

NEW EVIDENCE FOR ANCIENT SHIP DIMENSIONS

The width of shipsheds provides crucial evidence for the beam of ancient warships. In recent years it has become clear that the question of shipshed types is more complicated than I (and others) imagined in the 1960s.

Clearly we can still associate with the classical trireme the “traditional” shipshed type, with a clear width of about 6m, as found on the eastern side of Pashalimani/Zea harbour in Piraeus, or at Oeniadae. At the last Symposium I discussed the new evidence for a narrower shipshed type, with a clear width of just over 4m: for example, in Rhodes (4.20-4.40m) and Dor (3.80-4.50m). These would have been for smaller warships such as *hemioliae* or possibly *trihemioliae*. In Rhodes they are found adjoining shipsheds whose width is at the wider limit of the “traditional” type¹.

Two years ago I said that we must assume that tetrereis and pentereis were housed in shipsheds of the “traditional” type, ‘since there is no clear evidence of alternative provision for them, e.g. at Piraeus’. I now feel, however, that we have enough evidence to indicate a third, *wider* shipshed type, though it is not yet fully defined. I hope therefore that we can soon make a modest further contribution to establishing the size of the large ships of the fourth century BC onwards, inspired by the excellent study of the Aktion Monument and the wealth of new information which it has provided².

Some indications of a wider shipshed type already existed. Two of the 30 shipsheds on the island at Carthage are wider than the rest, having a minimum clear width of 7.1m at the upper end and of 8.0m at the lower end. They were about 48m long, like those on either side³.

Furthermore, the significance of a passage in Strabo’s description of Aktion had been overlooked. He describes a shipshed memorial below the hill on which the temple of Apollo Aktios stood, which had burned down before he wrote his account: ‘*neoria* in which Caesar dedicated as first fruits of his victory a set of ten ships, from a “one” (*monokrotos*) to a “ten” (*dekeres*); it is said, however, that both the shipsheds (*neosoikoi*) and the boats (*ploia*) have been destroyed by fire’. There is a clear implication here that the shipsheds were of varying widths, but no proof; and the remains were destroyed within a few years of the construction of the memorial⁴.

With this in mind we should at least look again at the evidence from Athens. Most of the shipsheds found at Piraeus, and all of the remains properly studied and published, were of the "traditional" type, for triremes. Could they have also held the *tetrereis* and *pentereis* introduced at Athens in the later fourth century? Lehmann-Hartleben, who accepted that these were larger ships, did not know the answer to this question. We cannot be sure that the shipshed builders will always have built the shipsheds large enough to take the largest ships in commission, as Vitruvius later demanded (5.12), but it is a sensible principle if space allows. There clearly was new shipshed construction in the last years of Athens' heyday, under Lycurgus (338-326); this is normally explained as reflecting the increased size of the Athenian fleet, but it could also reflect the increased size of some of the new ships⁵.

One thing we can assume, I believe: that if the dimensions of a ship type were fairly standard (whether trireme, *tetreres* or *penteres*), then so too would have been the dimensions of the shipshed type intended to house them, in whatever harbour. If one captured a warship from an enemy one would want to be able to slip it in an appropriate shipshed.

Should we therefore give any credence to the measurements published by Graser in 1872⁶? He claimed to have seen in Zea and Munychia shipsheds of different width groups, to fit ships of different beam: including penteconters (10.37-13.81 feet), 12 "normal" triremes (16-17.73 feet), 15 *tetrereis* (17.96-19.62 feet) and 7 *pentereis* (19.88-23.11 feet). In 1968 I was very hesitant on this: 'we only have his verbal descriptions, and the evidence is not conclusive'. It is certainly unfortunate that we have only his descriptions, which can no longer be checked; but perhaps we do need to look at his article again, in the light of the new evidence.

Some striking new evidence has now been discovered on a small island off the west coast of Rhodes - Alimnia. Lying about 6 miles off the coast of Rhodes, due west of Skala Kameirou, the island has now no good source of fresh water, but only brackish water and some water in cisterns after rain, and has been uninhabited since the 1960s. Animals are now left on the island all the year round, but the human inhabitants have withdrawn, mostly to Chalki which still has a permanent population of about 300; occasional visitors to Alimnia include holiday-makers on day trips from Chalki.

During a surface survey of ancient remains on the island in 1980, carried out while he was excavating a Neolithic settlement on the Kastro, Adamantios Sampson of the Ephorate of Prehistoric and Classical Antiquities of the Dodecanese

found remains on the south-eastern shore of the main enclosed bay of the island, Agios Georgios, and on the southern shore of an inlet on the east coast of the island, Emporio. A short account of this discovery appeared in 1988. In late August 1991 I was able to pay a short visit to the island, and to confirm the importance of the discovery⁷.

