

Notes

The Earliest Known Logboats of China

Reviews of the earliest archaeological evidence of nautical equipment have listed paddles and logboats from western Europe, Japan and Nigeria (Bednarik, 1997, 1999, 2003, 2014). Most of these finds are from various parts of Europe, and no very early examples have been reported from China in the international literature (McGrail, 2004: 352–4, 2015: 108–12). These discoveries include the mesolithic paddles found in peatbogs at Holmgaard (Denmark) and Star Carr (England) (McGrail, 1991). The Star Carr remains date from about 9500 years bp (Clark, 1971: 177). The most ancient boats currently known are the logboats from several sites: one boat, about 3 m long, from the peat of Pesse (Holland), which is 8265 ± 275 years old according to its now calibrated radiocarbon date (Van Zeist, 1957); one from Noyen-sur-Seine (France), at 7960 ± 100 bp; and another from Lystrup 1 (Denmark), at 6110 ± 100 BP (Arnold, 1996). A fragment of a logboat from Lough Neagh in Northern Ireland has been attributed to the 8th millennium bp (Callaghan and Scarre, 2009). The logboat excavated at La Marmotta on Lake Bracciano near Rome is of the late 7th millennium bp, coming from a lacustrine setting (Fuggazzola Delpino and Mineo, 1995).

Other remains of logboats, reported from the Americas, Arabia, China and Southeast Asia are considered to be more recent than these finds, that is from the late Holocene (McGrail, 2010). Further discoveries of wooden paddles from that period have been reported from three sites in northern Germany: Duvensee, Gettorf and Friesack. A worked reindeer antler from Husum, Schleswig-Holstein, Germany, however, may be a boat rib of a skin-boat of the Ahrensburgian, an Epipaleolithic tool tradition (Ellmers, 1980); it is thought to be in the order of 10,500 years old. Beginning with the mid Holocene, finds of boats and other navigational equipment become more common, particularly with evidence from Pharaonic Egypt (Ward, 2009). For comparison, in Japan the five paddles and a 6 m-long Early Jomon logboat from Torihama are 6000–5500 years old (Morikawa and Hashimoto, 1994), and the six paddles and partial logboat from Kamo date from about 5100 bp (Matsomoto *et al.*, 1952). At Dufuna in the Chad basin of western Africa, however, uncalibrated radiocarbon dates of 7670 ± 110 and 7264 ± 55 years bp have been obtained from a logboat, almost matching the oldest known in Europe (Breunig, 1996).

Like so much of the great wealth of archaeological information available from China, the following three early logboats from that country (Fig. 1) have so far only found fleeting mention in Chinese publications, and have thus remained unknown to Western researchers.

Kuahuqiao site

The Kuahuqiao site is located in Xiaoshan District, Hangzhou City, Zhejiang Province. In November 2002, a logboat was found in mud at a depth of 5 m, close to the dry lakeshore to the south-east of Kuahuqiao village during an archaeological salvage excavation (Zhejiang Provincial Institute of Cultural Relics and Archaeology, 2004) (Figs 2 and 3). The logboat was reported to have been secured by wooden stakes in its berth and surrounded by other wooden tools and some stone tools such as adzes and axes (Fig. 4). Wooden paddles were also located (Fig. 5). It appears that this area might have been a workshop for the manufacture and repair of boats. The excavators conjecture that the boat was abandoned on dry land.

One end of the logboat had previously been damaged by digging for clay for the nearby brick factory, while the other end remains well preserved (Fig. 6). The current length of the boat is 5.6 m, with what has been interpreted as a 1 m wide outrigger. However, this is merely an opinion and no clear evidence of an outrigger is reported (Jiang, 2014: 86–87). The presumed bow is

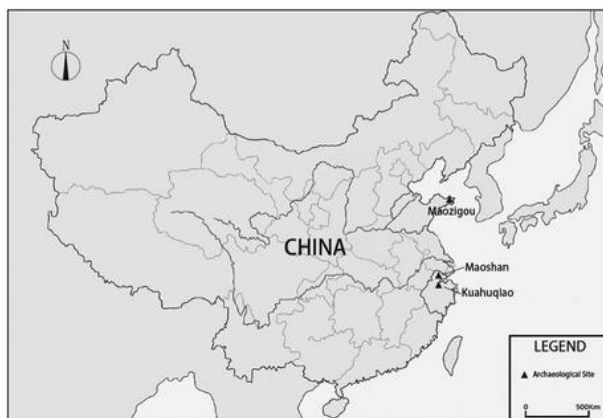


Figure 1. Map of China showing the three find sites of the logboats described here. (Jin Anni)



