Proceedings of the Seminar for Arabian Studies 51 (2022): 169–182

Boats, horses, and moorings: maritime activities at al-Balīd in the medieval period

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Summary

The importance of the medieval city of al-Balīd and its harbour was mentioned in many different sources, and mirrored by a large number of finds and pottery that confirm a primary role of the port as a pivotal hub in Indian Ocean trade during the pre-modern Islamic period (tenth–fifteenth century AD). This paper will examine maritime activities at al-Balīd from a different perspective, combining recent data from the study of ship timbers discovered at the site with the archaeological record, along with evidence of possible harbour facilities.

The study of the ship timbers has provided invaluable information about the technology, size, material, type, and function of the watercraft involved in the trade at al-Balīd. The reuse of these timbers in a terrestrial context also alludes to a variety of activities carried out at the site, such as boatbuilding, maintenance, repair, and salvaging. Collectively, this data yields useful insights into the relationship between the different vessels operating at al-Balīd and the structure of the site itself, mainly in connection with one of the most lucrative commercial activities at the port city — the trade of Arabian horses.

Keywords*:* al-Balīd, medieval maritime trade, Indian Ocean watercraft, maritime activities, horse trade

Introduction

Al-Balīd is a monumental archaeological site located in the south-western coast of Oman, at the eastern edge of the modern city of Salalah (Fig. 1). The town was known as Ẓafār in medieval times. The date of the city's foundation is still matter of debate, but probably occurred after the tenth century AD (Pavan 2021). Sources and materials attest that al-Balīd/Ẓafār gained a leading role among the South Arabian coastal centres after the conquest of the Rasūlids in 1278, when the city became a pivotal centre for international trade across the Indian Ocean, as reported by Ibn al-Mujāwir (Smith 1985), Marco Polo (Yule 1871), and Ibn Baṭṭūṭah (1962: 383) in descriptions of the city during the thirteenth–fourteenth century. The most recent excavations, carried out between 2016 and 2020 at the citadel (*Husn* al-Balīd) (Fig. 1/B–C), revealed that the demise of the town occurred around the middle of the eighteenth century (Pavan et al. 2018; 2020). Historical sources often highlight the importance of the sea and activities connected to the sea in the Indian Ocean, particularly about the relationship between land (port-city) and sea. In the case of al-Balīd, the horse trade is often mentioned as one of the most lucrative activities carried out at the site, but extant texts lack details regarding the modalities and the agents involved in these activities. Moreover, local maritime activities, such as fishing and regional trade (short-distance trade), are often overlooked.

A large number of timbers, mostly consisting of the remains of sewn vessels, have been discovered at al-Balīd, providing rare evidence of medieval western Indian Ocean watercraft. The timbers add invaluable data to our extremely limited information regarding the role of these vessels as agents of trade, culture, and religion in the Indian Ocean littoral. They offer data about the size and function of the ships, and their 'second life' in al-Balīd's terrestrial context. They also provide insights into maritime technology and the modalities of al-Balīd's relationship with the sea, enabling speculation about maritime activities and trade dynamics at the site, including the trade in Arabian horses.

The al-Balīd timbers

Most of the timbers discovered at al-Balīd, especially during the works at the citadel carried out by Jansen

Figure 1. A. *A map showing the location of al-Balīd (image A. Ghidoni);* **B.** *an aerial view of the site and the citadel (*husn*);* **C.** *an aerial view highlighting the areas where the timbers were discovered (images Office of the Adviser to HM the Sultan for Cultural Affairs, Sultanate of Oman).*

(2015), Zarins and Newton (2017: 67–70), and finally by Pavan et al. (2018; 2020), are fragments of planking from vessels held together by sewing. The generic terms 'timbers' and 'planks' used in this paper always refer to identified hull planks, unless specified otherwise. These planks bear a striking similarity to the archaeological evidence from other sewn vessels discovered in the Indian Ocean, such as the ninth-century Belitung (Flecker 2000; 2010) and Phanom-Surin (Jumprom 2014; 2019; First Regional Office 2016) shipwrecks, the ship timbers from Quṣeir al-Qadīm (Blue 2006; Blue, Whitewright & Thomas 2011), and the nineteenth–twentieth-century sewn boats from the region (Chittick 1980; Cooper et al. 2020; Ghidoni 2021; Kentley 1985; 2003; Kentley & Gunaratne 1987; Lydekker 1919; Pâris 1843: pl. 8; Prados 1996; Prins 1982; Shaikh, Tripati & Shinde 2012; Varadarajan 1998; Vosmer 1997: 231–234).

