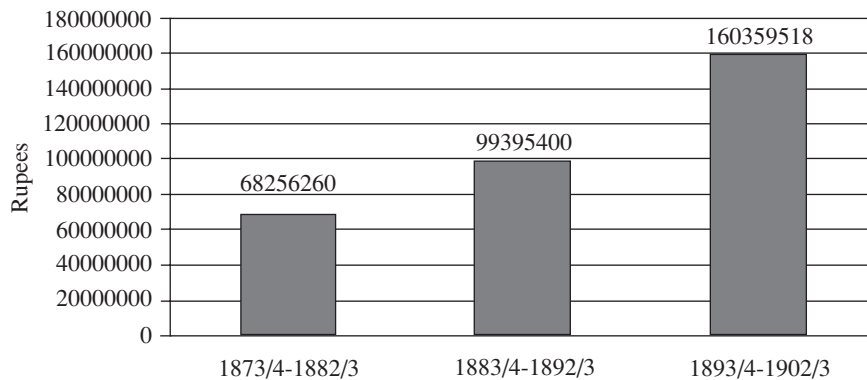


Chart 2. Total pearl exports per decade from Trucial Oman, Bahrain and the Persian Coast, 1873-1903 (derived from Table 4).

<sup>12</sup> Lorimer’s summary table excludes Kuwait and Saudi Arabia, though he does give the value of Kuwait’s exports in 1905/6 (134,700 Rs), in Annexure 1 of Appendix C (Lorimer 1915: 2253). Lorimer’s figures for the 1870’s broadly match Pelly’s 1868 estimate for Bahrain and the Trucial Coast.

<sup>13</sup> Another calculation can be made to establish the exact increase in exports between 1877/8 and 1905. In 1877/8 the total value of exports from the Gulf (excluding Kuwait) was 11,508,500 Rs. By 1904/5 it was 1.5 times higher (16,741,200 Rs). This is slightly misleading, as 1904/5 was a particularly bad year for pearling: in the preceding season of 1903/4, the value was 2.5 times higher than the 1877/8 value (29,085,300 Rs), while in the following season, 1905/6, the value was 1.9 times the 1877/8 value (21,298,861 Rs.). The 1905/6 value is found in Annexure 1 of Appendix C (Lorimer 1915: 2253), which includes Kuwaiti exports. The Kuwaiti value was excluded, to bring it in line with earlier seasons’ totals.

Lorimer also states that the market rate for each class of pearl had doubled between 1852/3 and 1877/8 (a statement possibly based on Durand's comment), and more than doubled again between then and 1905 (Lorimer 1915: 2239).<sup>14</sup> Thus, the market price of pearls more than doubled over the same period that the value of exports doubled. If this is the case, the stark mathematical conclusion is that the quantity of pearls exported from the area in question did NOT necessarily increase. If anything, the quantity of pearls exported may have dropped.

This indicates that demand had outstripped supply, and that as early as the mid 19th century (judging from Lorimer's data, and Durand's comments), the pearling industry was running at maximum productivity, though evidently not maximum profit. Despite the boom in the pearl trade, evident in the increasing value of exports, the yield from pearl-fishing in the Gulf had reached stasis. It is likely that without further structural change or technological innovation, which was discouraged by the British Government, a significantly greater production of pearls could not have been achieved. Other information derived from Lorimer, however, clearly indicates that concerted attempts were being made to expand production in response to the voracious market.

- Pearl banks of a certain type (*hairāt*, located on a mound and surrounded by deeper water) were largely of recent discovery, while other pearl banks (*najwāt*, "at ordinary level") were known of old (Lorimer 1915: 2221). This indicates that demand had led to more pearl sources being sought out and found.
- All kinds of boats were being pressed into service for pearling, "even jolly-boats" (Lorimer 1915: 2228). Moreover, the estimated total number of boats involved in pearling had almost doubled during the 19th century, from ca. 2300 in 1818, according to Captain Taylor (Hughes Thomas 1985: 19, 22, 39) to 4500 at around 1907 (Lorimer 1915: 2262).
- The main diving season (*ghaus al-kabir*) had "recently" been extended: traditionally it ran from June to the end of September. By 1905 it ran from mid-May for 130 days, until mid-September (Lorimer 1915: 2228).
- New sources of labour were becoming involved in pearl-diving. In Abu Dhabi, more and more bedouin were participating full-time, and as well as divers from Bahrain, Persia, Baluchistan and Sind (Heard-Bey 1996: 200-201). Labour shortfall in the oases had to be made up with slaves, indicating the beginnings of the kind of structural reorganisation alluded to above.

<sup>14</sup> Prices continued to rise in the years following Lorimer's 1904-7 survey. Captain MacKenzie noted that prices in 1909-10 averaged about 30 per cent. higher than the preceding year and showed an upward tendency throughout the season (Burdett 1995 Vol. 2: 81).

It has been noted above that the rise in the value of pearl exports during the 19th and early 20th centuries was more likely to be due to increased prices, in response to soaring demand, rather than increase in the yield. The attempts to increase the yield inevitably led to overexploitation. Concerns about over-fishing and declining harvests had been expressed as early as 1770, and again in 1790 and once more in 1878 by Durand. Nonetheless, the banks continued to be productive. In the early 20th century, however, there was such concern that official initiatives were considered to control the fishery and conduct an official investigation of the banks. According to MacKenzie, the *nakhodas* (captains of the pearling boats) complained that the number of oysters which could be collected was down by 40%, and that they were of inferior quality (Burdett 1995 Vol. 2: 117). The *nakhodas* blamed the recent popularity of mother-of-pearl, the western market for which had been expanding dramatically during the first decade of the century. They reasoned that less empty shells were being returned to the sea, and that previously these had "fertilized" the bed. Some captains were therefore enforcing a ban on taking pearl shell for export, in order to protect the more lucrative pearl trade. This was deemed an unlikely explanation by Mr James Hornell, an officer of the Madras Fisheries Bureau and Superintendent of the Pearl and Chank Fisheries, who concluded that unrestrained over-fishing was the problem (Burdett 1995 Vol. 2: 139). His proposals for a scientific investigation were eventually shelved. Before the long-term effects of the late 19th-early 20th century phase of intensive exploitation could become fully apparent, however, other forces intervened to reduce the pearling industry in the Gulf: the advent of the Japanese cultured pearl, the Great Depression and the two World Wars.

#### *Summary of Historical Trends in the Pearling Industry*

The earliest unequivocal historical references, in the 4th and 3rd centuries BCE, simply indicate an awareness of pearls and pearling in the Persian Gulf. By the 1st centuries BCE and CE, the pearling industry is accorded considerable importance, and a specific association is made with Bahrain. The frequency of references builds up over the succeeding centuries. The Sasanians appear to have had a close involvement, both as an elite market and, possibly, as official sponsors of pearling expeditions. It is not known to what extent they taxed the industry. The extent and organization of pearling is poorly understood during the Early Islamic period, but the industry appears to have continued to flourish from the advent of Islam through to the 15th century AD. The data is insufficient to ascertain whether these centuries are characterised by growth, contraction or fluctuation in the industry. Bahrain continued to be the pearling

leading centre, both in terms of the fishery and the market, but another centre, Julfar, emerged.

During the 16th and 17th centuries the pearling industry was controlled by Hormuz and subsequently Persia. Bahrain remained the chief pearling centre in the Gulf, though Julfar retained significance. Increasing numbers of western visitors testified to the richness of the banks. Western jewellers travelled to or lived in the region, but most pearls continued to be channelled through India, Persia and the Turkish dominions, and thence to the wider world, including Europe.

The comparative abundance of statistical data for the 18th-20th centuries, and especially the last quarter of the 19th and the start of the 20th, allows us to anatomize the development of the pearling industry more precisely. As noted above, the value of pearl exports approximately doubled between 1873 and 1905, as did the price of pearls. The price of pearls was also said to have doubled between ca. 1852 and 1878. There is some evidence that this increase in price and overall value of the fishery began in the mid 18th century or earlier. In 1790, Manesty and Jones's report on commerce in the region stated that the Bahrain pearl fishery yielded 500,000 Bombay Rupees (Saldanha 1908: 407). In 1873-4, according to Lorimer, the same fishery yielded 2,100,000 Rupees, over four times as much (Table 4). If the value of pearls doubled between ca. 1852 and 1878, and there was a fourfold increase between 1790 and 1873-4, then the value must also have approximately doubled between 1790 and 1852. Thus between 1790 and 1905 the value doubled three times, and should therefore have increased six-fold.

Another calculation supports the evidence for an increase in value during the late 18th century and the first half of the nineteenth, using mid-to-late 18th and early-to-mid 19th century estimates of the value of Bahrain's fishery in British pounds. Abraham Parsons, a merchant who gave an account of his travels in ca. 1775, stated that Bahrain's fisheries could yield £187,500 in a good year, and seldom less than £112,500 (Parsons 1808: 202).<sup>15</sup> By 1829, Wilson put the value of Bahrain's pearl fishery at £200,000-£240,000 (Le Baron Bowen 1951: 162; Wilson 1833: 284). Thus, in the ca. 54 years between the two, there was a maximum increase of 2.13 times, or a minimum of 1.07 times. The middle or

<sup>15</sup> This agrees with information given in Captain Taylor's 1818 report, which cites Justamond's 1776 translation of Abbé Raynal's 1770 work, *A Philosophical and Political History of the Settlements and Trade of the Europeans in the East and West Indies*. This states that in 1770 or shortly before, the annual revenue derived from the Bahrain fisheries was said to amount to ca. £157,000 (Hughes Thomas 1985: 26). Parson gives his figures for the value of the trade in Basra Toman (60,000-100,000 Toman), but provides an exchange rate with pounds sterling. Milburn (1813: 119) exactly reproduces Parson's figures and description of the pearl trade, without acknowledgement.

high end of this scale fits the evidence derived from Lorimer, Durand and Manesty and Jones, that there was an approximate doubling in value of Bahrain's fishery between the late 18th and mid 19th centuries.<sup>16</sup>

These calculations do not take inflation/depreciation into account. By examining the numbers of boats and people involved in the harvest, it is possible to obtain alternative measures of growth, focused on the size of the pearl-fishing industry, rather than the value of the pearl market. Table 2 gives a summary of the estimates of the numbers of pearl boats operating out of various ports or districts of the Gulf, between the 15th and the 20th centuries. Of the observers, Taylor, Brucks, Whitelock, Pelly and Lorimer (1907) made estimates for the combined fleet operating in the Gulf. They suggest there was an increase in the number of boats from less than 3000 to around 4500 between the 1810s and the early 20th century. The considerable elements of uncertainty in the estimates, and their rarity, do not allow any closer definition of the overall trend.

If the individual ports are looked at, the picture is more complex. The size of Bahrain's fleet appears to have fluctuated between 1000 and 1500 boats since the late 15th century.<sup>17</sup> There is not a consistent upwards trend. The same is true of Ras al-Khaimah/Julfar, Abu Dhabi and Sharjah: the number of boats fluctuates within a given range, but no clear trend is visible. Kemball's relatively complete account for each port in the Trucial States in 1844 gives figures which are generally close to those of Lorimer. In fact, the total number of vessels for those ports is almost identical (Kemball's total is 2530, Lorimer's is 2582). There are, however, some indications of how the apparent growth of the combined fleet can be explained: firstly, Dubai's fleet appears to have undergone considerable growth, with the number of boats more than trebling from 90 in 1844 to 335 in 1907. In just over half a century, Dubai had gone from being a relatively insignificant player to being the second most important pearl market in the Gulf (Lorimer 1908: 1439), with a sizeable fleet of its own. Secondly, the fleet of Qatar was extremely large by Lorimer's day, at 817 boats. Earlier accounts do not give details of Qatar's pearling fleet, with the exception of an

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<sup>16</sup> Growth was apparently rapid during the 1830s. Wilson also put the value of the entire Gulf fishery at £300,000, while six years later in 1835, Wellsted put it at £400,000 (Le Baron Bowen 1951: 162-3).

<sup>17</sup> Captain Brucks states that Bahrain employed 2430 pearling boats around the mid 1820s (Hughes Thomas 1985: 566). Bruck's estimate was later used by Whitelock (1936: 44), and perhaps by Miles (1919: 415). This very high figure is almost certainly incorrect. It is at odds with two closely contemporary estimates, given by Taylor and Wilson. Brucks may have been referring to the pearling fleet of the Persian Gulf as a whole: he later enumerates the number of boats fishing the banks at "around 3000" (Hughes Thomas 1985: 612). Alternatively, he may have given the figure for Bahrain's entire fleet, including boats devoted entirely to the carrying trade or to catching fish.

implausibly low figure of 200 given by Zwemer, around a decade before Lorimer's count (Le Baron Bowen 1951: 167). It may have been growing gradually during the 19th century, or rapidly in the late 19th/early 20th century.

If estimates of the total number of men employed in pearl-fishing are examined (Table 5), there appears to have been a significant decrease during the first part of the 19th century, from 40,000 to 29,000 men between 1818 and the early 1830s. By 1878, the numbers appear to have recovered slightly, to 35,000. Between that point and Lorimer's survey, however, a dramatic increase in numbers occurred, as the total more-than doubled to 74,000.<sup>18</sup> It is not possible to tell from this or other evidence whether this occurred rapidly, in the years immediately preceding Lorimer's survey, or whether there was a gradual increase in the last quarter of the 19th century.<sup>19</sup>

The conclusions of this examination of three strands of evidence (value of the pearl fishery, number of boats in pearling, number of men in pearling), combined with the analysis of Lorimer's figures given earlier, are as follows:

- Between the late 18th century and the mid 19th, the value of Bahrain's pearl fishery doubled; the value of the whole Gulf's fishery doubled again over the next quarter of a century, and then doubled again by the time of Lorimer's survey. This six-fold increase took place over ca. 120 years.
- There was an increase in the number of boats and men involved in the fishery over the same period of time, but not of the same order. Those increases, particularly the growth in the number of men, may have occurred sharply in the last quarter of the 19th and early 20th century.
- The discrepancy between the increase in value of the fishery, and the increase in the numbers of boats and men reflects the demand-led nature of the industry. Although there were clearly attempts to increase productivity, and increasingly intensive exploitation of the pearl beds, it is by no means certain that the actual yield of pearls was increased. Consistently rising prices kept the industry in a state of growth, particularly from the third quarter of the 19th century, notwithstanding fluctuations.