Figure 2. *a)* The logboat from Kuahuqiao site, c.7700 years old; *b)* detail of the presumed bow of the Kuahuqiao boat. *c)* interior floor of the Kuahuqiao boat, showing charring of the wood. (All courtesy of Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

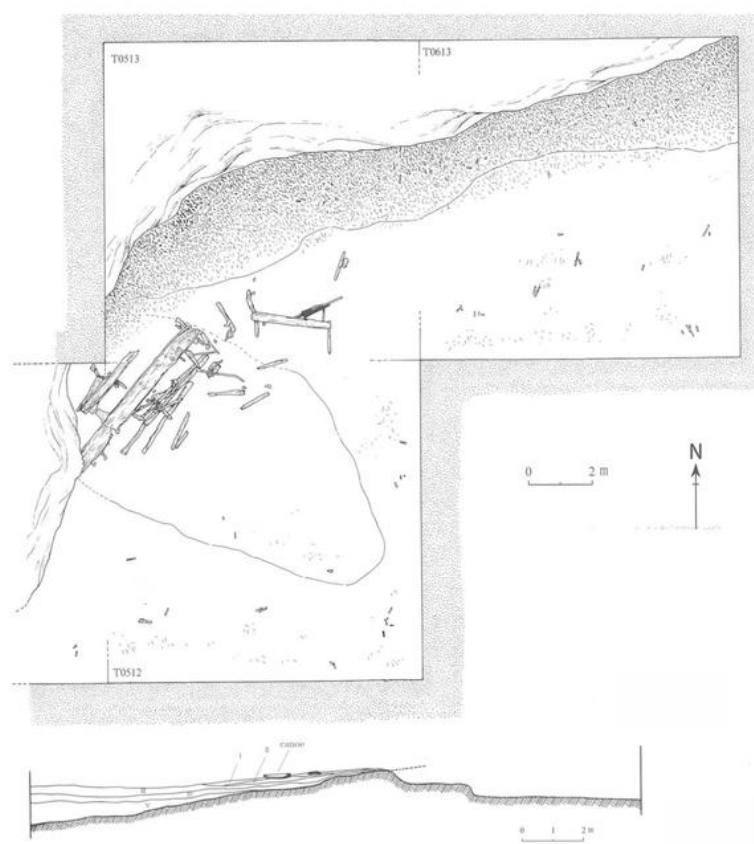


Figure 3. Context of the logboat from the Kuahuqiao site, showing the locations of wooden stakes and tools. (Courtesy of Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