Two timbers (BA0604128.73 and BA0604128.74) that feature a preserved section of sewing (Belfioretti & Vosmer 2010: 113; Ghidoni 2021: 226; Pavan et al. 2018: 227; 2020: 190–191) reveal the distinctive traits of western Indian Ocean sewn-plank construction technology (Fig. 2). These include the following:

- continuous sewing through holes located along each edge of the plank;
- the use of sewing cordage made of vegetal fibre, such as coir;
- the presence of a wadding, which is a caulking roll running longitudinally over the plank seams, generally inboard, and firmly compressed by the sewing cordage;
- rebates carved outboard where the stitches are recessed and protected against chafing;

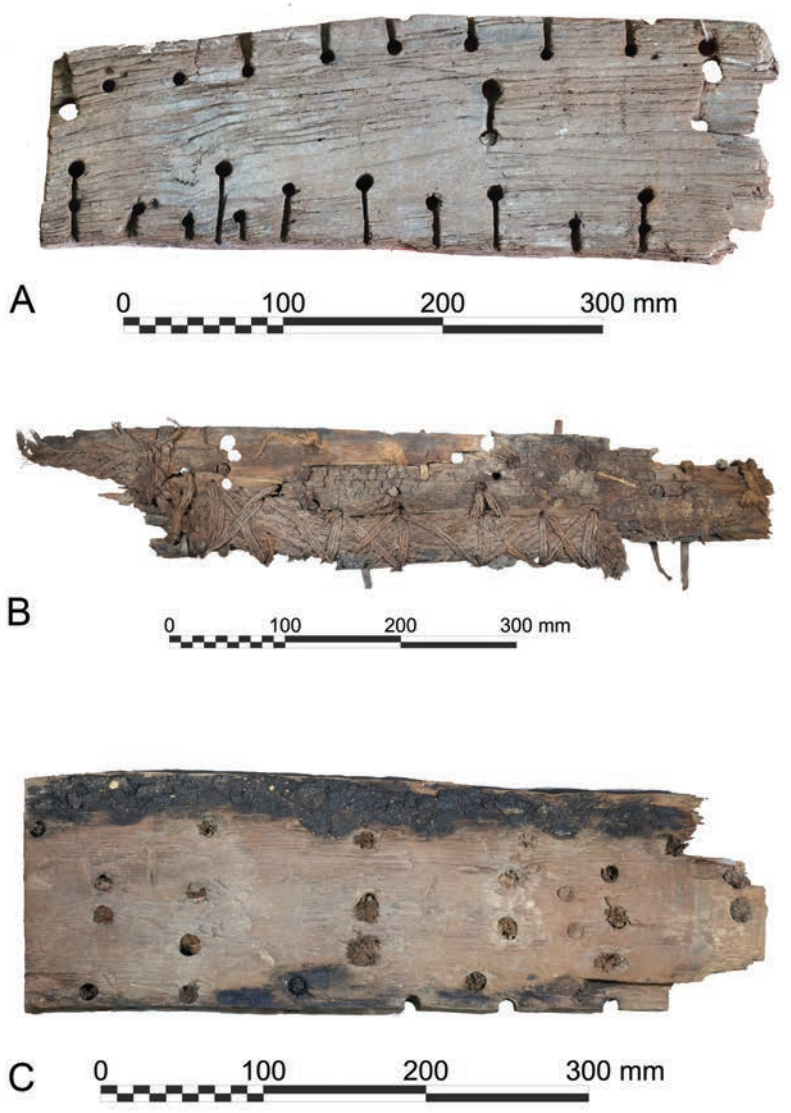


Figure 2. A. *A selection of timbers from al-Balīd showing the main features of sewn-plank construction: rebates where the stitches are recessed outboard and frame lashings in the centre of timber W068;* **B.** *a thick wadding made of fibre ropes and dowels on timber BA0604128.73;* **C.** *luting consisting of a bitumen amalgam near the edges of plank BA0604145.175 (images A. Ghidoni).*

- wooden plugs to watertight the sewing holes and lock the stitches in place;
- dowels driven obliquely from one side of the plank through the edge of the adjoining plank to facilitate their alignment during the construction, lock them in place during the sewing, and prevent their longitudinal sliding along their edges;
- luting, a sealing substance made of a bitumen compound, placed on the hull planks edges and seams to increase the hull water tightness; and
- frame lashing recessed on the outer surface of most of the hull planks.

Some of the timbers bear evidence of teredo (*Teredo navalis*) on their surface. The presence of these worm-like marine molluscs, which drill into wood and damage the hull of watercraft in tropical waters, further confirms the timbers' previous use in a maritime context.