<sup>18</sup> Le Baron Bowen's estimate is 40,000 men during the boom years, by which he presumably means the time of Lorimer. He does not appear to have studied Lorimer's report, and he dismisses O'Shea's (1947: 132) figure of 74,000 men, which was presumably derived from Lorimer. Lorimer's total is considered to be accurate by this author, as it is based on hard evidence, carefully collected settlement by settlement.

<sup>19</sup> Le Baron Bowen cites a figure of 30,000 men for 1896, originating from Samuel Zwemer (Le Baron Bowen 1951: 167, citing Zwemer S.M. 1900 *Cradle of Islam*. New York). This would mean that the doubling of manpower occurred in only a decade. Zwemer's figure seems implausibly small in the light of Lorimer's survey, and it has therefore not been used in Table 5. He may have been using older data. Zwemer also gave a very low figure for the number of pearling boats operating out of Qatar (200, as opposed to Lorimer's 817), though his figures for Bahrain are more plausible (900, compared to Lorimer's 917).

- There were fluctuations in the numbers of boats found in the major ports during the 19th century, and a possible decline in manpower during the first part of the 19th century. These irregularities may partly have been caused by the unpredictable yields of the pearl beds, perhaps exacerbated by over-fishing, and other factors such as epidemics amongst the pearling population (Lorimer 1915: 2253).<sup>20</sup>

#### DIRECT ARCHAEOLOGICAL EVIDENCE FOR PEARLING

The archaeological evidence shows that pearling was of considerably greater antiquity than suggested by the historical sources, and that its origins can be found in the Late Stone Age. Direct archaeological evidence includes actual pearls, mother-of-pearl, and in later periods, pearling apparatus (diver's equipment, merchant's weights etc.). An appreciable quantity of such data is found in published archaeological reports. Until the Islamic period the majority of pearls are found in funerary contexts.

#### *Pre-Islamic and Early Islamic artefacts*

##### 6th-5th millennia BCE

The oldest pearls yet identified in the Gulf region are found at sites dating to the 6th/5th millennium BCE. These Late Stone Age sites were created by herding, fishing, hunting and gathering communities, which are generally grouped under the term "Arabian Neolithic." One pierced pearl (Figure 2) was found in an enclosed working area at the site of H3, As-Sabiyah, Kuwait (Carter and Crawford 2002: 8; Carter 2002: 17). Other pearls are associated with Neolithic burials in the Lower Gulf, being found at a coastal shell midden in Umm al-Quwain, (Phillips 2002: 178), and at Al-Buhais, an inland site in Sharjah emirate. The latter was pierced, and found on the chin of a female interment (Kiesewetter et al. 2000: 142).

In addition to the pearls, mother-of-pearl artefacts were found at two of these sites, including pendants at Al-Buhais (Kiesewetter et al. 2000 fig. 2), and small pierced plaques or buttons at H3 (Figure 2). The latter were typically pierced four times and were found in standardised forms, the most common of which were circular, barrel-shaped and hourglass-shaped (Carter 2002: 17).

<sup>20</sup> Disease was a very real problem. In the dry words of Lieutenant J. Felix Jones, who wrote in 1839: "Grane (or Kowait) is in general healthy, especially since the last plague" (Hughes Thomas 1985: 52).



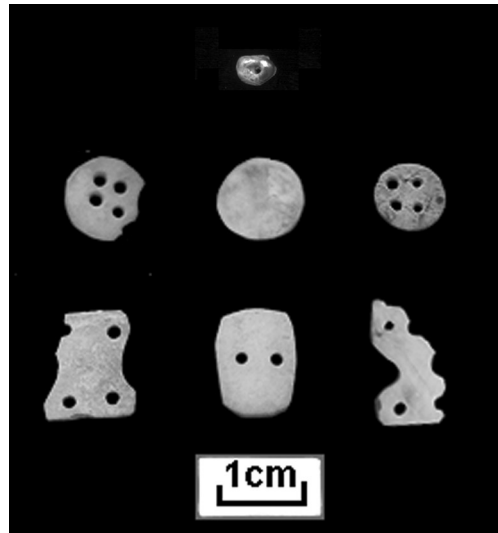


Figure 2. Pierced pearl and mother-of-pearl artefacts H3, As-Sabiyah (Kuwait), ca. 5000 BCE.

These artefacts resulted from deliberate pearl-fishing, rather than accidental acquisition during food-gathering activities (*contra* Uerpmann and Uerpmann 1996: 136). The finds from H3 and Al-Buhais show that pearls and mother-of-pearl were an intrinsic part of the Neolithic jewellery tradition. Reports of “vast numbers” of oyster shells at Abu Khamis, an Arabian Neolithic site in Eastern Saudi Arabia (Oates et al. 1977: 233), indicate that oysters were gathered in bulk. Very large coastal mounds of oyster shell in Eastern Saudi are also reported by Le Baron Bowen, near Al-Khobar and between Jubail and Ras Tanura (Le Baron Bowen 1951: 176). Although grinding stones and “crude pottery fragments” were associated, both characteristic of Neolithic sites in that region, these middens are not identifiable from maps produced by Masry (1997) or Burkholder (1984), so may have been bulldozed or not dateable to that period. Numerous microlithic drills at Abu Khamis and H3, as well as beads themselves, indicate a standardised shell bead industry at more securely-identified Neolithic sites. At H3, other species of shell were also deliberately selected and carefully worked to bring out their colour and visual properties (Carter and Crawford 2004). The manufacture of standardised classes of shell jewellery on a significant scale was undertaken there, and probably at several other sites (Carter et al. 1999: 55). The presence of pearls and other marine shell jewellery at Al-Buhais shows that either such jewellery was traded with inland Neolithic

groups, or that communities which spent part of their seasonal cycles inland also visited the coast.

It is likely that trade in pearls and shell jewellery extended beyond the Gulf. The Arabian Neolithic is well-known for its interaction with the contemporary 'Ubaid complex of Mesopotamia, which enjoyed widespread contacts with neighbouring regions (the Gulf, northern Mesopotamia and western Iran). The evidence includes 'Ubaid pottery distributed at Neolithic sites throughout the Gulf, and recent work in Kuwait shows that sophisticated boats enabled communication between the two regions (Carter 2002; Carter 2003a). Although various interpretations of the contact between Mesopotamia and the Gulf exist (Oates et al. 1977; Piesinger 1983; Masry 1997; Uerpmann and Uerpmann 1996) it is likely that it was a trading relationship, with 'Ubaid pottery representing one side of the transaction (Carter 2002: 25-26). Pearls and mother-of-pearl jewellery, among other artefacts, may have been exchanged for the ceramics. It has been suggested previously that 'Ubaid people took or traded for pearls from the Gulf (Oates et al. 1977: 233; Potts 1998b: 23; Uerpmann and Uerpmann 1996: 135). Confirmation of the presence of pearls in Mesopotamian 'Ubaid contexts, however, must await archaeological investigation.<sup>21</sup>

There is no evidence of pearl-diving at this stage, as opposed to gathering in the shallows, comparable to the mujannah of recent times. The technologies to allow diving were certainly known to coastal Neolithic communities (boats, weights), and there is slight evidence to suggest that it may have been employed at this time. Stone divers' weights are reported to have been recovered from oyster shell middens found "along the shore a mile south of al-Khobar" (Le Baron Bowen 1951: 176). This approximately matches the location of a string of Ubaid-related sites at Ain As-Sayh (McClure and Al-Shaikh 1993; Hermansen 1993). Unfortunately Le Baron Bowen's sites cannot be formally identified with the Ain As-Sayh ones, which were not described as shell middens, and furthermore, Hermansen identified later pottery of the Early Dynastic period (3rd millennium BCE) at some of them.

#### 4th-2nd millennia BCE

Pearl finds remain sparse during the succeeding millennia. None are recorded from the Gulf region during the 4th millennium, though a few are found

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<sup>21</sup> Most of the pearls encountered archaeologically, of all periods, are extremely small (< 5mm), and were only found through careful sieving of spoil. Such an approach has not yet been taken on the Mesopotamian 'Ubaid sites, so it is unsurprising that none have been encountered.

in Oman associated with 4th millennium burials, on the shore or the Indian Ocean (Santini 2000: 155; Uerpmann and Uerpmann 2003: 150-151). The first recorded Mesopotamian occurrences are known from this period though, with a report of a string of pearls from Archaic (Uruk IV, i.e. Jamdat Nasr Period) levels at Uruk (Heinrich 1936: 42, Pl. 37: top). These presumably originated from the Gulf. Although settlement in eastern Arabia appears to have declined during the 4th millennium, occupation is evident at some coastal and oasis sites in the Eastern Province of Saudi Arabia, in the same general area, and indeed often at the same sites, as the 'Ubaid-related sites of the Neolithic. Small quantities of Uruk period pottery are found, indicating contact with Mesopotamia. It is possible that a trade in pearls was taking place, similar to that of the 'Ubaid/Neolithic period, though probably on a smaller scale.

Occurrences of pearls are surprisingly infrequent during the 3rd and 2nd millennia BCE, considering the well-known renewal of regular maritime trade between Mesopotamia and the Gulf. Mother-of-pearl is comparatively frequent during the 3rd millennium, however, being especially associated with inlaid objects in the Royal Cemetery at Ur (Moorey 1994: 139). Around a dozen unpierced seed pearls are known from the late 3rd/early 2nd millennium site of Saar, Bahrain, in a variety of domestic or discard contexts. The only other published occurrence in the Gulf during these millennia is from the island of Failaka, off Kuwait (Table 6). These were three small pearls from late 2nd millennium levels in a large structure, interpreted as an elite residence (Howard-Carter 1986: 308). Ratnagar (1981: 20-21, 139) mentions a pearl oyster midden in the southwest of Bahrain, opposite the Ras al-Jazayir pearl bank, which contained a few sherds of Barbar pottery (late 3rd or early 2nd millennium BCE). She also notes the existence of a well and a fishing hamlet in the area during the early 20th century, however. The oyster midden cannot therefore conclusively be regarded as evidence for pearl fishing around that site during the Bronze Age, let alone a "pearling settlement of the Barbar culture".

#### 1st millennium BCE-6th century CE

Pearl finds steadily pick up in frequency during the 1st millennium BCE and the beginning of the 1st millennium CE. Within the Gulf, a small number are found in a Period IVe/d burial at Qala'at al-Bahrain, ca. 500-300 BCE (Højlund and Andersen 1997: 154-155, fig. 716: 1-4), with one of the 6th c. BCE reported from a tomb at Janussan (Lombard and Salles 1984: 82-83). An unspecified number are reported from the Iron Age cemetery of Al-Qusais, Dubai (Al-Tikriti 1985: 17). Pearls also occur in Mesopotamia by the second half of the 1st millennium, attested to by an earring with two pearls reported from Nineveh,

while impressive numbers were reaching Iran under the Achaemenids, judging from over 200 found at Pasargadae, and a necklace of 400-500 from a sarcophagus at Susa (Howard-Carter 1986: 308; Donkin 1998: 46). The Hellenistic period yields pearls from least two tombs at the cemetery of Shakhoura, Bahrain, incorporated into jewellery (Lombard 1999: 199, 201), as well as a couple of finds from the eastern Mediterranean and Anatolia (Donkin 1998: 55), hinting at a broad redistribution beyond the place of origin. A series of pearls from Taxila (Donkin 1998: 58), an eastern outpost of the Achaemenids conquered by Alexander, in northern Pakistan, may have originated from the Gulf, though south Indian sources cannot be ruled out. Indian and Sri Lankan sources were certainly known to Hellenistic authors (Donkin 1998: 65).

By the start of the Common Era, we know from the *Periplus* and Pliny that there were important pearl fisheries in the Gulf. The site of Ed-Dur, which was possibly the town of *Omana* in the *Periplus*, confirms the fact that pearling was a significant industry during the 1st-2nd centuries CE. At least 41 pearls were recovered from 17 tombs in the cemetery, nearly all pierced, and nearly all small in size. A mother-of-pearl disc is also recorded (Haerinck 2001: 47), and Potts (1998a: 54-55) reports a stack of pearl oyster shells outside the entrance of one of the monumental tombs, perhaps left as an offering. Other finds include a high quantity of imported luxury goods, including Roman glass. These indicate that ed-Dur was integrated into the maritime trade routes linking the Roman Empire, the Persian Empire, India and South Arabia.

Another revealing find from ed-Dur is a lead diver's weight with an iron ring to attach the rope (Potts 1998a: 54, 58). This is the only definite diver's weight reported in the archaeological record, though pierced stones of unknown date were excavated at the site of AK1, Qatar (Figure 3). The latter are too large to be net weights and too small to be anchors, and were found at the bottom of an undated fire-pit close to the shore of a small island. As noted above, other stone divers weights are reported from sites in eastern Saudi Arabia, south of Al-Khobar, and at Ras Tanura, turned up in the early years of oil exploration and development (Le Baron Bowen 1951: 176). These cannot be dated securely but were found in the vicinity of known Neolithic/Ubaid-related sites.

It appears therefore that ed-Dur had easy access to pearls, and although it is not close to the main body of pearl banks, some of its inhabitants were involved in pearl fishing. In this respect, it was similar to Julfar during later centuries. More pearls are found in funerary contexts around the Middle East between the 3rd and 6th centuries CE, either pierced or set into high-status jewellery or weaponry (Table 6), with several finds and references from the Caucasus and Black Sea region (Donkin 1998: 90-91; Simpson 2003: 67). Pearl finds also occur in the Levant and Egypt with reasonable frequency at this time (Donkin 1998: 91).



Figure 3. Possible stone diver's weights from Al-Khor, Qatar (excavated by the Qatar Archaeology Project in 2000, from an undated stone-lined pit).