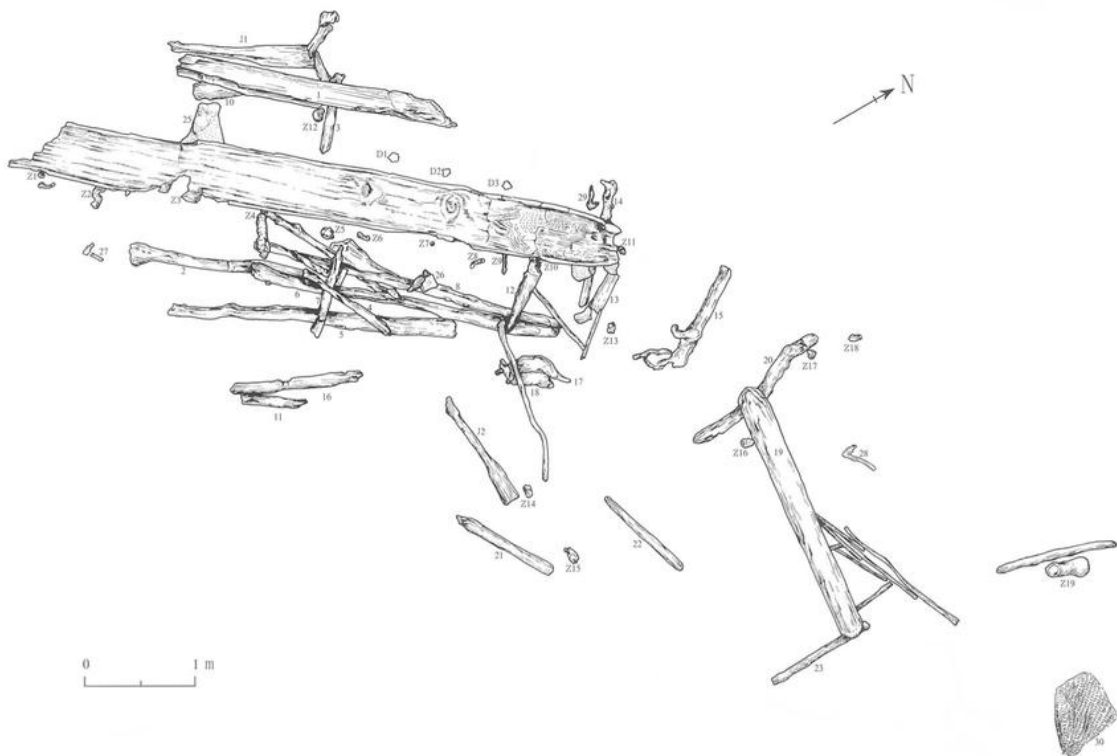


Figure 4. Site plan of the Kuahuqiao excavation, and section of the sediments. (Courtesy of Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

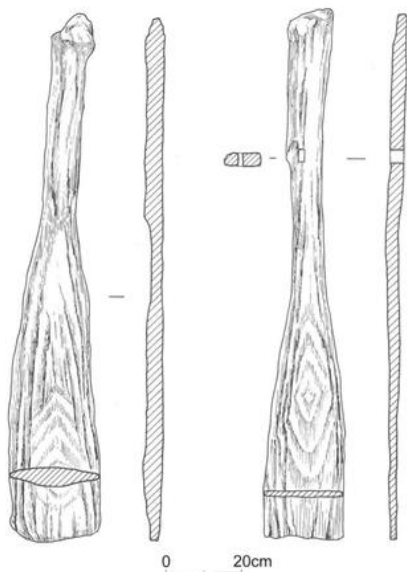


Figure 5. Two paddles found with the Kuahuqiao logboat. (Courtesy of Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

0.29 m wide and the hull is 0.52 m wide. The body of the boat has parallel sides and elevation and is rounded in transverse section. The maximum depth of the hull is 0.15 m and the thickness of the bottom averages

25 mm. The surfaces of the hull, both inside and outside, are very smooth. This implies that the logboat had either been used for a long period or had been very well polished. It has also been suggested that some parts of the interior surface of the hull were burnt, which has led to the conjecture that burning might have been a method of making logboats at that time (Fig. 2c).

According to radiocarbon dating results provided by Peking University and the Institute of Archaeology of the Chinese Academy of Social Sciences, the logboat is in the order of 7500–8000 years old (He 2012; Jiang and Wei, 2013; Jiang, 2014: 80) (Table 1). Three wood samples from the vessel have yielded results of 7070 ± 155 years BP (BK03006, cal. to 6070–5770 BCE at 1σ), 7055 ± 90 BP (BK03007, cal. 6010–5830 BCE) and 6991 ± 50 (ZK3173) respectively (Jiang, 2014). On the basis of the corresponding stratigraphic analysis the age of the logboat can be narrowed down to a range of 7600–7700 years old. The boat and paddles are now conserved in Kuahuqiao Museum, Hangzhou City, Zhejiang Province.