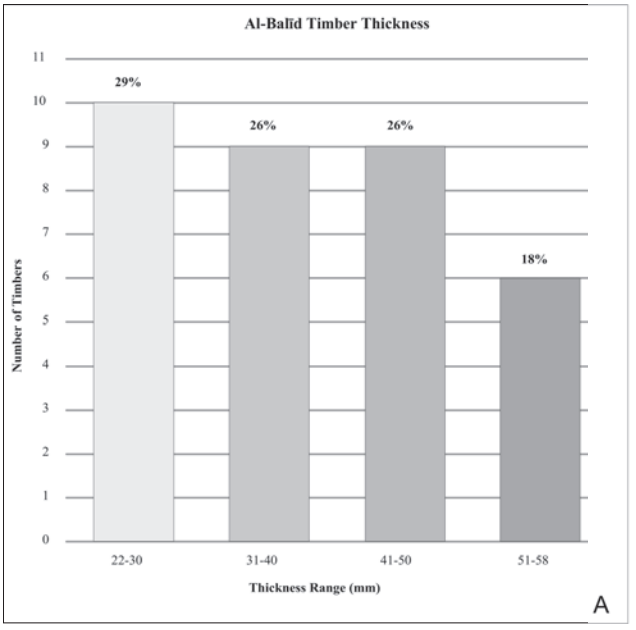
The date range of the timbers and the fact that they show different techniques, sizes, and materials, indicate that they belonged to different vessels visiting al-Balīd between the late tenth to the mid-fifteenth century (Ghidoni 2021: 228; Vosmer 2017: 199–200; 2019: 308–310; Belfioretti & Vosmer 2010: 114).

The evidence from the al-Balīd timbers raises two main research questions:

- what do these timbers tell us about western Indian Ocean vessels' size and function?
- what does the recycling of these timbers tell us about the boatbuilding and maritime activities at al-Balīd?

The size of the vessels

Unlike the remains of an even partially intact shipwreck, the al-Balīd timbers are scattered hull fragments of multiple vessels and, therefore, cannot provide us with information about the overall shape, cargo, propulsion, steering system, or crew of the vessels to which they once belonged. However, they offer useful insights into the size of the vessels that visited, or operated from, the port of al-Balīd during the medieval period.



VESSEL	LENGTH (m)	PLANK THICKNESS (mm)	REFERENCE
Yemeni ***sanbūq***	7–11	n/a (20?)	(Bowen 1952: 210; Prados 1996: 101-102)
East African ***mtepe***	15–20	n/a	(Hornell 1941: 55; Lydekker 1919: 91; Prins 1982: 89)
Omani ***kambārī***	9–12	15–25	(Vosmer 1997: 231; 2007: 330, 333; Weismann et al. 2019: 350-351)
Somali ***beden***	10	20	(Chittick 1980: 299-300)
Indian ***masula***	4.5–10	22	(Kentley 1985: 303, 311)
Iranian ***baggarā***	8-9	25	(Cooper *et al.* 2020: 9-14)
Indian ***revenchem vodem***	12	25	(Shaikh et al. 2012: 150)
Sri Lankan ***madel paruwa***	10	29	(Kentley and Gunaratne 1987: 35; Kentley 2003: 174)
Belitung wreck	18–22*	40	(Flecker 2000: 205, 209; Flecker 2010: 106)
Indian ***kettuvallam***	10.5	40–45	(Cooper et al. 2020: 9, 27)
Omani ***beden seyad***	11.2	45	(Ghidoni 2019: 347; Pāris 1843: plate 5)
Sri Lankan ***yathra dhoni***	15–21	50	(Hornell 1943: 43)
Phanom-Surin wreck	25–30*	70	(First Regional Office of Fine Arts 2016: 55)
***Estimated length**			B

Figure 3. A. *A chart showing the thickness distribution of the al-Balīd timbers;* B. *length and plank thickness of published sewn watercraft of the western Indian Ocean (images A. Ghidoni).*

Archaeological and ethnographic evidence from the Indian Ocean indicates that plank thickness is generally linked to the overall size of the watercraft, meaning that thicker hull planks usually correspond to larger and more seaworthy ships (Belfioretti & Vosmer 2010: 116).

The thickness of the al-Balīd timbers ranges between 22 and 58 mm (Fig. 3). A comparison between this data and that provided by the archaeological and ethnographic examples of sewn vessels of the Indian Ocean (Fig. 3) offers an opportunity to speculate about the size of ships from which these hull planks were removed, and results in the following observations.