According to Williamson, a chain of fourteen sites of Sasanian date are found along the extremely arid and inhospitable coast between Bandar-e Lengeh and Siraf, with associated oyster shell middens.<sup>22</sup> On these grounds he proposes that “the origin of *large scale* pearling can be firmly placed in the late Parthian and very early Sasanian period” (Williamson’s underlining) (Williamson 1971: 29). The existence of these sites is indeed likely to be due to the pearling industry, but whether they indicate an upturn in the industry is less certain, given the Classical references to the importance of pearling, and the abundance of pearl finds of the late 1st millennium BCE and Parthian period. It may instead reflect a temporary switch of the focus of operations from Bahrain to the Iranian coast. The Sasanian period in Bahrain is still poorly understood, as almost no evidence has been found for occupation on the island at that time. Apart from a handful of painted sherds, there is still a hiatus at the main urban site, Qala’at

<sup>22</sup> These sites are along the same stretch of Persian coastline that supported significant numbers of pearling communities during the Late Islamic period, grouped together under the heading “Shibkuh” in the charts and tables.

al-Bahrain (Højlund and Andersen 1997: 213; Højlund and Andersen 1994: 464). The implementation of an aggressive Sasanian naval policy at this time (Whitehouse and Williamson 1973), accompanied by the promotion of Rishahr on the Bushehr Peninsula as the region's leading entrepot, may have caused a decline in Bahrain's fortunes and temporarily removed its status as the sole focus of pearling activities in the Gulf.<sup>23</sup>

With the coming of Islam the number of pearls found in archaeological contexts drops. Although Islamic texts extol the high value of pearls, Islamic practice does not encourage deposition in funerary contexts. Consequently, pearls are absent from the archaeological record for around 700 years, though the historical sources show that pearling was still important.

*Mid Islamic artefacts (10th-16th centuries CE)*

Published pearls do not reappear in domestic contexts until the 14th century, with a find from Julfar (Sasaki 1994: 7). Six other pearl finds from Julfar are poorly provenanced, and may date to anywhere between the 14th and 17th centuries, or even later.<sup>24</sup>

Another find from the Islamic period is a cache of pearls from Qala'at al-Bahrain, found in a murex shell and dated to the 15th/16th century CE (Lombard 1999: 221). It is not clear whether Bahrain's main pearl market was at Qala'at al-Bahrain or at Manama at this stage, but the discovery of five small rounded conical weights at the former site implies that pearl trading was occurring there, some time between the 12th and 15th centuries (Frifelt 2001: 146, 151). Four of these are of chalcedony, and according to Frifelt (2001: 151), the weights used by pearl merchants were typically of this shape and made of that stone.

*Recent artefacts and ethnographic material (17th-20th centuries CE)*

As well as divers' weights and merchants' weights, a range of other equipment is associated with the recent and ancient pearling industry, but no examples have been reported in the archaeological record. Examples abound in ethnographic collections, however. Most are of organic material, and their archaeological absence can largely be explained by the poor preservation con-

<sup>23</sup> Note, however, the references in the Babylonian Talmud to pearls being brought up to Mesmahij, thought to be located on Muharraq, just off the main island of Bahrain.

<sup>24</sup> Two unpublished pearls are also reported from Islamic layers at Kush, Ras al-Khaimah (*pers. comm.* St John Simpson).

ditions typical of the region. Such equipment includes tortoiseshell nose-clips (*futam*), which are recorded as early as the 10th century by Al-Masudi, and are also mentioned by Al-Biruni and Ibn Battuta (Ibn Battuta 1962 vol. 2: 408; Al-Shamlan 2000: 34-38); leather finger-guards (*khabat*) (Hansman 1985: 94); short hooked knives (*mufliqa*) (Hansman 1985: 94); and a series of graded metal sieves used to sort the pearls by size.

#### INDIRECT EVIDENCE FOR PEARLING: THE ABU DHABI ISLANDS AS A CASE STUDY IN CHANGING SETTLEMENT PATTERNS

Indirect evidence can be deduced from site distributions in those areas where pearling was carried out, and by exploring the range of possible functions of such sites. The work of the Abu Dhabi Islands Archaeological Survey (ADIAS) has provided a particularly valuable source of such information, and the Abu Dhabi Islands region is presented here as a case study. As an environmentally marginal zone with very low rainfall and poor supplies of groundwater, it is thinly populated, and its settlement patterns are highly sensitive to socio-economic change. The data from Abu Dhabi turned out to relate mainly to the boom in the pearling industry mentioned above in the historical survey, which occurred between the 18th and 20th centuries CE.

##### *Changes in the Number of Sites*

Table 7 shows the number of archaeological sites known from the Abu Dhabi Islands region which can be assigned to any of 6 chronological horizons. These periods are defined by their pottery, and the longest potential date range for each ceramic period has been used.<sup>25</sup> Although other activities occurred, such as fishing, dugong hunting (Prieur and Guerin 1991), the passage of trading ships

<sup>25</sup> Because of the nature of the ceramic evidence, the dating schema used above for the historical and direct archaeological evidence can not be followed exactly. The author takes responsibility for the chronological assignments. The pottery database is held by ADIAS at ERWDA (Environmental Research and Wildlife Development Agency), Abu Dhabi. Table 7 and its derived distribution maps (Figures 4-5) include only those sites recorded by ADIAS, which contained datable pottery. The following were therefore excluded: settlements and islands not been visited by ADIAS; those visited by ADIAS but lacking ceramics; those visited by ADIAS but lacking datable ceramics. The reliance on datable ceramics also means that, even at sites featuring in Table 7, aceramic occupation from a different period may have occurred at the same site. Sites which produced only pottery of equivocal date were excluded. These include 38 sites with Mid-Late Islamic pottery which could have belonged to either of the two latest periods. These totals therefore do not tell the whole story, but offer an estimation of the intensity of use of the islands and coast.

(e.g. Carter 2003b), guano extraction (King and Tonghini 1998: 123) and sulphur extraction (King 2003), there is good evidence that intensity of settlement and usage was intimately linked to the fortunes of the pearling industry (see below).

In order to compensate for the very different spans of time covered by each period, a crude calculation has been made, “sites per century” (Table 7, Chart 3). This shows that for the first five thousand years, settlement evidence is sparse, with less than 1 identifiable site per century. After the start of the Common Era, the amount more than trebles for the 1st millennium CE. Site frequency then drops slightly but stays close to the former level during the middle of the Islamic period.<sup>26</sup> The final horizon (17th-20th c.) shows a dramatic increase in activity in the islands region, with the number of sites per century increasing approximately four-fold. The number of islands or coastal localities showing occupation also increases, from 6 to 14, as well as the absolute number of sites (see Figures 4-5 and Table 7). It is currently difficult to prove whether this

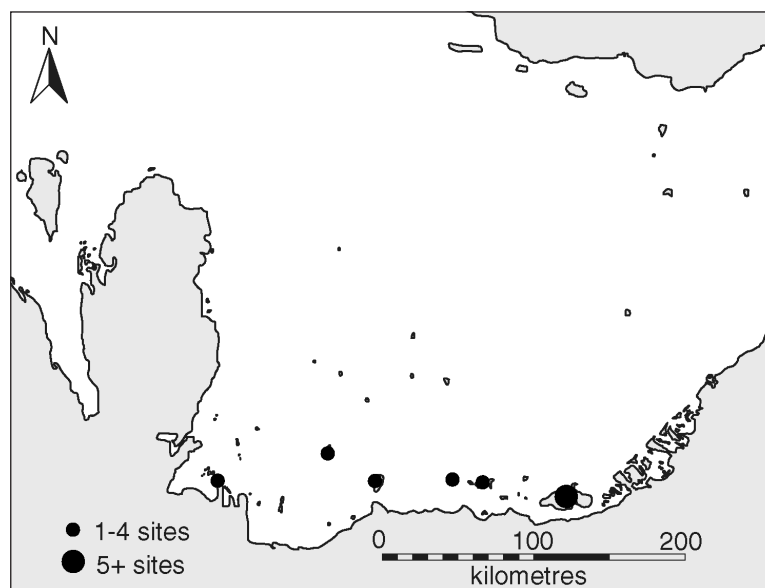


Figure 4. Site distribution in the Abu Dhabi islands region during the 13th-16th centuries CE.

<sup>26</sup> These totals obscure a marked lack of sites between the 9th and the 13th centuries CE.



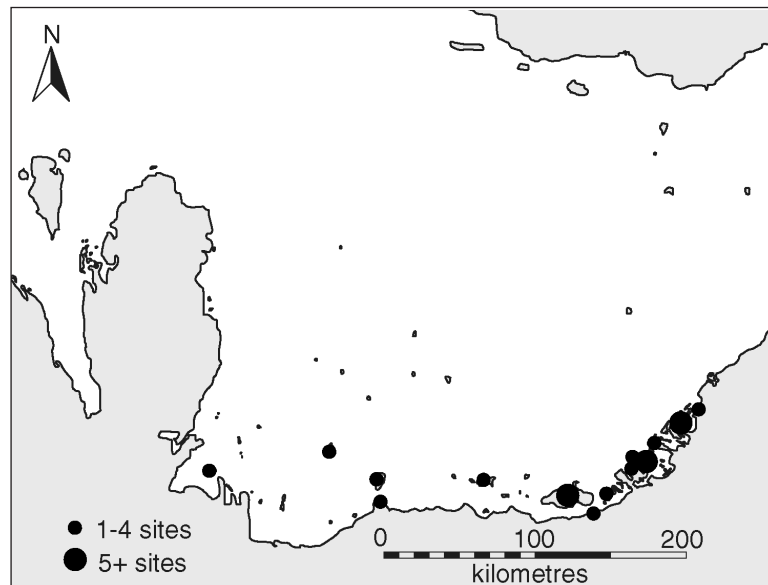


Figure 5. Site distribution in the Abu Dhabi islands region during the 17th-20th centuries CE.

expansion had its roots in the 17th or the 18th century. Many of the sites included in the final horizon could belong to either the 17th, 18th or even 19th centuries. It is not always possible to distinguish reliably between small and fragmentary assemblages. Nonetheless, it is likely that the boom began in the 18th century rather than before. This is judging from the establishment of the new pearling centres during that century, and the admittedly slight evidence for a slump towards the end of the 17th century (i.e. the difference in the revenues noted by Teixeira and Ovington). It is possible that the difficulty experienced in recognising 17th century sites may not wholly be due to imperfect knowledge of the ceramic sequence, but because they are largely absent from the study area.

The pattern through time can be compared with the developments evident from the texts and direct archaeological evidence.

- During the 6th/5th millennia (“Ubaid/Neolithic”), known sites are few. This period predates writing, so there are no historical texts with which to compare evidence. For this and the next two chronological horizons, the number of sites per century is consistently small (less than one). Both archaeological and historical evidence show that pearling occurred in the Gulf, but it is

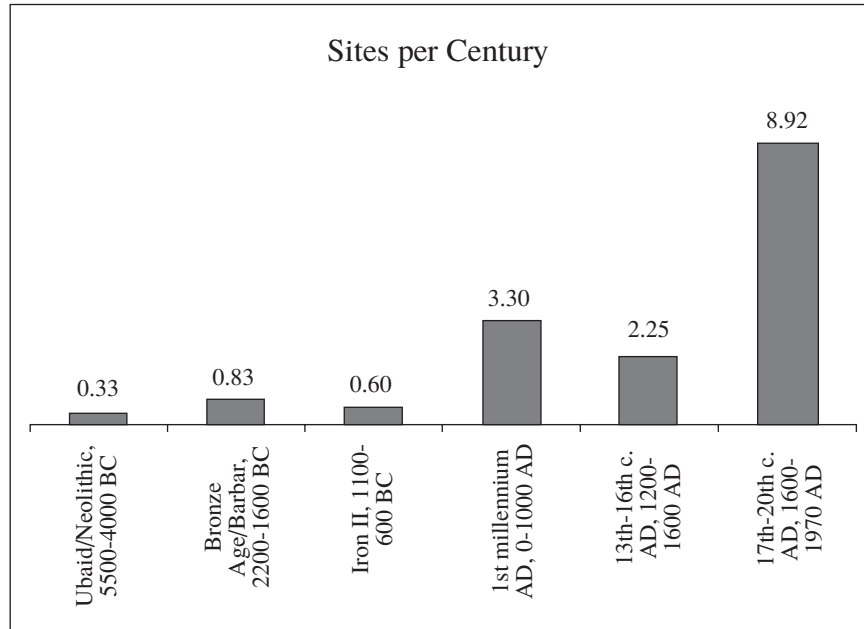


Chart 3. "Sites Per Century" (derived from Table 7).

impossible to tell at what scale and level of organisation, or whether the occupation of the Abu Dhabi Islands Region related significantly to the practice of pearl-fishing.

- The sharp increase in site frequency after the start of the Common Era ("1st millennium CE") broadly coincides with the appearance of regular references to large-scale organised pearling in the textual sources.
- There is a slight drop in site frequency in the penultimate horizon (13th-16th c. CE). Although more details on the conduct of pearling become available through writers such as Ibn Battuta and Ibn Majid, there is nothing in the texts to indicate any major change in the industry. The potential for future growth, however, is indicated by the visit of Balbi towards the end of this horizon (Table 1), which marks the increasing importance of European markets.
- The four-fold increase in sites in the final horizon (17th-20th c. CE) begins shortly after Balbi's account. This period also saw the foundation of important new pearling centres in marginal areas, including the Islands region (Abu Dhabi), as well as the production of a wealth of historical and economic data, collated by Lorimer, which indicate that a pearling boom was in progress

by the 19th century. The historical and archaeological evidence for settlement reconfiguration in the 18th century shows that the pearling boom which is so well documented by Lorimer began before his chronological frame of reference.

In two important respects the settlement pattern of the Abu Dhabi islands reflects the historical evidence. Firstly, the increase in textual attestations following the start of the Common Era is accompanied by a persistent rise in site frequency. Secondly, the archaeological evidence for a dramatic intensification of settlement or usage in the 18th century, or less likely the 17th, supports the historical evidence from the foundation of new pearling centres, and from Lorimer, that the industry began a period of expansion during or before the 18th century, which lasted into and gathered pace during the 19th and early 20th centuries.