Maoshan site

The Maoshan site is located in Linping Subdistrict, Yuhang District, Hangzhou City, Zhejiang Province. In October 2008, the Institute of Archaeology of Zhejiang Province found some remains of pre-Historic agriculture during an archaeological survey at

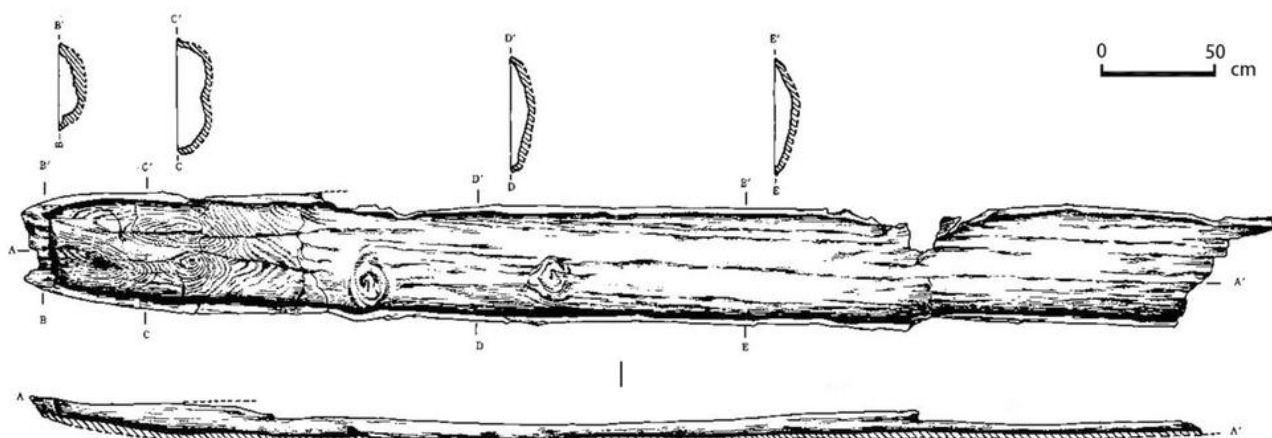


Figure 6. Drawing and sections of the Kuahuqiao logboat. (Courtesy of Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

Maoshan. In July 2009 it launched an excavation, the first phase of which was completed in January 2010. A second and third excavation campaign followed. The second phase, from February 2010 to January 2011, led to the discovery of a complete logboat with pointed bow and squared stern in the stratum of the mid Liangzhu culture within the eastern part of the site (Fig. 7). According to Zhao Ye (2012), the canoe was found on the eastern bank of G7 (ditch No. 7) in the eastern part of the site, and the author conjectures that it was abandoned on dry land. The logboat is 7.35 m long, 0.45 m wide, 0.23 m deep, 0.02 m thick, and was made of an entire trunk of Masson's pine (*Pinus massoniana*). It is partially damaged (Zhao, 2012). Compared with the logboat of Kuahuqiao, the one from Maoshan is much more slender and better preserved.

The Liangzhu culture was the last Neolithic jade tradition in the Yangtze River delta and is assigned an age between 3400 and 2250 years BCE. Although some wooden paddles had been reported from the site before, this was the first time an entire boat was discovered in a site of the Liangzhu culture. In May 2011, the logboat was transferred to Zhejiang Provincial Museum for conservation and further recording.

Maozigou site

The Maozigou site is near Songguojia village, Longxü Island, Rongcheng County, Jiaodong Peninsula. In September 1982, the Institute of Archaeology of Shandong Province found a logboat 4 m below present ground level, at Maizigou to the south-west of Songguojia village (Fig. 8). The logboat was found by local villagers when they were digging a pool at Maozigou, a basin about 1 km from their village (Wang, 1987). The boat is well preserved, except for damage to its right side. It is 3.9 m long and the maximum depth of the interior is 0.15 m. The prow is 0.60 m wide and 0.18 m high, the hull is 0.74 m wide

