

Notes

The Transition from Shell to Skeleton in the Mediterranean and in North-west European Waters

In their recent, admirable article (*IJNA* 41.2, 2012: 235–314), a professorial trio of maritime archaeologists (Patrice Pomey, Yaacov Kahanov and Eric Rieth) has presented the evidence for a fundamental shift in the way Mediterranean planked vessels of the 1st millennium AD were built. Such a shift is recognized by us as a change in the building sequence from ‘shell-first’ (plank-first) to ‘skeleton-first’ (frame-first). Early boatbuilders, on the other hand, may well have thought of this process as a change in the way hull shape was controlled: from shape being determined by eye (visual appreciation), as each strake of planking was shaped and laid, to one in which hull shape was obtained by fashioning each frame so that the required hull was outlined. In this latter case it seems likely that ‘rules of thumb’ and other ‘design aids’ were used.

This change, from ‘plank-first’ to ‘frame-first’, is a process that, even as late as the 1980s, was considered to have begun, on the Iberian Atlantic coast, no earlier than the 14th century AD, whereas, Pomey *et al.* (2012: 301) now date the change in the Eastern Mediterranean to the mid-1st millennium AD. The distinguished trio’s paper, synthesizing evidence from 27 vessels (including some built before the shift), could well be the beginning of a research path leading to a significant increase in our knowledge of the early history of Mediterranean, frame-first shipbuilding.

The similar ‘revolution’ that took place in north-west European waters—in seagoing vessels of the Romano-Celtic tradition, probably as early as the 2nd century AD (Marsden, 1994: 33–95; McGrail, 1995; 1997)—is not considered in detail in the paper under discussion, but the authors recognize that it was evidently earlier and different in detail from that in the Mediterranean. Their paper, however, includes some misconceptions about this Romano-Celtic tradition that must be challenged.

On page 304 of the Pomey *et al.* paper, it is stated that ‘these Romano-Celtic vessels’ (Blackfriars 1; St Peter Port 1; and Barland’s farm) ‘were not built “on keel”, but on a flat-bottom’. Furthermore, it is concluded that ‘the concept of the hull was determined by the bottom planks’. Neither remark is correct. These three seagoing vessels differ from their river-based relatives (the so-called ‘Rhine barges’) in several ways, one of which is that the seagoing vessels have a keel (defined as ‘the central-bottom, longitudinal, strength member’) consisting of two or more planks laid side-

by-side. This keel (more precisely, a ‘plank-keel’) was clearly the first element to be positioned in the building sequence. Furthermore, hull shape was not ‘determined by the bottom planking’, but by the earlier-erected framing (Nayling and McGrail, 2004: 206, fig 9.2).

Although these three seagoing boats were ‘flat in the floor’, their plank-keels protruded into the water below the general level of their bottom planking (Nayling and McGrail, 2004: 119, fig. 6.7). Indeed, these centrally placed timbers have all the qualities required by a keel:

- they were significantly thicker than the bottom planking;
- they were scarfed to the stem and stem posts to form the backbone of the boat, thereby giving longitudinal strength to the hull;
- in conjunction with stems and framing, they outlined the hull and provided a shape to which the planking was added;
- under way, they gave the boat directional stability and acted to offset leeway.

In addition to these attributes, the Romano-Celtic plank-keel ensured that the boat remained near-upright after taking the ground on the tidal foreshores of north-west Europe—an environment without parallel in Mediterranean waters.

Compared with the Mediterranean group of early, frame-first vessels, now so well-documented by Pomey *et al.*, the known, seagoing Romano-Celtic boats are few in number. Moreover, at present, none is available for further study: the Barland’s Farm boat, having been conserved, is in pieces within Newport Museum’s reserve collection awaiting the building of a new museum; the conservation of St Peter Port 1 in the Mary Rose Trust’s laboratories is not yet finished and its future appears to be uncertain; and little has survived from Blackfriars 1 (excavated in 1962). There is, however, a fourth boat that is probably of this tradition: the 2th–3rd century AD boat from New Guy’s House (Marsden, 1965; 1994: 97–104).

Dr Peter Marsden (1966; 1967: 34–5) was the first to recognize and publish the frame-first building sequence of one of these Romano-Celtic boats—that of Blackfriars 1. He and I were recently invited by English Heritage to examine a small area of the New Guy’s House boat that had been exposed, at a

considerable depth, within the grounds of Guy's Hospital, near the River Thames in London, where it is intended to build a Cancer Care Centre (Watson, 2012). The remains proved to be waterlogged and in a sound condition. English Heritage subsequently decided that excavation of this legally protected boat (the only vessel in England subject to a scheduling order—22 June, 1983) should not be undertaken. Instead, they arranged that the new hospital building would be designed so that all load would be transferred away from the boat and that, should it prove necessary, the boat could be recovered from underneath the new Centre. Furthermore, it is intended that the ground water around the boat will be increased by

diverting rainfall from the roof of the new building. English Heritage considers that these arrangements should ensure that the New Guy's House boat cannot be damaged by the building operation and will remain waterlogged.

It seems clear that, for some considerable time, none of these four vessels will be available for further research. Future work on Romano-Celtic seagoing vessels probably depends on some fortuitous discovery of another example of this tradition.

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A Submerged Monumental Structure in the Sea of Galilee, Israel

We report the discovery of a conical stone pile built of large, natural, unhewn basalt cobbles and boulders measuring *c.* 70 m in diameter at a depth of -218.5–-219.5 m.

Geophysical survey

The south-western part of the Sea of Galilee was surveyed in the summer of 2003, when the lake level was 210.7 m bmsl (Reshef *et al.*, 2007) (Figs 1a and b). Detailed mapping of the bottom morphology and bathymetry was obtained with Marimatech E-Sea Scan 800 sidescan sonar (325 kHz) and ODOM Echotrack dual frequency (24 kHz and 200 kHz) echo sounder. For processing and assembling a mosaic image of the sidescan sonar data we used the CARIS software.

The shallow sub-bottom structure (up to 13 m deep) was mapped with acoustic single-channel data acquired by a Datasonics dual-frequency (2–7 kHz and 10–20 kHz) sub-bottom CAP 6600 Chirp II profiler. The seismic data totalled approximately 60 km with a

source interval of about 2.5 m. To enhance the quality of the seismic images, we applied signal processing that included filtering, noise reduction and scaling to the data.

The submerged structure

In the seismic-reflection profiles in the south-western part of the Sea of Galilee we note a submerged, slightly asymmetric cone-shaped pile of stones, rising above the gently sloping (<2°) sandy bottom of the lake. Sonar images show that the pile is circular in plan, and the Chirp-reflection profiles show that the western face is somewhat steeper than the eastern part (Fig. 2a). Sub-bottom reflectors that dip away from the exposed part show that a portion of the base of the cone is buried producing readings of about 3–4 milliseconds, which correspond to about 2–3 m of sand (Fig. 2b).

Close inspection by scuba diving revealed that the structure is made of basalt boulders up to 1 m long with