#### *Changes in Spatial Distribution*

Figures 4-5 show the distribution of sites in the Abu Dhabi Islands during the last two ceramic periods. The increase in the number of sites and occupied islands/localities is clearly evident. This increase occurs in the eastern part of the region, showing that intensification was concentrated in the islands surrounding and including Abu Dhabi. This certainly relates to the 18th century foundation of that town, which stimulated the creation of numerous satellite settlements, campsites or special-purpose sites.

Distribution in the western and central parts does not change significantly between the two periods. Those localities occupied or visited between the 13th and 16th centuries are also used during the subsequent period, though the precise location of the actual sites changes in many cases. An apparent focus of activity in both periods can be found on the island of Abu al-Abyadh. This island has five known sites of the 13th-16th centuries, implying that the island played an important part in the pearl-fishing process at the time when the leading pearl markets were in Bahrain and at Julfar. Ibn Majid tells us that islands were used for pearl fishing by the late 15th century, and the Abu al-Abyadh sites may represent the seasonal encampments of pearl-fishers from one or both of those two regions.<sup>27</sup> Five sites are also found on the island during the subsequent ceramic period (17th-20th c.), at different locations on the island. Abu

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<sup>27</sup> Judging from the pottery, it would mainly have been visitors from the Julfar region in Ras al-Khaimah: over 75% of all pottery from the island is Julfar Ware, while less than 4% appears to be Bahraini. The rest is of other or uncertain origin.

al-Abyadh's significance to pearl-fishing has been noted by other authors, prompted by the presence of large oyster middens, one of which (ABY13) is over 3km in length (Hull and Rowland 2003).

#### *Site Hierarchy, Formation and Function*

There is no doubt that occupation or usage of the islands region intensified in response to the growth of the pearling industry between the 18th and 20th centuries. Ideally, a precise definition of the way in which they were created and used would allow insights into this process. Unfortunately, it is difficult to define the exact function of most of the sites, or assess the degree of permanence of occupation. A range of functions and permanence might be applicable, including special-function site (e.g. a place for resource-gathering, such as water or wood); occasional camp-site (i.e. one visited opportunistically); seasonal camp-site (i.e. an established camp-site visited regularly during a certain season); seasonal settlement or market (i.e. a location which has a fixed population during a certain season); permanent settlement or market (i.e. a location with a permanent year-round population); and town.

This hypothetical site hierarchy can not reliably be discerned. Nonetheless, a simpler 3-tiered settlement hierarchy is evident. This is described below, along with suggestions as to how the sites from each category were created. Space does not allow a full treatment of the many sites and their features which have been recorded by ADIAS since 1992, and the discussion below is limited to sites dating to the final ceramic horizon (17th-20th c.).

#### 3rd Order Sites: artefact scatters, installations, water-collection features and alignments

Sites with these features make up the most common type of site in the islands region, and the third and lowest tier in the settlement hierarchy. Many sites in the islands region consist only of clusters of stone-lined hearths (e.g. MR9 on Marawah: King 1998: 78), while others are characterised only by scatters or heaps of imperishable debris, mainly shell and/or pottery (e.g. DH21 at Jebel Dhanna: see King et al. 2003: 46; Carter 2003c: 57-60). It is not usually possible to tell whether habitation structures once accompanied these features. The presence of stone alignments (e.g. at Abu al-Abyadh: Hull and Rowland 2003 fig. 3) shows that foundations were sometimes laid to brace perishable superstructures (e.g. palm fronds, driftwood, tent cloth). Whitelock (1836: 43) states how "sails, oars and yards" were fashioned into tents at the temporary encampments. Not all alignments would have had superstructures: outline mosques are commonly found, consisting simply of a line of stones with a niche (*mihrab*)

oriented towards Makkah (see e.g. King 1998: 84-85, Pl. 40-41). Mosques with wooden superstructures are also reported, for example on Marawah (King 1998: 75, Pl. 43). These would have left little trace in the archaeological record.

Although permanent habitation at some of these sites must not be entirely ruled out, sites with these features are best construed as the remains of opportunistic or seasonal camp-sites. Historical accounts explain how the presence of pearling fleets during the summer could have caused the formation of such sites. Captain Brucks, writing of his sojourn in the Gulf in the 1820s and 1830s remarked that between Dubai and Abu Dhabi “the coast has no fixed inhabitants, but during the fishing season temporary villages are erected near the backwaters” (Hughes Thomas 1985: 548). Balbi had observed such temporary pearling villages as early as 1580 (Slot 1993: 7). These acted as base camps, which boats of the pearling fleet regularly visited. During the 18th century, according to Justamond’s translation of Abbé Raynal, the pearlery spent their nights “upon the island [Bahrain] or the coast, unless they are prevented by wind from going on shore” (Hughes Thomas 1985: 25). Alan Villiers, who accompanied a Kuwaiti pearling vessel during the late 1930s, recounts that sometimes the boat and crew would pull in at “some lonely beach” to sleep. He says that the smaller vessels came in by night to the beaches, but that the larger ones anchored at sea (Villiers 1969: 357). Both Le Baron Bowen and Villiers also state that the smaller vessels came to the beach every tenth day to rest their crews, and that pearling vessels regularly came to shore was to replenish fresh water and fuel (Le Baron Bowen 1951: 173; Villiers 1969: 358, 369).<sup>28</sup> If they were able to land, it is possible that some smaller boats came to shore during spells of bad weather: Le Baron Bowen (1951: 173) says they were forced to wait it out when the *shamal* blew, though he does not specify whether any of the boats pulled ashore to do this. Rentz says that the boats took shelter “among the reefs” near the mainland (Rentz 1951: 398). At times it was also necessary to come ashore to bury dead comrades (Le Baron Bowen 1951: 173). On many or all such occasions, crew the appears to have disembarked, to make camp or for other reasons, thus potentially leaving hearths, shelters, temporary mosques, wells and midden material. Great numbers of outline mosques are sometimes found: on the northwest coast of Abu al-Abyadh they are said to occur every 300m (Hull and Rowland n.d.: 8). Another commentator notes that the large size of such mosques “on many of the islands” is disproportionate to the visible

<sup>28</sup> Le Baron Bowen (1951: 173) says reprovisioning occurred every three weeks or so. Rentz (1951: 398) claimed it was necessary every month.

settlement remains, and suggests that the crews of the pearling fleets gathered to worship communally (Elders 1998: 93).

Outside the diving season, the collection of pearls by wading occurred (*mujannah*). According to Heard-Bey, by the early 20th century groups of people practised this “all along the coast” of Abu Dhabi emirate during the winter (Heard-Bey 1996: 185). Such groups would have left the remains of encampments or impermanent villages, along with considerable quantities of pearl oyster shell, partly accounting for the numerous and sometimes sizeable oyster middens (e.g. the 3km example from Abu al-Abyadh, the vast middens reported along the coast of the Eastern Province of Saudi Arabia, or the middens reported by Williamson on the Persian coast). Unfortunately, it is not possible to know from current evidence to what extent such middens are the product of prehistoric or early historic times, when gathering from the shore may have been common, or to what extent they resulted from the intensive exploitation of the banks between the 18th and 20th centuries.

Although shore-based pearl-gathering probably accounts for much of the midden material, on-shore oyster middens could also be created by divers who were working from boats. Most accounts indicate that in recent centuries the shells were opened on the boat and then thrown overboard (e.g. Lorimer 1915: 2230; Wilson 1833: 286), but some sources state that they were brought ashore. When the fishery was controlled by the Persians during the 18th century, it was compulsory to bring the shells ashore to be opened in the presence of a Persian officer (Parsons 1808: 203). In the 1830s Whitelock observed that, once laden with oysters, the boats went to nearby islands to open them (Whitelock 1836: 42). Whitelock even names the islands where he has observed the existence of large shell middens, presumed to result from this process: “from the large heaps which I observed on Sir Beni-Yas [Sir Bani Yas], Zurkoh [Zirku], Surdy [Sirri?] and Seer Abonaid [Sir Abu Nuair], I conclude that these are found to be the most convenient islands for this purpose.” Miles indicates that this still happened as late as the 20th century “as soon as the boat is full of oysters, the Captain sails to a sandy islet, where the oysters are exposed in the sun until they rot, when the pearls are gathered from the shells” (Miles 1919: 416). Of the islands named by Whitelock, the Abu Dhabi Islands Archaeological Survey only has pottery collections from Sir Bani Yas. Numerous Late Islamic campsites are noted on that island (e.g. at SBY18, SBY19, SBY23, SBY30, SBY32, SBY33) (King 1998: 33, 36, 39, 42-3). One of them, SBY33, is explicitly identified as a pearling camp, with an oyster midden measuring 180 × 40 × 3m (King 1998: 44).

Inevitably, the more boats and crew participating in the summer dive and in the winter collection, the greater the number and/or size of the seasonal camp-

sites and middens left behind. Thus, as the industry boomed, so the number of sites increased, partially accounting for the dramatic increase in site numbers during and after the 17th/18th centuries.

#### 2nd Order Sites: sites with substantial stone architecture

More substantial Islamic period architecture, consisting of stone-built houses and mosques, is occasionally found. Remains of this kind comprise a second tier of the archaeologically visible settlement hierarchy in the Abu Dhabi islands region.

Such sites are rare, but are reported at Dalma (Elders 1998: 92-93; King 1998: 51-55) and Ghagha (King and Tonghini 1998 Pl. 2). Dalma hosted a seasonal market and re-provisioning centre in Lorimer's day (Lorimer 1915: 2231), a role it may have played at least since the late 16th century, when it was visited by Balbi. Oral-historical information provides additional confirmation that Dalma and Ghagha were more than camp sites. According to members of the Rumaythat tribe, Dalma, Ghagha and Sadiyat (an island just off Abu Dhabi) were the only islands which supported a permanent population, due to the presence of reliable water supplies (Hull and Rowland 2003).

Abandoned Late Islamic villages with ruined stone architecture are also found on islands which are not mentioned by the Rumaythat correspondents, for example on Sir Bani Yas, at sites SBY14 and SBY21 (King 1998: 30-31, 38). Whitelock (1936: 44) also mentions "the remains of a town" on "Surdy." Surdy probably refers to Sirri, an island close to the Persian coast (160km north of Abu Dhabi and 60km south of Persian coast). It is possible that 2nd-tier settlements were more numerous in recent centuries than the living Rumaythat realise. Some may have been abandoned at the onset of the collapse of pearling in the 1920s and 1930s, or may relate to an earlier Islamic horizon. More work is required to identify and date such sites.

The population of such sites may have shown different degrees of size or permanence. Some may have had small permanent populations, which swelled during the pearling season as others moved in to service the fleets working the banks. This was the case at Dalma, where the population expanded during the pearling season, with the arrival of merchants, the emir's representative and their households (Lorimer 1908: 363). Ghagha supported a small permanent population of Qubaisat and had mosques and several stone houses, until the decline of the pearling industry led to its abandonment (Archive Editions 1987: 15).

The presence of stone-built architecture does not necessarily mean that a site was permanently occupied: a seasonal settlement with no permanent population may have well-built stone buildings, which were abandoned for part of the year.

At the start of the 20th century, small islands around Qeshm on the Iranian side were only inhabited for a few months of the year (Donkin 1998: 124). Nonetheless, the amount of resources invested in structuring the living space tends to reflect the amount of time spent at a given location. At the very least, it can be argued that architectural elaboration reflects a trend towards sedentarization (Cribb 1991: 106-111), and the investment of time, labour and resources in building permanent structures indicates an intention to come back.

#### 1st Order Sites: the town

The highest settlement tier in the region consists of the town of Abu Dhabi, which had grown quickly after its foundation in 1761, with 400 houses springing up in two years, and the fort being constructed in 1793 (Heard-Bey 1996: 44; Heard-Bey 1997: 262). This served as a centre of population and manpower, a mercantile centre, an administrative centre, a defensive centre and a supply base. Abu Dhabi town was a service centre writ large, as well as a pearl-trading emporium. Its foundation gave both benefits and disadvantages to its rulers and inhabitants. The main advantage was its proximity to the pearl banks, with resultant logistical benefits: the shorter journey to the main banks would have meant that less supplies were needed, and that there was less danger of the loss of ships and men. In the booming economic situation, this was sufficient to offset the logistical disadvantages, i.e. the paucity of water and distance from food-production areas.

#### DEMOGRAPHIC AND ECONOMIC CHANGES RESULTING FROM THE PEARLING BOOM

The foundation of Abu Dhabi and its success over the next 150 years related directly to the demand for pearls, as did the increase in the number of smaller sites in the islands region. This change in settlement pattern, which is so evident in the archaeological record, reflects a socio-economic reconfiguration of the whole of the Gulf region, in response to the international demand for pearls.

#### *The cash economy and the development of urbanism in marginal coastal areas*

Between the 18th and the 20th centuries, the multi-faceted subsistence economy was supplemented by, and in some areas (including Abu Dhabi) superseded by, a cash economy based on the pearling industry. The emergence of this cash economy permitted changes on a regional scale, ultimately allowing the development of urbanism in marginal areas which could not have supported towns prior to the advanced development of the pearl trade (e.g. the foundation



of Abu Dhabi). Such changes included an overall increase in population beyond that allowed by the food-production capacity of the region, as cash was available to bring in foodstuffs from external sources. The increasing population became concentrated into coastal centres, which maximised benefits from the pearling industry. Conversely, after the collapse, a census taken in the 1950s shows a decrease in the population of almost every tribe and coastal settlement since Lorimer's day (Heard-Bey 1996: 164).

The concentration of manpower and economic interests in the pearling centres had long been a seasonal phenomenon: as early as the 12th century, the population of the ports had swelled during the diving season, according to Al-Idrisi (Donkin 1998: 124). The difference now was in scale, and in the fact that sizeable populations were maintained outside the pearling season. Heard-Bey states that there was an "influx of nomads into the pearling communities of the coast," chiefly Abu Dhabi and Dubai (Heard-Bey 1997: 262). Rentz (1951: 397) notes that during the boom years the divers in the Gulf would include "Bedouins who once would come from as far away as Hadramaut" (in Yemen), while Le Baron Bowen (1951: 169, quoting Bertram Thomas) states that boats would come from as far away as Socotra, and also notes an annual migration of divers into the Gulf from the Batinah Coast of Oman.