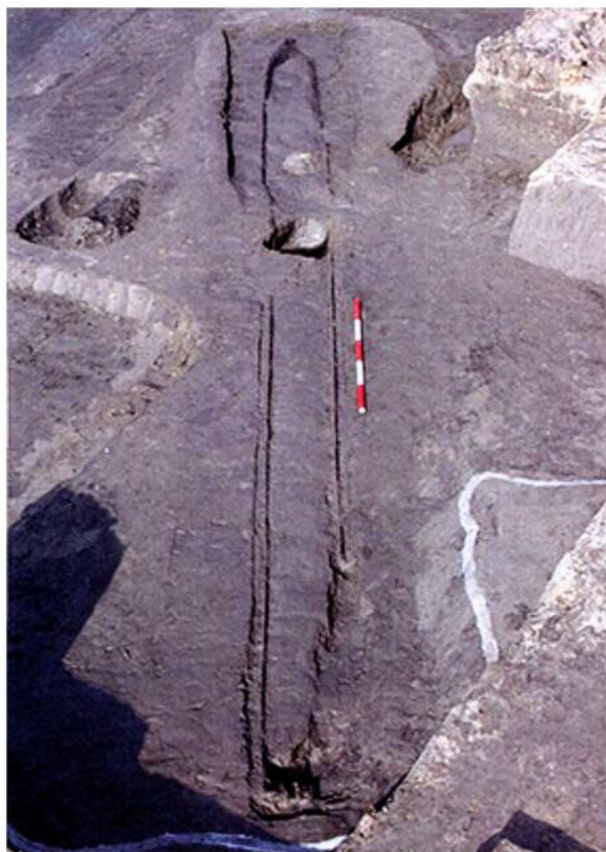


Figure 7. The logboat in Maoshan site during excavation in 2009, probably about 4500 years old. (Courtesy of Zhao Ye, 2012)

and 0.24 m high, and the stern is 0.70 m wide and 0.30 m high. There are two low bulkheads that divide the logboat into three sections: the front section is 0.84 m long, the mid section is 1.3 m long and the back section is 1 m long (Wang, 1987; Guo, 2014).

Table 1. Radiocarbon analysis results of the Kuahuqiao logboat (Zhejiang Provincial Institute of Cultural Relics and Archaeology, Xiaoshan Museum, 2004)

Serial No.	Material	¹⁴ C age (BP)	Chronological calibration age (BCE)		Laboratories
			1σ (68.2%)	2σ (95.4%)	
BK2003006	Hull of logboat	7070 ± 155	6070–5770 (67.2%) 5760–5750 (1.0%)	6250–5650 (95.4%)	Peking Univ.
BK2003007	Wood	7055 ± 90	6010–5830 (65.6%) 5820–5810 (2.6%)	6080–5730 (95.4%)	Peking Univ.
ZK3173	Hull of logboat	6991 ± 50	5980–5950 (10.2%) 5920–5800 (10.2%)	5990–5940 (15.8%) 5930–5740 (79.6%)	Arch. Inst., Chinese Acad. of Soc. Sciences

Half-life period: 5568 years; BP refers to 1950.