Almost a third of the hull planks (29%; ten planks) have a thickness between 22 and 30 mm, pointing to relatively small vessels. This range appears to be the 'standard' thickness of sewn boats recorded in the Indian Ocean in the twentieth century ranging between 6 and 11 m in length (see Fig. 3). The best examples are three small sewn boats that share geographical proximity and strong similarities: the Omani *kambārī* (Weismann, Dziamski & Haar 2019; Vosmer 1997: 231–234; Alian 2006), the Yemeni *sanbūq* (Bowen 1952: 201–215; Prados 1996), and the Somali *beden* (Chittick 1980). The *kambārī* is a small double-ended vessel with straight and raked stem and stern, fastened with coir cordage and used in Dhofar, southern Oman, until the 1980s (Vosmer 1997: 231–234). *Kambārī* is a regional term for this boat (also called *sambuk* or *sanbūq)* that derives from *kambar* (also *qanbar*, *kunbār*, or *qinbār*), meaning coconut fibre cordage in local Jabbali dialect and clearly referring to its fastening material (Vosmer 1997: 231; Agius 2002: 79). The Yemeni *sanbūq* is related to the *kambārī*, with which it shares similar shape, size, construction method, and function. It was common along the south-east coast of Yemen, particularly east of al-Mukalla, where local maritime communities used it until the late 1990s (Prados 1996: 99). The *beden* is the third example of this type of sewn watercraft and were documented by Neville Chittick along the Somali coast west and south of Ra's ʿAsir in 1980 (Chittick 1980). Like the *kambārī* and *sanbūq*, they are small fishing vessels with a double-ended hull and raked stem and stern. These sewn boats from Oman, Yemen, and Somalia have almost identical shapes and sizes, and feature plank thicknesses ranging between 15 and 25 mm and lengths between 7 and 10 m. This evidence suggests that at least some of the 22–30 mm-thick hull planks discovered in al-Balīd might have previously belonged to boats not exceeding 12 m in length.

Nine hull planks measuring 31–40 mm in thickness, corresponding to 26% of the dataset, point instead to

medium-sized vessels. By comparison, the hull planks of the Belitung wreck measured 40 mm thick, and the overall length of the hull was estimated at 20–22 m (Flecker 2000: 205, 209; 2010: 106). Timbers with a thickness of 40 mm are frequent in the collection (five specimens, 15% of the dataset), perhaps suggesting that vessels with a similar size to that of the Belitung wreck were common at al-Balīd.

The remaining timbers of the dataset have a thickness ranging from 40 mm to almost 60 mm and point to considerably larger vessels. The hull planks of the ninth-century Phanom-Surin wreck, a sewn vessel discovered in Thailand, measure 70 mm in thickness. The vessel has a maximum width of 8 m, and despite not being excavated at the time of this paper, its massive keelson measuring 17 m suggests an estimated length of 25–30 m (First Regional Office 2016: 55; Vosmer 2017: 198). Hence, a significant number of al-Balīd timbers could have come from the hulls of large, ocean-going ships ranging in length between 20 and 30 m.

Functions of the vessels

The spectrum of vessel sizes implied by the al-Balīd timbers probably reflects a variety of maritime activities carried out by these vessels. Once again, ethnographic records from the region indicate that the size of a vessel is generally related to its function. Smaller boats are generally used near the coast, while large, heavily built vessels are more seaworthy and thus capable of long-distance sailing.

Small boats

It is likely that some of the smaller vessels sailing around the port would have looked like the *kambārī* from Dhofar (Fig. 4) and would have had similar uses (Vosmer 1997; Alian 2006; Weismann, Dziamski & Haar 2019). They could have been rowed or sailed along the coast for fishing, as was done in the region with sewn crafts until the 1980s, by using seine nets to catch sardines off the coast around Ṣalālah and Ṭāqah, southern Oman (Alian 2006: 10; Vosmer 1997: 231). Al-Balīd was renowned for exporting sardines (Zarins & Newton 2017: 73), which, as reported by Ibn Baṭṭūṭa (1929: 113) and Ibn al-Mujāwir (Smith 1985: 85), were also used as fodder for the horses to be exported to India, or as fertilizer. The high distribution of thinner hull planks, representing one third of the collection, suggests a large presence of these small vessels, probably used around the port and associated with this activity.

Small boats would have also been used for lightering, which was the main function of the *kambārī* in Dhofar (Vosmer 1997: 231). Due to the lack of proper harbour facilities in southern Oman until the 1970s, these sewn boats ferried goods and people back and forth from large cargo ships anchored offshore (Fig. 5). Ibn Baṭṭūṭa witnessed similar watercraft when he visited Ẓafār in the fourteenth century, stating that it was customary to send small vessels called *sumbuq* to the ships arriving at the port (Ibn Baṭṭūṭa 1962: 383). Being a large city-port with a rich record of imported goods, al-Balīd would have relied on many of these sewn boats for the loading and unloading of goods.