The boom on the Arabian coast affected both sides of the Gulf: immigrants from the Persian side crossed to swell the population of the Arabian coastal settlements (Heard-Bey 1996: 164-5). The ending of the Iranian city of Bandar-e Lengeh's status as a tax-free port in 1902 severely damaged Iranian pearling interests, and led to further immigration into the coastal towns of Arabian side of the Gulf. Iranian, Indian and Arab merchants moved their homes and businesses to the Arabian side, particularly Dubai, in direct response (Lorimer 1915: 2236; Lorimer 1908: 456, 1098). As well as Lengeh, smaller towns on the Iranian side, which had a history of involvement in trade and pearling, also declined. These notably include Bandar-e Kung (aka Kunj, Khunj, Cong, Congo), a small settlement just outside Lengeh, which had recently been reduced to half its former size at the time Lorimer was writing (Lorimer 1908: 1041). Kung seems to have been particularly susceptible to fluctuations in population: nearly a hundred years earlier it was described by Captain Brucks as "now in ruins, but . . . formerly a flourishing place" (Hughes Thomas 1985: 601); Slot (1993: 23) attributes its decline to a series of Omani raids in the late 17th/early 18th century, and says it was completely ruined by 1756. This perhaps exemplifies the manner in which towns on both sides of the Gulf were sensitive to short- and medium-term political and economic events, such that the bulk of the population would leave if better opportunities were presented elsewhere. Smaller communities on the Persian coast continued to partake in pearl diving, as demonstrated

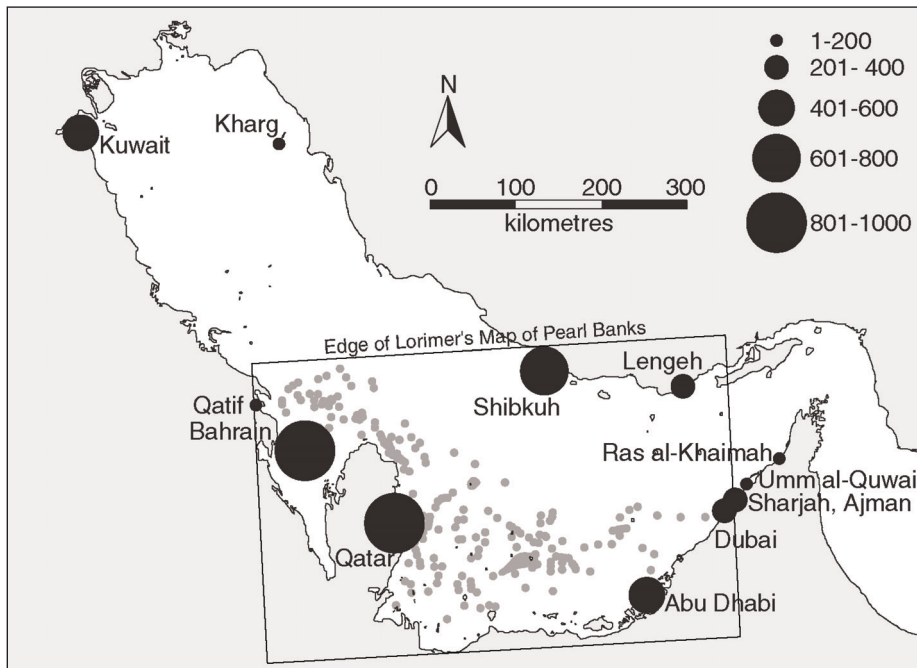


Figure 6. Distribution of pearling boats in the Gulf at the time of Lorimer (after Lorimer 1915, Appendix C, Annexure 3).

by the significant number of pearling boats (655) originating from 31 villages and islands in Shibkuh district, according to Lorimer’s statistics (see Table 2 and Figure 6).

As the Arabian centres boomed, local institutions developed to administer the towns and regulate the cash economy, namely new systems of taxation and the consolidation of hereditary ruling families. In around 1801 or 1802,<sup>29</sup> according to Durand, the Al-Khalifa ruler of Bahrain began to impose a tax, *nob*, on each pearling boat (Burdett 1995 Vol. 1: 63). Originally this was to pay for armed boats to protect the pearling fleet. This idea was immediately taken up by the other chieftains of the Arabian littoral, from Musandam to Kuwait. Previously, it was the Persian authorities who had levied tax on the pearling industry: as

<sup>29</sup> This occurred “about the Mahommedan year 1216” according to Durand (Burdett 1995: 62).

late as 1769 or the early 1770s, Parsons claimed that officers of the ruler of Iran still collected pearl tax in Bahrain, to a value of up to a third of the yield (Parsons 1808: 202-203). During the period of confusion in the mid-to-late 18th century, Bahrain's rulers had sometimes been unable to raise pearl revenues effectively. The nob was soon followed by the *traz*, a different tax, also levied by the Arab chieftains (Burdett 1995 Vol. 1: 63). In due course the Gulf sheikhs were to levy taxes on boats, pearl-divers and crew, the merchants, and the pearls themselves (Heard-Bey 1996: 114-115). The development of new forms of taxation marked the crystallization of the new order, whereby pearling revenues were directed towards the native Arab chieftains in their expanding or newly founded towns.

These changes mainly affected those regions of the Gulf which were poorest in terrestrial natural resources, but which enjoyed good access to the sea and thus the pearling banks. Abu Dhabi represents an ideal case study of such a region, but the growth of towns such as Kuwait, Doha, Dubai, Sharjah and others was also stimulated by the pearling boom. Table 2 and Figure 6 illustrate the fact that from around the mid 18th century, pearling centres were no longer only located in those areas best able to provide manpower and staples from local sources (Bahrain and Julfar/Ras al-Khaimah), but in resource-poor zones lacking the subsistence base to support sizeable population centres. Qatar, for example, was a very major participant in pearl-fishing by the start of the 20th century, mainly at Doha, despite having a small population (27,000, compared to 100,000 for Bahrain), and despite the fact that "agriculture hardly exists" there (Lorimer 1908: 1532). Presumably, Qatar's location next to the densest pearl banks came into play once the pearling industry reached a scale such that local resource limitations could be overridden. The same can be said of Abu Dhabi (population 11,000). Even the towns of Kuwait,<sup>30</sup> Sharjah and Dubai are poorly located in terms of local availability of agricultural resources.

Different conditions pertained in Bahrain, which was rich in water and arable land and had been able to support urban life since the Bronze Age; and Ras al-Khaimah, which was also agriculturally rich, and had supported the town of Julfar since the 14th century (Kennet 2003: 121-122). The pearl-fishing industries of these two areas did not grow in the way that those of the marginal zones expanded, and Table 3 shows that a comparatively small percentage

<sup>30</sup> Kuwait, because of its strategic location on the route between the Gulf and Basra, Mesopotamia's leading entrepot, had an important carrying trade and therefore did not have an overwhelming reliance on pearling, though this was a major source of currency.

relied on pearling during the boom years at the start of the 20th century. Ibn Majid reports that around 1000 ships of Bahrain were employed in the industry in the 15th century, while Lorimer counts 917 in the early 20th century.<sup>31</sup> Neither does the involvement of the Julfar/Ras al-Khaimah region appear to have increased significantly: Teixeira reports that 50 pearling boats sailed from Julfar in the 16th century, while Lorimer's combined total for Ras al-Khaimah town and adjacent ports is only 61 vessels.

*Migration into and within the Abu Dhabi islands region*

The Abu Dhabi Islands case study provides detailed information on how the pearling boom, and the consequent establishment of new urban pearling centres, stimulated population expansion into new areas.

During the boom, members of certain tribes (chiefly the Qubaysat and Rumaythat) devoted themselves more and more to pearling and other maritime activities, staying in the islands region outside the diving season (Heard-Bey 1997: 263). They were presumably major participants in the winter harvest, the mujannah. These groups were not restricted to the mainland, but also travelled from island to island. As well as wading for pearls, they participated in winter fishing and exploited other marine resources (Hull and Rowland n.d.). The men of these groups would have joined the diving fleets during the summer. The increase in the number of sites in the islands region was therefore not only due to an increase in the number of boats and people during the summer dive, but also the arrival of tribal groups which increasingly specialised in maritime activities, and inhabited the region year-round. This phenomenon was primarily stimulated by the growth of the pearl trade, which provided the summer activity for the male population, and the cash to purchase basic foods stuffs and other goods to survive the winter.

The exact point at which these groups began to settle in the islands region, beyond the confines of Abu Dhabi town itself, is not established. Heard-Bey (1997: 263) suggests that migration to the ports had occurred by the end of the 19th century, and that tribal specialisation took place over several generations. This does not directly address the issue of settlement on the islands themselves, whether permanent or seasonal. Although it would have been cumulative and

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<sup>31</sup> This does not take into account Bahrain's role as the Gulf's chief marketplace for pearls, which certainly profited in line with the general enrichment of the pearling trade. By the mid 1820s, figures given by Captain Brucks show that pearls accounted for 97% of the value of Bahrain's exports (Hughes Thomas 1985: 568).

probably ongoing up to and into the 20th century, the process probably began as soon as Abu Dhabi itself was founded. It is hard to imagine that the entire population stayed in the town during the off-season, only venturing forth during the dive, though sectors certainly did (see below).

The degree of sedentarism within the islands, and the annual pattern of migration, including movement between the islands and Abu Dhabi town, is also difficult to estimate. The migration patterns reported by living members of the islands communities, which involved year-round habitation of the islands region for some families, refer to behaviour during the 1950s, after pearling had ceased to be an important industry (Hull and Rowland 2003). This fully specialised maritime existence may only have evolved recently: Heard-Bey (1996: 28) reports that sections of the Rumaythat took that option following the collapse of pearling. Whether such modes of existence developed prior to the collapse of pearling is unknown. Archaeology cannot currently answer that question, given the difficulties in distinguishing the camp sites of pearl-fishers from the impermanent villages of mobile occupants of the islands. This failure is perhaps not significant, and it is probably safe to say that intensive use of the islands, whether defined as occupation or resource exploitation, only became practical once Abu Dhabi was founded as a regional centre.

#### *Tribal and Regional Specialisation in Pearling*

The structure of society changed as pearling became a central activity, particularly in Abu Dhabi emirate. As they specialised in pearling and fishing, groups of Qubaysat and Rumaythat became attached to specific coastal and island locations, giving up many of their interests in the interior. These interests, such as camel-herding and date farming, were sold or delegated to others (Heard-Bey 1997: 263). This indicates a new degree of specialisation, at odds with the collection of skills which previous inhabitants of the region had tended to combine, according to season and demand (herding, date farming, fishing, pearling).

Towards the end and climax of the pearling boom, the degree of specialisation extended further still. Certain individuals became full-time pearl-fishers, entirely abandoning the seasonal aspect of their craft. They were able to do this by travelling to warmer pearling waters during the winter months. Lorimer records that pearl-fishers from Kuwait, Bahrain and the Trucial States (modern UAE) sailed to Ceylon in the winter; government records show this did not happen before 1889 (Lorimer 1915: Appendix C: 2229). Even some of those who stayed behind could be regarded as year-round professional pearl-fishers, because they did not partake in other activities during the off season: "in winter some of the pearl

diving class take part in the ordinary sea fisheries, but the majority of them spend the season at home in idleness” (Lorimer 1908: 1438). Whitelock (1836: 32) makes the same claim, showing that this was the case even by the first half of the 19th century, and Le Baron Bowen (1951: 179) indicates that it was also true of some individuals after the end of the boom period.

*The End of the Pearling Boom*

It is not the intention of this study to examine in detail the collapse of the industry and its consequences. Cultured pearls from Japan began to appear on the market in quantity during the 1920s (Le Baron Bowen 1951: 164). Soon after this, the Great Depression struck, which severely affected the global market for pearls (Al-Shamlan 2000: 146). If that were not enough, the economic disruptions caused by the Second World War meant that many of those still in pearling were unable to equip their boats satisfactorily, due to rising food prices (Heard-Bey 1996: 205). The economic consequences were very serious, such that some deaths by starvation were said to have occurred in Dubai towards the end of World War II (Heard-Bey 1996: 250).

Faced with these pressures the pearling industry in the Gulf contracted. Chart 4 shows Le Baron Bowen’s estimate of the value of Bahrain’s harvest between 1830 and 1949. Notwithstanding the long gaps in the evidence, which misleadingly results in an apparent slight downward trend during the 19th century, the drop-off in the first half of the 20th century is very marked.<sup>32</sup> A total of \$1,500,000 in 1896 has dropped to just \$200,000 by 1949. The decline is also reflected in the number of boats used in pearling: Le Baron Bowen (1951: 169) estimates that by 1946 only 530 boats were employed in pearling in the whole Gulf, compared to 3000 at the industry’s peak (cf. Lorimer’s total of 4500). Chart 5 shows how Bahrain’s pearling fleet contracted during the first half of the 20th century, using figures derived by Agius (2005: 105, fig. 12).<sup>33</sup>

Nonetheless, the industry did not completely die off until oil revenues had thoroughly penetrated each of the states bordering the Persian Gulf. As late as

<sup>32</sup> Chart 4 is based on Le Baron Bowen’s assessment of figures quoted by other authors in ca. 1830, 1835, 1896, 1925, 1926, 1946 and 1949 (Le Baron Bowen 1951: 163). Lorimer’s figures can be used to fill part of the long gap between the points at 1835 and 1896. Chart 1 shows that, contrary to the slow decline between these dates suggested by Le Baron Bowen’s figures, the value of Bahrain’s pearl exports increased steadily throughout that period.

<sup>33</sup> Agius ultimately derives his figures from an Arabic work by Khalil al-Marikhi (*Lamhat min madi l-bahrayniyya*, or Glows of “Light from Bahrain’s Past”), as well as Lorimer and Le Baron Bowen.