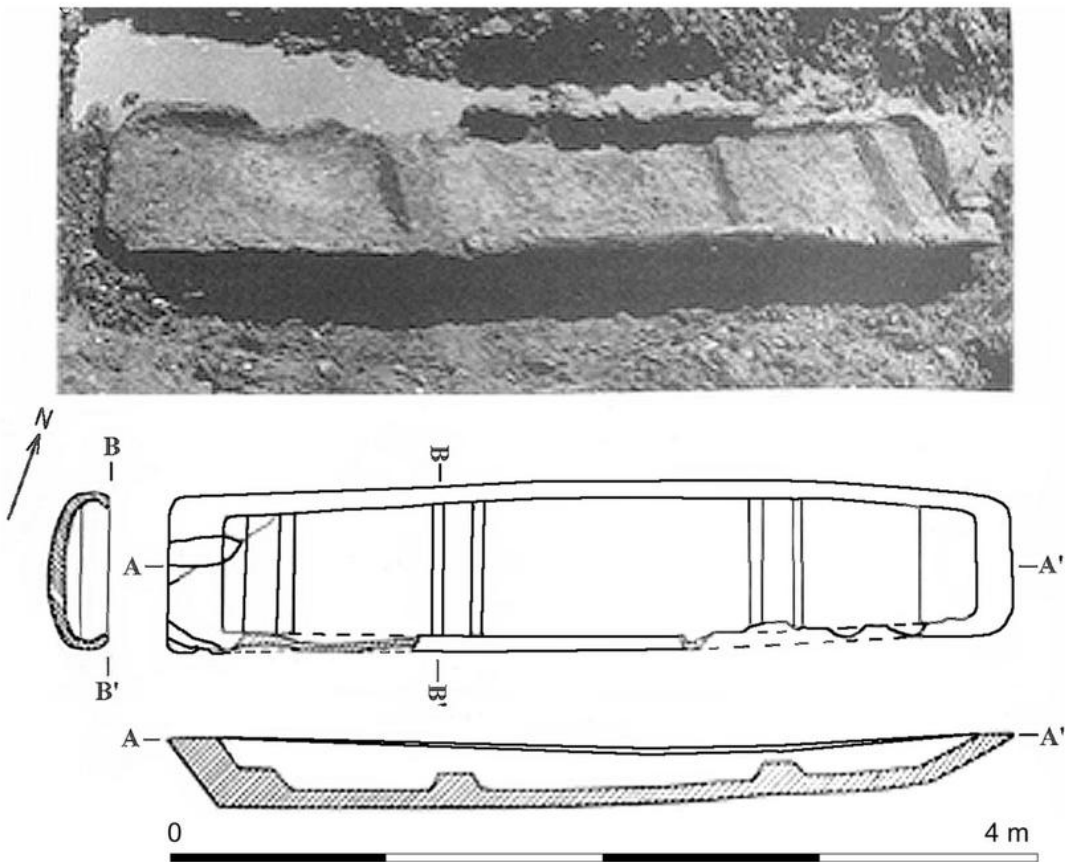


Figure 8. The logboat from Maozigou, probably in the order of 3000 years old. (Courtesy of Wang Yongbo, 1987)

The boat is made of a hollowed-out log. The hull has convex sides that would serve to increase the buoyancy while decreasing the resistance. Because the surface of the boat is eroded, no traces of fire or tools can be observed. However, based on its workmanship, this logboat is thought to have been made with metal tools.

According to the result of stratigraphic analysis, the age estimate of the relevant marine deposit layer of the site is 3800–3000 years bp. Therefore the age of the logboat should be assumed to be no later than the

Shang (1556?–1046 BCE) and Zhou Periods (1046–256 BCE). The present location of the remains is unknown.

Summary

The specimen from Kuahuqiao is only a few hundred years more recent than the currently oldest such find in the world, the Pesse logboat from Holland. It is almost the same age as the French find from Noyen-sur-Seine, and probably roughly matches in age those from Lough

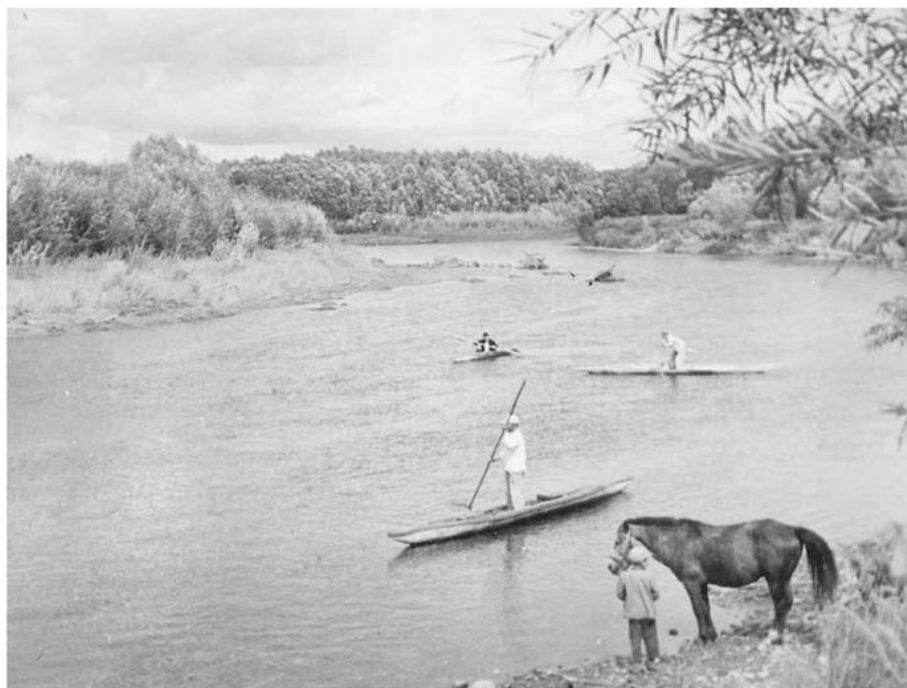


Figure 9. Historical use of canoes in Yunnan Province, date unknown. (Courtesy of Li Zhiyuan)

Neagh in Northern Ireland and Dufuna in Nigeria. This sample of five logboats demonstrates that such relatively advanced vessels were in use in eastern Asia, western Europe and western Africa before the advent of Neolithic technologies, in the 6th and 7th millennia BCE.