Medium-sized vessels

Medium-sized ships could have been used for fishing far from the coast in pelagic waters. Their size would have also made them suitable for transporting goods and people within medium-range distance, for example between the maritime centres located on the Arabian coast. However, as indicated by early twentieth-century records, 15–20 m sewn vessels could travel long distances. The District Commissioner of Lamu, Mr Mullins, reported by Hornell (1941: 62), remarks that East African *mtepe* from Faza, in the Lamu archipelago, could sail as far north as Aden and as far south as Lindi, in southern Tanzania. Sea craft of similar length, such as *badan*, *sanbūq*, and *baggarā/gharookuh* used to sail from the Gulf to East Africa (Facey 2005: 137; Hornell 1942: 18; Jewell 1976: 59–60) and even cross the Indian Ocean to southern India (Pâris 1843: 13–14). The *Jewel of Muscat*, a reconstruction of a medieval sewn cargo vessel, based on the ninth-century Belitung shipwreck and measuring 18 m in length (Fig. 6), successfully crossed the Indian Ocean in a 3800-nautical mile journey from Oman to Singapore in 2010 (Staples 2013; Vosmer 2010; Vosmer et al. 2011).

Another maritime activity associated with medium-sized vessels could have been to transport pilgrims along the last stretch of their Hajj through the Red Sea. Historical sources report that the Red Sea was particularly hazardous for large ships, due to its numerous shallow

Figure 4. *A* kambārī *(also known as sewn* sanbūq*) on display at the al-Balīd Archaeological Park, Salalah (image A. Ghidoni).*

Figure 5. *A* kambārī *being used to unload cargo from a ship anchored off Salalah, Oman (photograph courtesy M. Kaplan).*

reefs and unpredictable weather conditions (Ibn Baṭṭūṭa 1962: 364). Pilgrims undertaking the Hajj via the Indian Ocean were often transferred into smaller sewn boats called *jalba* (1962: 361) that operated along the coasts of Yemen, Oman, and the Dahlak Islands of Eritrea (Agius 2007: 219; 2013: 86), and which conveyed them along the final leg of their journey to Jeddah, the port of Mecca. Al-Balīd was also a pilgrim centre and it is likely that Muslim pilgrims stopped there on their journey to other holy places in Arabia (Zarins & Newton 2017: 66). Lastly, medium-sized boats could also have been used for pearling. Although this activity was carried out predominantly in the Gulf, al-Bīrūni, reported by Carter (2012: 41), informs us about the presence of pearl banks near Shihr, Yemen, not too far from al-Balīd.

Figure 6. *The* Jewel of Muscat*, based on the ninth-century sewn shipwreck* Belitung*, sailing off the coast of Muscat, Oman (image A. Ghidoni).*

Large ships

The thickest hull planks in the al-Balīd dataset probably once belonged to large, ocean-going cargo vessels. References to the size of Indian Ocean ships are usually very generic, and emerge mostly after the medieval period in the writings of Europeans who commonly described ship sizes according to estimated cargo capacity rather than length (Agius 2007: 218). These cargo ships probably carried most of the imported goods, such as ceramics, that were discovered in large numbers at the site (Pavan et al. 2020: 180–189).

Portuguese accounts of the sixteenth century remark on large trading ships in East Africa ports, such as Mombasa (Prins 1986: 67) and Mozambique (Ravenstein 1898: 26), and southern India, in Kannur (Stanley 1869: 240–242) and Calicut (Ravenstein 1898: 128). Gujarati ships are often described as being of considerable size (Cortesão 1944: 45). Ubiquitous in the Indian Ocean (Lewis 1973: 243), they generally carried 300–600 tons but could reach up to 800 tons and have a crew of 1000 men (Manguin 2012: 605–606; Moreland 1939: 176).

The presence of large watercraft at al-Balīd is also indicated by the discovery of several large stone anchors offshore (Newton & Zarins 2010: 259–260) (Fig. 7). These were probably mooring anchors (Käpitan 1994) and their size and weight provide some indication of the dimensions of the ships that used them. Based on an examination of thirty stone anchors, mostly from Qalhāt, Oman, Vosmer estimated that ships exceeding 100 metric tonnes were in common use in the Indian Ocean (1999: 259, fig. 12).

Lastly, these massive ships would probably have been employed in the horse trade. Al-Balīd was one of the main centres involved in the exporting of Arab horses to India, as remarked by Ibn Baṭṭūṭa and Marco Polo (Ibn Baṭṭūṭa 1929: 113; Yule 1871: 381). Although very little is known about the modalities of this exchange, Albuquerque's (1875: 66) description of a 200-ton merchantman from Aden loading horses in Qalhāt confirms the use of large ships for this enterprise. We also have Chinese sources in the thirteenth–fourteenth century commenting on these 'horse boats', sewn with coir fibre and of a greater capacity than a typical trading vessel (Li 1989: 283). A painted panel in the Narumpunatasāmi temple of Tiruppudaimarudur, southern India, provides pictorial evidence of one of these vessels in the sixteenth century (Deloche 2009: 553, 556, figs 2, 6). Unfortunately, its sketchy and stylized nature makes it difficult to determine the ship's size with accuracy, but the presence of six horses in the hold hints that it was a large ship.