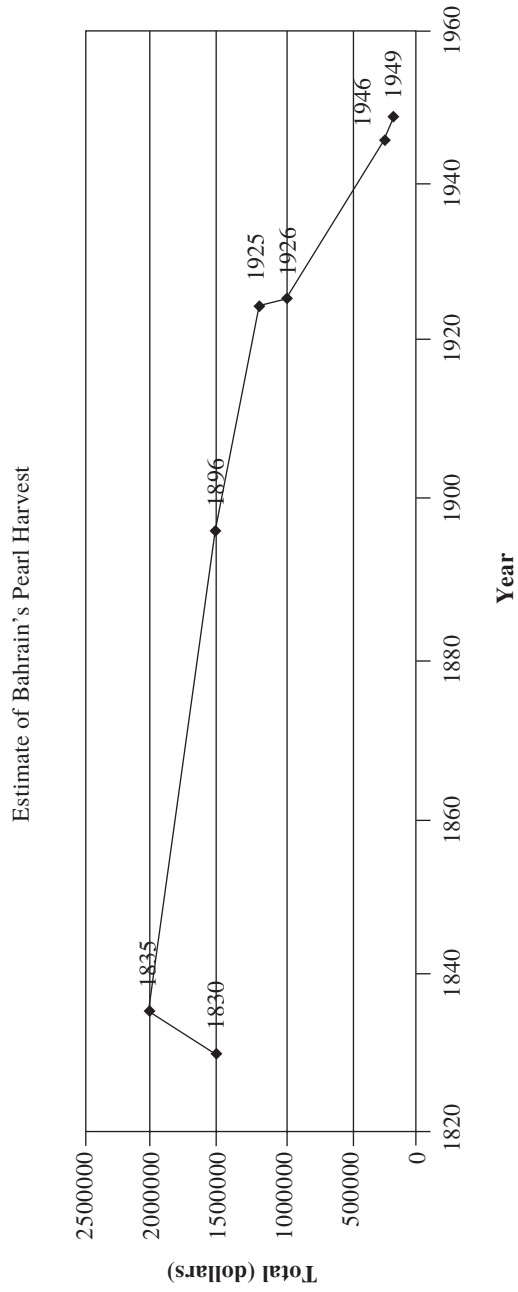


Chart 4. Estimated value of pearl harvest from Bahrain, in US dollars, 1830-1949 (after Le Baron Bowen 1951: 163).

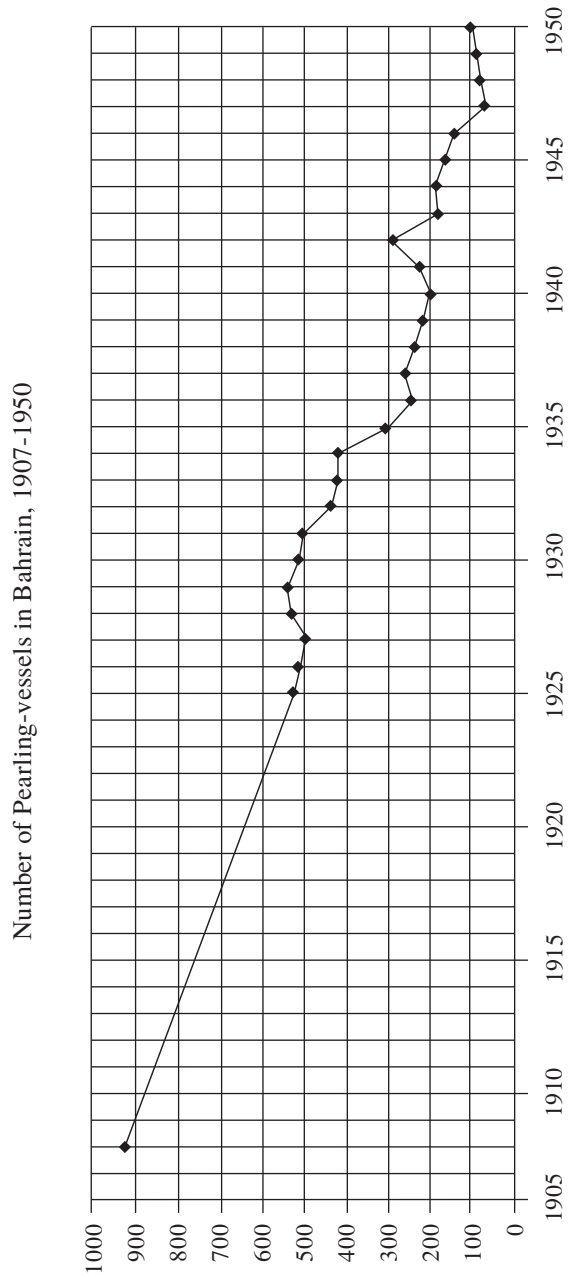


Chart 5. Number of pearlring vessels in Bahrain, 1907-1950 (after Agius 2005: 105, Table 12).



1928, Belgrave was able to state that “the prosperity and almost the very existence of Bahrain depends upon the Pearl industry” (Burdett 1995 Vol. 2). In Le Baron Bowen’s day the men of the Trucial Coast, where the oil industry was slow to start, were still pearling, and people still travelled from the Batinah Coast in Oman to take part in the dive (Le Baron Bowen 1951: 179). Heard-Bey (1996: 207) notes that there was an increase in the number of men who dived for pearls in the early 1950s, following bad harvests. As employment by oil companies became more available, however, the need to partake in the dangerous, exhausting and poorly remunerated work of pearl diving was removed. Al-Shamlan (2000: 147) marks the death of pearling in Kuwait in 1959, with the last ruling concerning the departure of the fleet issued from the Court of Kuwait. Within a decade, the industry in its traditional form had completely vanished throughout the Gulf, though pearls continued to be collected using motor-launches and diving equipment until the end of the 20th century.

#### DISCUSSION AND CONCLUSIONS

*“We are all from the highest to the lowest slaves of one master, Pearl”* (Mohammed bin Thani, ruler of Doha, Qatar, 1863).<sup>34</sup>

The expansion of settlement in the islands region coincides with economic and historical evidence for a constant and demand-driven expansion of the pearling industry. This occurred between the 18th and the 20th centuries. Several factors encouraged the expansion of pearling. The traditional markets of the regions bordering the Gulf were active and growing. By Lorimer’s day nearly all the pearls from the Gulf were channelled through Bombay, whence they were dispatched to the European markets, Baghdad, Persia, Turkey and other parts of India (Lorimer 1915: 2236). The Indian market was particularly important. The ruling and administrative classes of India prospered during the 18th and 19th centuries under British rule, and its market correspondingly grew, aided by improved communications (Heard-Bey 1997: 262; Heard-Bey 1996: 164). The European market had been flooded by pearls from the New World in the early 16th century (Donkin 1998: 279, 319), but this threat to the Old World production zones faded as the New World oyster beds were progressively fished out (Donkin 1998: 321, 325, 329).

Heard-Bey (1996: 164) credits British rule with encouraging the practice of pearl-fishing in the Gulf, through enforcement of the maritime truces from 1820 onwards, and eventually the Perpetual Treaty of Peace of 1853. Contemporary

<sup>34</sup> Ferdinand 1993: 38, citing W.G. Palgrave’s account of Mohammed bin Thani’s words.

and earlier documents support this view. In 1756 Kniphausen had noted the low volumes of trade caused by continuous disturbances resulting from disagreements between local sheikhs (Slot 1993: 14). Lieutenant Kemball (later Captain), the architect of the Perpetual Treaty, recorded in 1844 that "it became a matter of vital importance to secure to all the tribes, in common, peace and tranquillity, while engaged in the practice of their vocation on the pearl banks, and in the prosecution of their carrying trade, the only means which (the barrenness and infertility of the soil of their country, producing not sufficient for the maintenance of the inhabitants, being called to mind) nature has placed within their reach for gaining a livelihood" (Hughes Thomas 1985: 71). In the text of the Perpetual Treaty of 1853, the Arab signatories themselves acknowledged "the evil consequences formerly arising from the prosecution of our feuds at sea, whereby our subjects and dependents were prevented from carrying on the pearl fishery in security" (Hughes Thomas 1985: 88), though to what extent they themselves framed the wording of this document is uncertain. In 1878 Durand remarked that, since the imposition of the maritime truce, both the chiefs of the Gulf and the general populace had been enriched by the pearl trade (Burdett 1995 Vol. 1: 62).

By the end of 19th century, the demand which drove the expansion of pearling was a global one. The British Empire itself was a prodigious consumer of pearls, and the markets of Europe and increasingly the USA fuelled the pearling boom. The strongly demand-led impetus behind the industry was made explicit in 1910 by Captain C.F. Mackenzie, the Political Agent in Bahrain, who stated that "the demand for pearls is more than equal to the supply," and that "any revival in the prosperity of Europe and America is immediately followed by a corresponding rise in the value of pearls" (Burdett 1995 Vol. 2: 81). According to Heard-Bey (1996: 182): "Victorian Britain and the rest of Europe saw in pearls a tangible symbol of the romantic Orient. This predilection was taken up by society in the United States, and during the first two decades of the 20th century New York became the second biggest market for Gulf pearls after Bombay." By 1951, the Paris market had risen to pre-eminence, being described by Le Baron Bowen as "the world's pearl emporium" (Le Baron Bowen 1951: 177). MacKenzie provides figures which demonstrate the astonishing growth of that market: exports to France rise from Rs 350,000 in 1907-8, to Rs 1,300,000 in 1908-9, to Rs 4,000,000 in 1909-10 (Burdett 1995 Vol. 2: 107). Al-Shamlan (2000: 167-175) recounts how Kuwaiti pearl merchants travelled directly to Paris during the 1930s in unsuccessful attempts to secure better prices for their merchandise.

In exchange for the pearl harvest, the gathering of which increasingly domi-

nated the local economy, the Gulf imported foodstuffs and cheap finished goods from various parts of the British Empire, mainly from or via India. Manufactured imports into the Gulf included cotton goods and “industrial wares” (Ferdinand 1993: 33-34). The archaeological record from 19th-20th century sites in the Abu Dhabi Islands shows that cheap decorated ceramics were also imported, mainly porcelains and semi-porcelains from the Far East and Europe. It is significant that large quantities of staples were brought in to feed the population overburden. Imported staples mainly consisted of grain and pulses, as well as rice, coffee and sugar (Lorimer 1908: 1440; Heard-Bey 1996: 202). The reliance of the region on these staples is stressed by Lorimer (1908: 1439) “scrutiny of the trade statistics shows how artificial is the existence of the larger coast settlements of Trucial ‘Oman and how entirely dependant they are on the proceeds of the pearl fishery for the means of purchasing the ordinary necessities of life, which they do not themselves produce.” According to Heard-Bey (1996: 188), the quantity of imports directly shadowed the fortunes of the pearl trade: “The importation of foodstuffs and other goods grew along with the growth of the pearling industry during the last decades of the 19th century and in the 20th century, until in 1928 and 1929 a peak was reached which was followed by a very sharp decline.”

The special environmental conditions of the region therefore ensured that staples, as well as cheap finished goods, were key imports. These supported a population which was expanding beyond the region’s carrying capacity. The result was rapid population agglomeration in one of the most inhospitable regions of the planet. At the same time, the pearling industry ensured the full integration of the Gulf region into the global capitalist economy. The exposure to the demands of the world market caused the reorientation of the regional economy, society and settlement patterns between the 17th/18th century and the 20th century, towards specialised production of pearls. Although this degree of integration, and its impact on Gulf society, was unprecedented, it followed a long history of pearling in which the Gulf was linked to neighbouring regions, and indirectly to more distant markets, through an export trade in pearls. This phase of the industry goes back at least to the first millennium BCE. Archaeology reveals that pearl-fishing is of greater antiquity still, with prehistoric origins beginning over 7000 years ago. Moreover, even in this earliest manifestation, the industry may have been geared towards export, in this case to Mesopotamia. The societies of the Gulf were therefore shaped by the pearl oyster and trade in its products from the earliest days.

*Acknowledgements*

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Table 1. Summary of Primary and Secondary Historical References to Pearling in the Middle East. Where possible, the date given is not for the publication of the reference, but for the time to which the reference originally referred. Other useful sources exist for the 19th and 20th centuries which have not been included in this table due to lack of space; these are reproduced in Burdett (1995), Hughes Thomas (1985) and Saldanha (1908). Significant statistics from these sources which do not appear in Table 1 are included in Tables 2 and 5.