A second Chinese find, from Maoshan in Zhejiang Province, is of Neolithic age, and a third logboat from China, from Maozigou, appears to date from the late Bronze Age. The largely complete three logboats from China are a useful addition to the world literature on archaeologically recovered early watercraft. It is to be emphasized, however, that alongside logboats, it can be safely assumed that bamboo rafts were also in service throughout this time. Indeed, they are thought to have been in use for hundreds of millennia, including in

maritime colonization events (Bednarik, 2014). The prospects of discovering the remains of such rafts are, however, minute, especially along maritime coasts, due to the significant changes in sea-level during the Pleistocene. Boats resembling the logboats (as well as bamboo rafts) are still in use today in inland navigation in China (Fig. 9).

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New Evidence of the Shipsheds Built by Evagoras at Salamis, Cyprus

This note summarizes the importance of the harbour site at Salamis, Cyprus, and provides new photographic evidence of the structure and location of the remains of the shipsheds that Evagoras built at Salamis naval harbour. It establishes the position of the north-east corner of the city wall that separated harbour from city, supported by an 18th-century sketch map of the city of Salamis.

The naval harbour that King Evagoras had built c.410–400 BC for his fleet of *triremes* at Salamis, for which we have historical evidence, is important to us today for two main reasons. Firstly, it is important historically because its construction provides a vivid illustration of the three-cornered power struggle that was taking place in the Mediterranean between Athens, Sparta and the Persian Empire. Evagoras, whose ambition it was to unify Cyprus under his command, cultivated the friendship of the Athenians. According to the mythology of the time, Evagoras could claim ancestry from King Telamon of Salamis Island who, it was said, fought alongside Ajax at Troy and was the legendary founder of the city of Salamis. When the Athenians were defeated by the Peloponnesian fleet at Aegospotami, the Athenian general Conon and his remaining fleet took refuge with Evagoras at Salamis in 405 BC. Later, Evagoras took part in the battle of Cnidus in 394 BC and provided most of the resources with which the Spartan fleet were defeated. In recognition of Evagoras' services, the Athenians raised a statue to him and he was made an honorary citizen of Athens. By 391 BC Evagoras was virtually at war with the Persians, whose strategy was to keep Cyprus divided into city states and he remained a thorn in their side until they invaded Cyprus in 385 BC. A peace

was then concluded, which allowed Evagoras to remain king of Salamis until his death in 374 BC. It was the possession of a formidable fleet of *triremes* at his naval harbour at Salamis that allowed Evagoras to play such a dominant role in the Eastern Mediterranean and to keep the Persians at bay for 15 years.

The second reason why Salamis is important to us today, as will be illustrated herein, is that the naval harbour that Evagoras had built at Salamis has been unoccupied for more than 2000 years and has been spared the redevelopment that besets many Classical period harbours. Salamis also has an added advantage as an archaeological site. The catastrophic earthquake of the 4th century AD effectively raised the sea-level at Salamis by c.2 m with the result that the ancient shoreline has now become a reef, about 100 m offshore. The result of this is that Evagoras' naval harbour is presently sited in the calm waters of a lagoon and has been largely protected from winter storms for the past 1800 years.

Salamis harbour surveys

In the early 1970s, prior to the Turkish occupation of North Cyprus in 1974, both N. C. Flemming and A. Raban carried out survey work in the southern half of the harbour (Flemming, 1974; Raban, 1995). Their work was entirely confined to the southern half of the harbour, taking in the old commercial port south of the headland and the area to the north of the headland. After the occupation in 1974, the UN issued a mandate that no archaeological work should be carried out in North Cyprus without its approval.

In 2012, the author published an article, based on observations and documentary research, that suggested