Figure 7. *Large stone anchors discovered at al-Balīd, on display at the site's Archaeological Park, Salalah, Oman (image A. Ghidoni).*

Boatbuilding activities

Data from ethnographic research on sewn boats, as well as the archaeological record and experimental archaeology projects, provide valuable analogies for interpreting boatbuilders' interventions on the al-Balīd timbers. The main activity indicated by the timbers is certainly related to the breakdown and dismantling of vessels. Medieval boatbuilders and carpenters would have collected spare boat parts either to repair other vessels or recycle them as architectural elements in the citadel and other buildings. The number of hull planks discovered in just a small area of the site suggests that this would have been an essential occupation at al-Balīd.

Boat construction is another activity suggested by the timbers. The site was heavily dependent on the sea, strongly suggesting boatbuilding at its premises. Most of the vessels built at al-Balīd would have probably been the small watercraft inferred by the thinner hull planks of the collection, and which were used for fishing and lightering. However, since the site was actively involved in the Indian Ocean maritime trade network, it is likely that at least some of the thicker timbers of the dataset would belong to medium-sized to large ships built at the site.

The al-Balīd timbers also allude to ship maintenance activities. Their sewing pattern is not always easy to identify, and unusual hole arrangements and inconsistencies in their diameter and spacing occur on several hull planks indicating, in most cases, multiple repairs (Fig. 8). Experimental archaeology projects on medieval Indian Ocean sewn vessels, such as the *Jewel of Muscat* (Vosmer 2010; Vosmer et al. 2011) and *al-Hariri* boats (Staples 2019), showed that a common risk in sewn-plank construction is that the timber would sometimes split along the line of the sewing holes (Vosmer 2010: 130; 2019: 304). This problem is particularly evident in timbers with fine, straight grain, such as teak. Staggered sewing holes, and sometimes confusing hole patterns in many of the al-Balīd timbers might indicate the shipwright's attempt to prevent this problem (Fig. 8/A,C).

One plank from al-Balīd (Wo56-Wo60-Wo73) shows that boatbuilders repaired a large crack by sewing it as if it were the seam between two hull planks (Fig. 8/B). The splitting and cracking of the wood would have been a particularly common occurrence since many al-Balīd timbers show additional holes drilled next to the sewing holes to reinforce the sewing.

The evidence of repair in the timbers does not necessarily mean that all the timbers were repaired in al-Balīd. It is however plausible that at least some of the repairs were carried out at the site. Al-Balīd was probably visited by a large number of vessels, and regular mending would have been a crucial requirement for the crews of Indian Ocean ships to keep their vessels sound and capable of undertaking long voyages in relative safety. Sewn boats need constant maintenance because