Date of source	Summary	Site or Area	Secondary Source	Primary Source
early 2nd mil. BCE	"fish-eyes" imported into Ur	Ur, Iraq	Oppenheim 1954: 7	Tablets from Ur (archives of the Temple of Ningal)
early 7th c. BCE	Assyrian recension mentions Gilgamesh tying weights to feet to dive for the Flower of Immortality	Bahrain/the mouth of the rivers	Oppenheim 1954: 7 George 1999: 98	<i>Gilgamesh</i> Tablet XI, 288-292
4th-3rd c. BCE	Pearls produced in India and "certain islands in the Red Sea" (Persian Gulf)	The Gulf	Potts 1990: 138	Theophrastus, <i>De Lapidibus</i> 36 (Caley and Richards 1956: 52-3)
ca. 300 BCE	Pearls found in the Indian sea, and off the coast of Armenia, Persia, Susiana and Babylonia. They are esteemed by Persians, Medes and all Asiatics	The Gulf	Donkin 1998: 51	Athenaeus (2nd c. CE), <i>The Deipnosophists</i> III: 45, citing Chares of Mitylene, <i>Histories of Alexander</i> : Book 7 (Athenaeus 1854: 154-4)
3rd c. BCE	Pearling is important in the Gulf, and Tylos (Bahrain) is famous for its pearls	Bahrain	Hansman 1985: 94; Donkin 1998: 80	Pliny, <i>Natural History</i> VI. 26, citing Nearchus

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Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
3rd c. BCE	Pearl fisheries found around an inhabited island off the Carmanian coast, and in the Indian Sea	The Gulf, around Qays Island	Donkin 1998: 51	Arrian, <i>Indica</i> 38 (2nd c. CE) citing Nearchus (Arrian 1926: 417)
1st c. BCE	Pearls are found at "a certain island in the Gulf"	Bahrain?	Potts 1998a: 53	Athenaeus (2nd c. CE), <i>The Deipnosophists</i> III: 45, citing Isidorus of Charax, <i>Description of Parthia</i>
1st c. CE	There is much diving for pearl oysters near the mouth of the Gulf	The Gulf	Hansman 1985: 94	<i>The Periplus of the Erythrean Sea</i> 35 (Casson 1989: 71)
1st c. CE	Pearls are ranked highest amongst valuables; those from the Gulf are specially praised	The Gulf	Potts 1998a: 53	Pliny, <i>Natural History</i> IX. 54-8
ca. 250 CE	Pearling practised by Arabians on the opposite shore of the Gulf	The Gulf, or Oman	Potts 1998a: 53	Flavius Philostratus, <i>Life of Apollonius of Tyana</i> , III, 57 (Pajares 1979: 222)
3rd-6th c.	Pearls are "brought up" to Mashmahij	Muharraq Island (Bahrain)	Simpson 2003: 67	<i>Babylonian Talmud: Rosh Hashana</i> 23a (Simon 1938: 99)
4th c. CE	The Sasanian king's sword-belt is set with pearls	Iran	Lukonin 1983: 711	Faustus of Byzantium
4th c. CE	A Roman soldier discovers a leather jewel-case full of pearls in a Persian camp		Simpson 2003: 66	Ammianus Marcellinus XXII.4.8
early 5th c. CE	Pirates seize merchandise and pearls from India and China	India	Colless 1969/70: 20; Yousif 2002: 297	<i>Chronicle of Séert</i> LXIX (Part I: 212-213)
5th c. CE	Firuz II wears a famously large pearl when killed in battle		Donkin 1998: 94	Procopius Caesarensis (5th-6th c. CE) <i>History of the Persian Wars</i> , I.iv.14

Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
5th-7th c. CE	Rishahr has a market for excellent pearls	Iran, Bushehr Peninsula	Whitehouse and Williamson 1973: 40	Moses Khorenac'i, <i>Geography</i> , Recension B: 38 (Marquart 1901: 138)
6th c. CE	Khusrau sends Bishop Ezekiel with divers to fish for pearls	The Gulf	Yousif 2002: 320; Colless 1969/70: 29	<i>Chronicle of Séert</i> (Part II: 86)
6th c. CE	The Emperor of Persia adorns his throne with pearls. Certain fish are dangerous to divers	The Gulf	al-Shamlan 2000: 33-34	Al-Mukhabbal al-Sa'di
6th c. CE	The carriage of Khusrau I is set with pearls	Iran	Simpson 2003: 67	Sebeos, <i>History</i> , Ch. 8 (Thomson and Howard-Johnston 1999: 8)
late 6th c. CE	Khusrau II commissions a crown set with pearls; Persians decorate belts and clothing with pearls.	Iran	Donkin 1998: 94; Simpson 2003: 67	Theophylact Simocatta, <i>History</i> v.1.9, iii.6.4; iv.3.7 (Whitby and Whitby 1989: 133, 80, 106-107)
6th-7th c. CE	Khusrau II is given a diadem set with pearls, and gives stockings set with pearls	Iran	Simpson 2003: 67	Sebeos, <i>History</i> , Ch. 12, Ch. 27 (Thomson and Howard-Johnston 1999: 27, 47-48)
6th-7th c. CE	Khusrau II's diadem set with pearls the size of eggs; his tunic and weapons set with pearls	Iran	Donkin 1998: 94	al-Tabari (9th-10th c. CE)
pre-Islamic	Divers use oil to improve visibility. A diver is taken by a shark	The Gulf	al-Shamlan 2000: 34	Al-Musaib bin 'Adas
7th c. CE	Pearls are worn in Paradise	N/A	al-Shamlan 2000: 29-31	The Qur'an
8th c. CE	Pearls are found in Paradise	N/A	al-Shamlan 2000: 31-32	The <i>hadith</i>
9th c. CE	During Arab Conquest, Sasanian booty at Nihavand includes 2 chests of pearls	Iran	Simpson 2003: 66-67	Al-Baladhuri

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Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
10th c. CE	Pearl fishing in the Gulf occurs beginning April to end September. Pearls also known in Red Sea and Ceylon. The waters surrounding Qatar are rich in pearls	The Gulf	al-Shamlan 2000: 34-35; Hardy-Guilbert 1998: 89	'Ali bin al-Husain al-Masudi: <i>Muru' al-Dhahab</i> (Al-Masudi 1983 vol. I: 168-9).
11th c. CE	The "sultans" of al-Hasa collect half the pearls collected by the divers of Bahrain	Qatif, eastern Saudi	Naji 1993: 435	Nasir-i Khusrau: <i>Safarnama</i>
11th c. CE	Oysters are left overnight before opening. Details given on timing of pearl-fishing, and the location and depth of pearl banks	The Gulf	al-Shamlan 2000: 37	Abu Rayhan Muhammad bin Ahmad al-Biruni: <i>Al-Jamahir fi Ma'rifat al-Jawahir</i>
12th c. CE	There are pearl fisheries at Qatif	Qatif	Donkin 1998: 124	Benjamin of Tudela, <i>Itinerary</i> (Asher 1900: 137)
12th-15th c. CE	Pearls are used in medicine	N/A	al-Shamlan 2000: 32-33	Various Arabic medicinal texts
mid 12th c. CE	Julfar is a major pearling centre. There around 300 well-known pearl fisheries in the Gulf. Ports grew in population during the diving season	Julfar (Ras al-Khaimah region)	Vine and Elders 1998: 114; King and Tonghini 1998: 123; Donkin 1998: 124	al-Idrisi (1836 vol. I: 151-157 [Part 2, Section 6])
14th c. CE	Pearl banks found between Siraf and Bahrain, fished April-May by divers and traders from Persia, Bahrain and al-Qatif. The "sultan" takes one fifth. Many divers are in debt to the traders	The Gulf	al-Shamlan 2000: 36	Ibn Battuta (1962 vol. 2: 408-9 [245-246])

Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
1375 CE	Pearling is conducted beyond the Tigris-Euphrates, for the Baghdad market	The Gulf	Elders 1998: 72	<i>The Catalan Atlas of the Year 1375</i>
1403-1406 CE	Pearls are taken to Hormuz before export to the western world	Hormuz	Donkin 1998: 135-6	Gonzales de Clavijo
1490	An unsurpassed pearl fishery in Bahrain employing ca. 1000 ships. Inhabited and uninhabited islands around Bahrain have pearl fisheries	Bahrain	Vine and Hellyer 1998: 111; Kunitzsch 1993: 387	Ahmed ibn Majid, 9th and 10th <i>fa'ida</i> (Tibbetts 1971: 213 222)
Early 16th c. CE	Hormuz is well-stocked with pearls	Hormuz	Donkin 1998: 135	Lodovico di Varthema
1514 CE	Bahrain has a great pearl fishery and market; Julfar has a great pearl fishery. Pearls are exported via Hormuz to India and elsewhere	Julfar	Vine and Elders 1998: 114; Donkin 1998: 135	Duarte Barbosa (1866: 34, 37-8, 42)
late 16th c. CE	The value of Bahrain's annual pearl trade amounts to 600,000 ducats; 100 terrada sail from Bahrain every year, 50 from Julfar, 50 from "Nihhelu"	The Gulf	Hansman 1985: 94; Vine and Elders 1998: 114	Pedro Teixeira, <i>Kings of Harmuz</i> (Sinclair 1902: 174-177)
1580 CE	Balbi visits the Gulf to inspect the pearl markets. Best pearls are from Bahrain and Julfar. Mentions Dubai, Sharjah, Dalma, Sir Bani Yas <i>et al.</i>	The Gulf	Slot 1993: 7, 37-39; Elders 1998: 92	Gasparo Balbi, <i>Viaggi</i> , Ch. XIII (Pinto 1962: 120-122)
1583 CE	"a great store of pearls from the island of Baharim" kept at Hormuz	Hormuz	Le Baron Bowen 1951: 161. Hughes Thomas 1985: 31	Ralph Fitch (or Filch)



## THE HISTORY AND PREHISTORY OF PEARLING IN THE PERSIAN GULF 195

Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
1616-1617 CE	William Robbin, a jeweller, lives in Isfahan	Iran	Saldanha 1908: vi	Letters received by East India Company
1675 CE	Reference is made to the richness of the pearl fishery, Bahrain being the chief place	The Gulf	Saldanha 1908: xviii	Captain John Weddell
1689 CE	The Shah of Iran derives 50,000 ducats annually from Bahrain's pearl banks, with 100,000 taken by others	Bahrain	Floor 1984: 132	John Ovington
1660s and 1670s CE	The pearl fishery, which is particularly rich around Bahrain, provides one million pearls annually. The Persians used to pay a tax on pearling to the Portuguese	Bahrain/ Eastern Saudi	Donkin 1998: 124	John Chardin (Chardin 1724: 85-87)
1754 CE	240,000 rupees derived annually from Bahrain's pearl banks under Nadir Shah (1736-1747), excluding that taken by others	Bahrain	Floor 1984: 139	Baron von Kniphausen
1763 CE	The inhabitants of Kuwait live by fishery of pearls and fish, and employ over 800 boats in these tasks	Kuwait	Le Baron Bowen 1951: 167	Niebuhr 1792: 127
1770 CE	Annual revenue "from the fishery in the latitude of Bahrein is computed at 3,600,000 French livres (£157,500)." Overfishing in eastern Gulf	Bahrain	Hughes Thomas 1985: 26	Justamond/Raynal, cited in Captain Robert Taylor
1775 CE	Annual revenue from Bahrain fishery ranges between £112,500 and £187,500	Bahrain	Parsons 1808: 202	Abraham Parsons

Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
1790 CE	Bahrain's pearl fishery yields 500,000 Rs annually, despite a drop in productivity. Pearls exported to India, Persia and elsewhere	The Gulf, Bahrain	Saldanha 1908: 405-408	Manesty and Jones
1810 CE	The whole extent of the Gulf coast is a valuable pearl fishery	The Gulf	David 1998: 140	Captain John Wainwright
1818 CE	Bahrain employs 1400 boats and 32000 men, fishery worth 100,000 Basra Toman. Various statistics on fisheries of Persian ports, the Bani Yas, and the Arabs of the Gulf	The Gulf	Hughes Thomas 1985: 14-40	Captain Robert Taylor
ca. 1820 CE	Sharjah sends out 300-400 pearling boats each year	Sharjah	David 1998: 147	George Brucks
1829 CE	The value of pearls produced in Bahrain is £200,000-£240,000. Bahrain has 1500 pearling boats	Bahrain	Le Baron Bowen 1951: 162	Wilson 1833
1835 CE	The value of the pearl trade in the Gulf is £400,000 per year	The Gulf	Le Baron Bowen 1951: 163	Wellsted, James R. 1838 <i>Travels in Arabia</i> . London: 264
1836 CE	The al-Qawasim territories send out 350 pearling sambuks each year; ca. 3000 boats and 29,000 involved in the Gulf as a whole	Ras al-Khaimah, Sharjah	Hansman 1985: 94. Le Baron Bowen 1951: 167	Whitelock 1836
1878 CE	The <i>nob</i> tax imposed ca. 1801-2. Concerns about decreasing yield from overfishing	The Gulf	Burdett 1995: 61-75	Report by Captain Durand

## THE HISTORY AND PREHISTORY OF PEARLING IN THE PERSIAN GULF 197

Table 1. (cont.)

Date of source	Summary	Site or Area	Secondary Source	Primary Source
1896 CE	5000 pearling boats in the Gulf (including 900 from Bahrain, 200 from Qatar), employing 30,000 men. The value of pearls shipped from Bahrain in 1896 was £303,941	Bahrain	Le Baron Bowen 1951: 163, 167	Zwemer, Samuel M. 1900 <i>Cradle of Islam</i> . New York: 100
1908-1915 CE	Full details of pearling industry, including revenues and value of exports since mid 19th c.	The Gulf		Lorimer 1908/1915, esp. Appendix C

Table 2. Number of boats engaged in pearling. Smaller settlements around Ras al-Khaimah and Sharjah have been conflated into those towns. Julfar and Ras al-Khaimah have been treated as synonymous. Qatif includes Lorimer's totals for Tarut, Jinnah, and Musallamiyah islands. Sources are as follows: Ibn Majid (Vine and Hellyer 1998: 111); Teixeira (Sinclair 1902: 176); Taylor, Brucks, Harness, Kemball, Hannel (Hughes Thomas 1985); Niebuhr, Wilson, Whitelock, Pelly and Lorimer (Niebuhr 1792: 127; Wilson 1833: 285; Whitelock 1836: 44; Pelly 1868: 33; Lorimer 1915, Appendix C, Annexure 3). Where possible, the dates given in this table refer to the time at which the surveys or estimates were made, not the publications.

"District"	ibn Majid 1490	Teixeira late 16th c.	Niebuhr 1763	Taylor 1818	Brucks 1820s	Harness 1826	Wilson 1829	Harness 1831	Whitelock 1830s	Kemball 1844	Kemball 1856	Hannel Pelly 1856	Lorimer 1907
Bahrain	1000	100		1400	2430		1500		2430	800	1000-1200	1500	917
Qatar													817
Kuwait			800 <sup>35</sup>							350			461
Abu Dhabi				500					350 <sup>36</sup>	600	600		410
Dubai										90			335
Sharjah					300-400	160		210	350 <sup>37</sup>	500			299
Umm al-Quwain						15		32		60			70
Ras al-Khaimah		50				10		14		80			61
Ajman						30		45		50			40
Qatif													167
Shibkuh									100 <sup>38</sup>				655
Lengeh					30								201
Kharg													40
Gulf Fleet		200 <sup>39</sup>		2300 <sup>40</sup>	ca. 3000				3230			4000 to 5000	4473

<sup>35</sup> Includes fishing boats.

<sup>36</sup> Includes "other towns of the Pirate Coast."

<sup>37</sup> Includes Ras al-Khaimah and other Qawasim territories.

<sup>38</sup> This total is for the whole Persian coast.

<sup>39</sup> Teixeira's total includes another 50 boats from "Nihhelu." The total amount, and the number quoted for Bahrain, are anomalously low.

<sup>40</sup> Combines Taylor's combined totals for the Persian ports, Bahrain and the Arabs of the Gulf, respectively numbering 500, 1400 and 400 (Hughes Thomas 1985: 19, 22, 39).

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Table 3. Population of coastal towns and districts engaged in pearling, according to Lorimer's survey of 1904-7. People in pearling derived from Lorimer 1915, Appendix C, Annexure 3 (data gathered 1904-1907). Population derived from individual gazetteer entries in Lorimer 1908. Figures for smaller settlements around the places listed below have been conflated into the main towns/districts. No population figure is given by Lorimer for Kharg island. Note that the population includes women and children, not just men (Lorimer counts "souls"). The figures for Ajman may constitute a rare error by Lorimer, or reflect population instability during the years of the survey.

<b>"District"</b>	<b>Men in pearling</b>	<b>Total Population</b>	<b>% in pearling</b>
<b>Ajman</b>	781	750	100
<b>Dubai</b>	6,936	10,000	69
<b>Abu Dhabi</b>	5,570	11,000	51
<b>Qatar</b>	12,890	27,000	48
<b>Umm al-Quwain</b>	1,759	50,00	35
<b>Sharjah</b>	5,639	18,750	30
<b>Kuwait</b>	9,200	37,000	25
<b>Bahrain</b>	17,633	100,000	18
<b>Shibkuh</b>	5,992	42,500	14
<b>Qatif</b>	3,444	26,000	13
<b>Lengeh</b>	2,385	20,000	12
<b>Ras al-Khaimah</b>	1,360	26,700	5
<b>Kharg</b>	250	-	-
<b>TOTAL (excl. Kharg)</b>	<b>73,566</b>	<b>319,700</b>	<b>23</b>
<b>TOTAL (Arabian littoral only)</b>	<b>60,385</b>	<b>204,500</b>	<b>25</b>

Table 4. Pearl exports from Trucial Oman, Bahrain and the Persian Coast, 1873-1905, in Rupees. Derived from Lorimer 1915: 2252, "Statistics of the Value of Pearls Exported Annually from the Principal Emporia of the Persian Gulf between 1873 and 1906." The total for the Persian Coast is calculated by adding Lorimer's figures for the regions of Lengeh, Bushehr and Bandar Abbas. The figures for Muscat are not included here.

Year	Trucial Oman	Bahrain	Persian Coast	Total
<b>1873-74</b>	1180000	2100000	4596500	7876500
<b>74-75</b>	1200000	2100000	5700000	9000000
<b>75-76</b>	1490000	2800000	3200000	7490000
<b>76-77</b>	1000000	2175000	2372000	5547000
<b>77-78</b>	2124200	1850000	2395000	6369200
<b>78-79</b>	1216560	1520000	2995000	5731560
<b>79-80</b>	1400000	1811000	2240000	5451000
<b>80-81</b>	3050000	2023000	2276000	7349000
<b>81-82</b>	2665000	1586000	2847000	7098000
<b>82-83</b>	2287000	1659000	2398000	6344000
<b>83-84</b>	2822000	1877500	2680100	7379600
<b>84-85</b>	3978000	2312000	2684900	8974900
<b>85-86</b>	2600000	1744000	3120000	7464000
<b>86-87</b>	1800000	1821000	2572700	6193700
<b>87-88</b>	2600000	2493500	3207500	8301000
<b>88-89</b>	5000000	3207000	4353000	12560000
<b>89-90</b>	4000000	3331000	4498000	11829000
<b>90-91</b>	2700000	3876000	3226700	9802700
<b>91-92</b>	3500000	4231000	4129500	11860500
<b>92-93</b>	5250000	4925000	4855000	15030000
<b>93-94</b>	5000000	3693750	4213440	12907190
<b>94-95</b>	6000000	4658620	3935200	14593820
<b>95-96</b>	8000000	3855000	4173000	16028000
<b>96-97</b>	10000000	5167000	3865000	19032000
<b>97-98</b>	7500000	3911000	3587600	14998600
<b>98-99</b>	5500000	4793000	3871000	14164000
<b>1899-1900</b>	7749990	6824430	3451905	18026325
<b>00-01</b>	4200000	3961700	2750000	10911700
<b>01-02</b>	5000000	7130100	4028500	16158600
<b>02-03</b>	8000000	8495610	7043673	23539283
<b>03-04</b>	9000000	10275300	4905000	24180300
<b>04-05</b>	5000000	10488000	626600	16114600

Table 5. Men in pearling. Taylor and Brucks derived from Hughes Thomas (1985: 22, 566) Whitelock from his own report (1836: 44); Durand from Burdett (1995: 62); Lorimer from his Gazetteer (Lorimer 1915: 2220). Taylor's total is a combination of his figure for Bahrain (32,000) and the "Arabs of the Gulf" (8000) (Hughes Thomas 1985: 22, 40).

Taylor, 1818	Brucks, 1820s	Whitelock, 1830s	Durand, 1878	Lorimer, 1907
40,000	30,000	29,000	35,000	74,000

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Table 6. Summary of artefactual evidence for pearling in the Middle East.

Date	Summary and comments	Site	References
ca. 5000 BCE	Single pierced pearl and mother-of-pearl artefacts	<b>H3</b> , As-Sabiyah, Kuwait	Carter 2002: 17
ca. 5000 BCE	“A solitary pearl was also found amongst the human remains”	<b>UAQ2</b> , Umm al-Quwain, U.A.E.	Phillips 2002: 178
5200-4200 BCE	A single pierced pearl at a female’s chin. Mother-of-pearl pendants. Reports of ca. 20 pearls now recovered	<b>Jebel al-Buhais 18</b> , Sharjah, U.A.E.	Kiesewetter <i>et al.</i> 2000: 142; fig. 141; Pers. comm. Uerpmann H-P.
Early-mid 4th mil. BCE	A single pierced pearl, found in a shell midden	<b>Khor Milkh 1</b> , Oman	Uerpmann and Uerpmann 2003: 150-151
Early-mid 4th mil. BCE	At least 3 perforated pearls from the cemetery, clasped in the hands of the deceased.	<b>Ras al-Hamra 5</b> , Oman	Biagi <i>et al.</i> 1984: 47, 55; Santini 2002: 155
3200-3000 BCE (Uruk IV)	A small string of pearls ( <i>echte Perlen</i> )	<b>Warka (Uruk)</b> , Iraq	Howard-Carter 1986: 308; Heinrich 1936: 42, Pl. 37: top
2100-1750 BCE	“A minute pearl” from Test Pit 1 (phase 0.2) and “about a dozen” from elsewhere on the site	<b>Saar</b> , Bahrain	Crawford <i>et al.</i> 1997: 61
mid 2nd millennium	“a few well preserved specimens” of pearls	<b>Tepe Giyan</b> , western Iran	Donkin 1998: 45; Herzfeld 1941: 144
1500-1400 BCE	Three pearls in Late Kassite (Failaka 4A) context, upper layers of “Ruler’s Villa” or “Palace”	<b>Failaka Island</b> , Kuwait	Howard-Carter 1986: 308
Mid or Late 2nd mil. BCE (LBII)	A gilded bronze statuette with pearls in the eye sockets	<b>Gezer (Gexer)</b> , Palestine	Howard-Carter 1986: 308; Donkin 1998: 42
?late 2nd/ early 1st mil. BCE	Stone statuette of bird inlaid with a pearl, from a grave	<b>Luristan</b> , western Iran	Donkin 1998: 45;
1st mil BCE	“A number of pearls”	<b>al-Qusais</b> , Dubai, U.A.E.	al-Tikriti 1985: 17
late 7th c. BCE	Pearls ( <i>echte Perlen</i> ) from the Temple of Marduk, Babylon	<b>Babylon</b> , Central Iraq	Donkin 1998: 46

Table 6. (*cont.*)

Date	Summary and comments	Site	References
mid 1st mil BCE	4 irregularly-shaped pearls from Pot burial 16 (Qala'at al-Bahrain Period IVd/e)	<b>Qala'at al-Bahrain</b> , Bahrain	Højlund and Andersen 1997: 154-155
mid 1st mil BCE or later	A pearl said to have been found with a "later snake burial"	<b>Qala'at al-Bahrain</b> , Bahrain	Bibby 1970: 165
6th c. BCE	A single pearl from a burial, Mound IIIB, tomb 34	<b>Janussan</b> , Bahrain	Lombard and Salles 1984: 82-83
2nd half of 1st mil. BCE	A "gold earring adorned with pearls" from Kuyunjik, near Nineveh	<b>Kuyunjik</b> , Northern Iraq	Layard 1853: 595; Donkin 1998: 46; Howard-Carter 1986: 308, 310
6th c. BCE	Silver and gold pin with pearl(s) on the finial	<b>Ephesos</b> , Asia Minor (Anatolia)	Donkin 1998: 55
5th-4th c. BCE	244 pearls, some perforated	<b>Pasargadae</b> , Iran	Donkin 1998: 46
4th c. BCE	Pearls on an earring (NB may be included in Donkin's Pasargadae record, above)	<b>Pasargadae</b> , Iran	Moorey 1994: 93
4th c. BCE	400-500 pearls in a 3-strand necklace from Achaemenid sarcophagus	<b>Susa</b> , Iran	Howard-Carter 1986: 308; Donkin 1998: 46
3rd c. BCE	Gold-plated bronze pin crowned with two pearls	<b>Paphos</b> , Cyprus	Donkin 1998: 55
"Hellenistic"	Necklace of pearls and granulated gold beads	Near <b>Mytilene</b> , Lesbos, Asia Minor	Donkin 1998: 55
ca. 200 BCE	"a few small pearls"	<b>Taxila (Bhir)</b> , N. Pakistan	Donkin 1998: 58
late 2nd/1st c. BCE	Necklace from Tomb 3, Mound 1, with stone and glass paste beads, and pearls	<b>Shakhoura</b> , Bahrain	Lombard 1999: 199, no. 326
1st c. BCE/1st c. CE	Necklace from Tomb 56, Mound 2, with rock crystal, carnelian, glass paste and a pearl	<b>Shakhoura</b> , Bahrain	Lombard 1999: 201, no. 335
"BCE/CE"	"pearls"	<b>Taxila (Sirkap)</b> , N. Pakistan	Donkin 1998: 55
100 BCE-200 CE	Pearl earrings and pendant	<b>Beit Gibrin (Eleutheropolis)</b> , southern Judaea	Donkin 1998: 91



Table 6. (cont.)

Date	Summary and comments	Site	References
40-120 CE	Two pairs of pearl earrings ( <i>crotalia</i> type)	<b>Tell Umar (Seleucia)</b> , Iraq	Donkin 1998: 94
“early Roman”	Pearl necklace, pin and earring	<b>Caesarea Philippi and Hauran district</b> , S. Syria	Donkin 1998: 91
ca. 100 CE	Pearls from a necklace or pendant, from a tomb	<b>Jawan</b> , Saudi Arabia (near Qatif)	Donkin 1998: 94
1st-2nd c. CE	At least 41 pearls, pearl oysters and a lead diver’s weight	<b>ed-Dur</b> , Umm al-Quwain, U.A.E.	Potts 1998a: 54; Haerinck 2001
?2nd/3rd c. CE	“pearls”	<b>Taxila (Sirsukh)</b> , N. Pakistan	Donkin 1998: 58
2nd/3rd c. CE	Pearl earrings and necklace	<b>Antaradus (Tortosa)</b> , Syria	Donkin 1998: 91
3rd c. CE or later	Pearl-oyster shells ( <i>Pinctada margaritifera</i> ) found in Sasanian contexts	Iran, Mesopotamia, Georgia	Simpson 2003: 67
4th/5th c. CE	Perforated seed pearls from two graves	<b>Tell Mohammed ‘Arab</b> , Northern Iraq	Simpson 2003: 66
6th/7th c. CE	Knife hilt with seed pearls from a grave	<b>Tal-e Malyan</b> , Iran (Fars)	Simpson 2003: 66
“Sasanian”	Pearl earrings	<b>Siraf</b> , Iran	Donkin 1998: 94
Early/mid 14th c. CE	“One pearl” in Level 7	<b>Julfar al-Mataf</b> , Ras al-Khaimah, U.A.E.	Sasaki 1994: 7 (for dating see Kennet 2003: 115, Table 3)
15th/16th c.	Cache of pearls in a murex shell from “Palace of Uperi” trench	<b>Qala’at al-Bahrain</b> , Bahrain	Lombard 1999: 221, no. 367
Mid-Late Islamic	5 “pearl weights” from Qala’at al-Bahrain. May date to anywhere between 12th/13th to 17th c. CE	<b>Qala’at al-Bahrain</b> , Bahrain	Frifelt 2001: 146, 151; figs 304, 324. Højlund and Andersen 1994 fig. 1991
14th-17th century	6 seed pearls found by Iraqi expedition	<b>Julfar al-Nudud</b> , Ras al-Khaimah, U.A.E.	Hansman 1985: 94
Undated	Stone diver’s weights?	<b>al-Khor</b> , Qatar	unpublished
Undated	124 rock carvings of probable pearling vessels	<b>Jassasiyah</b> , Qatar	Facey 1987

Table 7: Site Frequency within each identifiable ceramic horizon. Note that there were also 38 sites which contained pottery compatible with either of the last two ceramic horizons (mainly non-diagnostic Julfar Ware sherds). These were excluded from the analysis.

<b>Ceramic Horizon Time Span</b>	<b>Years</b>	<b>Number of Identified Sites</b>	<b>“Sites Per Century”</b>
<b>Ubaid/Neolithic</b> 5500-4000 BCE	1500	5	0.33
		LACUNA	
<b>Bronze Age/Barbar</b> 2200-1600 BCE	600	5	0.83
		LACUNA	
<b>Iron II</b> 1100-600 BCE	500	3	0.60
		LACUNA	
<b>1st millennium CE</b> 0-1000 CE	1000	33	3.30
		LACUNA	
<b>13th-16th c. CE</b> 1200-1600 CE	400	9	2.25
<b>17th-20th c. CE</b> 1600-1970 CE	370	33	8.92

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