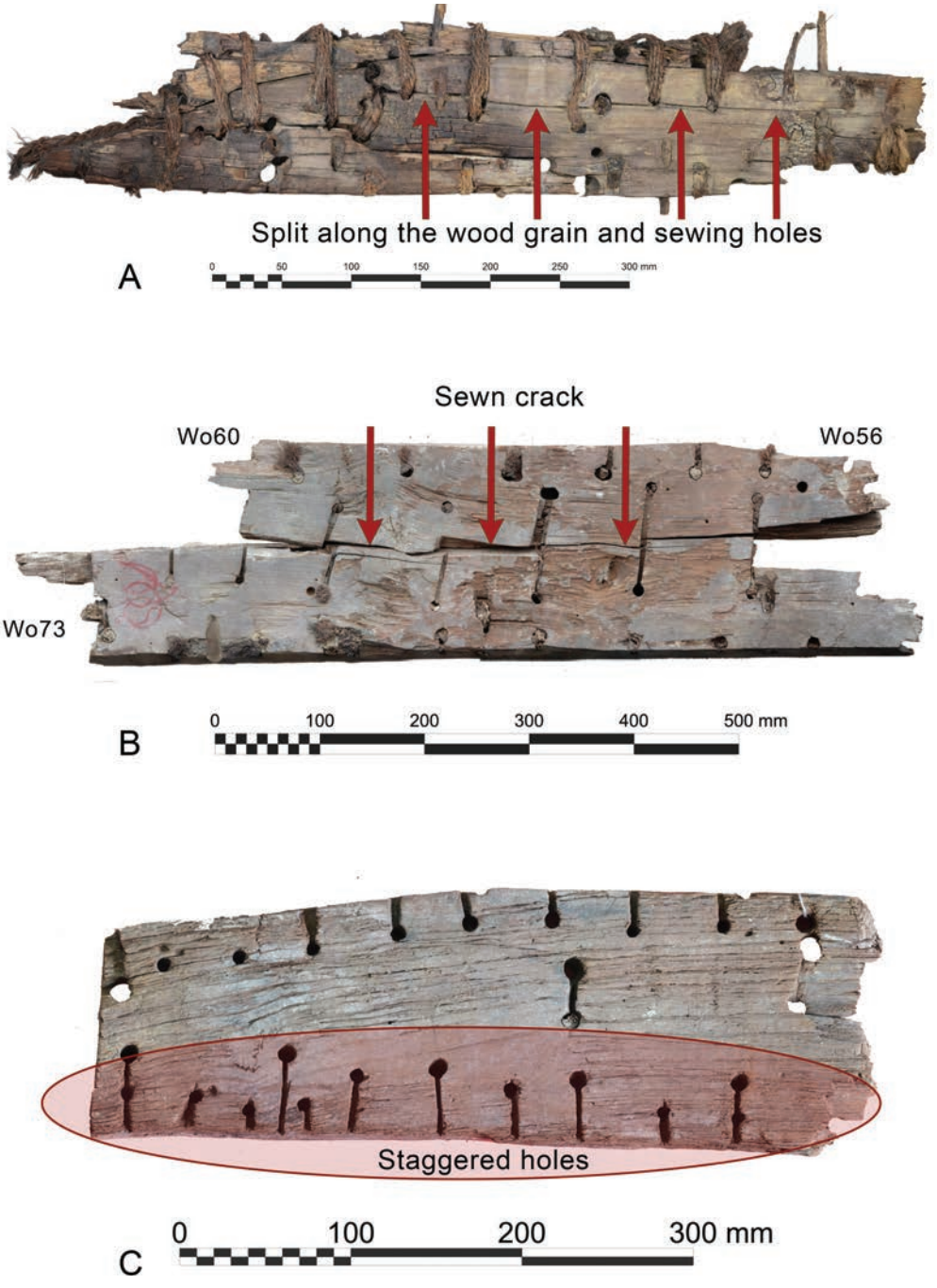


Figure 8. *Al-Balīd timbers showing the main issues of sewn-plank construction:* **A.** *timber BA0604128.73 split along the wood grain and sewing holes;* **B.** *a large longitudinal crack was sewn on plank Wo56-Wo60-Wo73;* **C.** *holes with different spacing and distance from the edge on plank Wo68, perhaps to prevent the plank from splitting along the wood grain or the line of sewing holes (images A. Ghidoni).*

hull planks can crack and split, and their stitching has to be replaced regularly.

Al-Balīd's boatbuilding structures

There is no definitive evidence of boatyard facilities or presence of tools associated with boat construction, that could point to an area of the site where these activities were carried out. Historical sources do not mention shipbuilding or maritime structures when describing al-Balīd. Newton and Zarins, who directed the excavation at al-Balīd between 2005 and 2012, have suggested that a large complex located in the south-eastern limit of the site could be interpreted as a drydock (2017: 84) (Figs 1/B & 9). This complex, excavated in 2010–2011, comprised a 'customs annex area' surrounded by a wall and associated with the south-east gate of the city, a stone jetty extending 40 m from the southern city wall, and a 'sea wall' separating the complex from the eastern branch of the lagoon (Newton & Zarins 2017: 77–87).

Regularly spaced holes penetrate each side of the jetty at its base, probably to allow water to pass through, between the annex and the west side of the jetty. People at al-Balīd could have used the tide variations to let water in and out of the area east of the jetty, by closing these holes with wooden poles, as in a drydock (Newton & Zarins 2017: 84). If confirmed, this would be one of the earliest records of a drydock (Barker 1999: 318).

The presence of such an elaborate system in al-Balīd could be explained by the fact that, unlike the nearby coastal towns of Mirbāṭ to the east and Raysūt to the west, the city lacked a protected natural harbour to shelter or haul boats out during stormy seas. A drydock would have allowed the boatbuilders of the city to repair, build, and even protect vessels during the summer monsoon when the sea was too rough and dangerous to anchor watercraft offshore.

It is possible, therefore, that the repair, maintenance, breakdown and, perhaps, building of vessels at al-Balīd could have been done in this area. However, the assumed drydock appears to be rather narrow, and perhaps too shallow to allow the entrance of the massive cargo ships implied by the thickest al-Balīd timbers. Instead, it would have worked well with small- to medium-sized boats, which would have accessed it easily during high tide.

Jetty and horse trading

Newton and Zarins have also suggested that the jetty in the south-east complex of the city could have been

Figure 9. A. *The south-east complex of al-Balīd (image Office of the Adviser to HM the Sultan for Cultural Affairs, Sultanate of Oman);* **B.** *southern end of the eastern jetty, showing the stone slabs with circular holes (image A. Ghidoni).*

associated with the horse trade in al-Balīd (2017: 83). It is 42 m long and is one of three similar structures connected to the site's southern wall, extending towards the ocean. Heavily built with stone blocks, it acted primarily as a breakwater to protect the annex area and the entrance of the east arm of the lagoon (Fig. 9).

The southern end of the jetty is associated with several large rectangular stone slabs (Fig. 9/B). These were probably the foundations of a wooden pier, as indicated by the presence of large holes carved on their surface, and which still bear some traces of wood (Newton & Zarins 2017: 82). According to Newton and Zarins the structure would also have served as a loading ramp, as is suggested by the presence of a walkway connected to its northern tip (2017: 83). The wooden pier could have extended into the sea beyond the surf, which is heavy along this coast, thus allowing the safe loading of horses from the site into the holds of large cargo ships bound for India.

As the textual sources, archaeological evidence, and recent records from the region indicate, the loading and unloading of goods was carried out by small lightering vessels rowed back and forth from ships anchored offshore and the beach. However, this operation would have been extremely challenging and dangerous for livestock. Loading horses into small vessels launched into the waves would have certainly posed a high risk for their safety. Consequently, a ramp, such as the one described by Newton and Zarins, would have been a much safer choice.

However, Albuquerque (1875: 71), who visited Quriyat, north-east Oman, in the sixteenth century, described the city as '... an entrepôt of many ships [which come to export dates of which both in the town and neighbouring country there is abundance]; but because the harbour is rather rocky, and the sea runs with a strong current, they do not export horses, although many are bred in the land.'

Albuquerque's comment is rather vague and could lead to two different interpretations. The first is that the presence of reefs and strong currents in the harbour would have made it dangerous for small boats to load horses safely and transport them to the larger vessels anchored offshore. Alternatively, the statement might suggest that the conditions of the harbour were too dangerous for the horses themselves, perhaps alluding to the practice of letting the horses swim to the trade ships rather than being ferried aboard small watercraft or being loaded via piers and docks. For example, in more recent times horses were sometimes disembarked by letting them jump off the ship and swim to shore. In this case, perhaps, the horses could have been led into the sea towards the cargo ships through the safe waters of the lagoon, while the jetty would have served as a breakwater to protect its entrance and keep it open and clean. However, our information on this topic is still very limited and these are just possible interpretations. Unfortunately, historical sources make no mention of the modalities of horse loading or of the maritime structures at al-Balīd/Ẓafār.

Conclusion

To conclude, evidence from the al-Balīd timbers indicates that the town featured many watercraft in a wide variety of sizes and functions — an observation that is crucial for the study of Indian Ocean boatbuilding in the middle Islamic period. It also corroborates the few textual accounts that mention vessels of various sizes, and generally provides valuable insights into a topic about which the historical accounts provide scant detail. This study of the al-Balīd timbers is also particularly relevant because, unlike the descriptions made by Europeans from the sixteenth century onwards, the dates of the al-Balīd material, which range between the tenth and fifteenth centuries, provide some of the earliest information we have about the potential dimensions of Indian Ocean ships. Thus, the data from al-Balīd offers us a unique and hitherto unavailable glimpse into the various maritime activities carried out at this vital port and, more generally, into the broader, complex world of Indian Ocean trade during the medieval period.

Acknowledgements

We are grateful to H.E. Abdul-Aziz bin Mohammed Al-Rowas, former Adviser to His Majesty the Sultan for Cultural Affairs for providing the opportunity to conduct archaeological investigations at al-Balīd and to study the timbers, and to all his staff, particularly Dr Said Al-Salmi and Hassan Al-Jaberi for their support in Muscat, and to Ghanem Al-Shanfari and Ali Al-Kathiri for their assistance at the Museum of Frankincense Land in Salalah, where the timbers are stored. Fieldwork was carried out with the

collaboration of Mohammed Al-Jahfali, Said Al-Amri, and Abdul Rahman Al- Mashani. We are also grateful to the Ministry of Heritage and Tourism, Sultanate of Oman, for continuing to support the project. We would like to thank IASA (International Association for the Study of Arabia, former British Foundation for the Study of Arabia) and the Barakat Trust for providing financial support to the research on the timbers with the Small Research Grant and the ṢADAQA JĀRIYA grant. Lastly, we offer our sincere thanks to Robert Jackson for spending his precious time on proofreading this paper.

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