At Emporio Sampson found remains of 11 shipsheds, and 3 more badly destroyed; so far I am only sure of the eleven. The ships are cut in the bedrock which is now very weathered; they continue into the water but it is difficult to say precisely how far. I checked those in the deeper water at the eastern end, and found that no. XI, for example, continues for a further c.5m, down to a depth of 0.65m, and then more abruptly to a depth of 1.20-1.30, where it breaks off.

We can be sure only that the slips continued into the water for some 5m, to add to the present dry length of 16m (no. XI) to 21m (no. VI). The short length is indeed a problem, particularly when combined with the considerable widths (mainly 8.50-8.70m or 9.50-9.80m). The slips are not spaced at completely regular intervals but take account of the very rough bedrock, of hard limestone. As Sampson noted, nos III and IV intercommunicate.

Sampson published the plan which I reproduce (Fig. 1); he discusses the widths and says that the length could be established in only a few cases, but does not mention the gradients. Determining the gradient is not easy where the rock is so weathered and there is an earth fill at the top of the slips. However, on the east side of slip no. II a fairly secure measurement was possible: a drop of 1.34m over 9.2m; if we allow a little for the earth fill, we arrive at a gradient of 1 in 7⁸.

At the back of the inlet there are remains of walls which seem to be of good Hellenistic date, close to the shore; Sampson describes these and also considerable remains of houses and a kiln on the slope of the low ridge on the south side of the inlet, dating from the Hellenistic to Byzantine periods; also an Early Christian basilica near the shore and an early Roman burial, which indicates that the harbour structures were by then no longer in use as such.

A similar discovery was made on the south-eastern shore of the inner bay of the natural harbour of Agios Georgios. The harbour is well protected from the prevailing winds (N, SE, SW), and currents which set from the open sea to the south-west; it was used by the Italians in the Second World War as a naval station for small ships and flying boats: remains of their living quarters still stand on the shore close to the chapel of Agios Minas, which is built over the foundations of earlier structures, now just submerged, on a short headland projecting into the

bay. These structures have not yet been studied, but could belong to a simple ancient jetty.

Just inside (north-east of) this headland at least 10 shipsheds were constructed along the shore (Figs. 6-11). They give the impression of greater depth, since except at the south-west end the slips were cut into a steep hillside, part of which clearly proved too steep to be used (on either side of no. VI). Much work remains to be done in studying these slips, particularly at both ends of the row and in the water⁹. The commonest width here is 9.60-9.90m. Again the slips are very short, surviving to c. 14 to 20m (no. VI). Sampson notes that the length of none can now be established. He believes that they must belong to the same date as the shipsheds at Emporio - very probable but not yet proved. He reports that the pottery finds from this area are mainly Hellenistic.

No evidence has yet been found in either group of shipsheds for (1) roofing; (2) external or internal walling; (3) installations such as capstans.

The most striking feature of both groups is the width of the slips, even if one allows for possible working space on either side of the ship. Most fall into one of two groups: 8.50-8.70m (E); or 9.50-9.80m (E) / 9.60-9.90m (AG). Of the wider ones, one (E I) must be a "double" or even a "treble" shipshed, and AG I and VI could well be "doubles". I am not sure that there is any significance in the greater width of the first shipshed in each of the two rows.

TABLE OF WIDTHS

8.50-8.70m	9.50-9.80m (E) 9.60-9.90m (AG)	10.80-11m	13m	18.20m
<i>E II-VI</i>	<i>E VII, VIII, X, XI</i> <i>AG III, IV, VII, IX, X</i>	<i>E IX</i>	<i>AG I</i>	<i>E I</i>
		<i>AG II, V</i>	<i>AG VI (13.20m)</i>	

As for the two main groups, it is very tempting to conclude that we have here wide shipsheds for the big ships of the Hellenistic period; the main problem is that they seem to be so awkwardly short. When investigated in more detail they may prove to be "doubles" of the narrow shipshed type which I have defined (see note 1, above), in which case the length problem disappears. In any case this new evidence will have to be studied further, and taken into account by those seeking to establish the dimensions of the Hellenistic "polyremes"¹⁰.

What of the historical context? Who built a small naval station off the west coast of Rhodes, apparently in the Hellenistic period (although this is not yet absolutely certain)? Sampson concludes that Emporio, close to the coast of Rhodes, was developed as a naval station in the Hellenistic period, when Rhodian naval power was at its height; he dates the remains at Agios Georgios to the same period. He clearly believes that the naval station could only have been developed by the Rhodians. This is the obvious explanation: south of the city of Rhodes itself, the west coast of the island of Rhodes certainly lacks any other good harbour. The only problem which arises concerns the “wide shipshed” interpretation: on the evidence we have had hitherto the Rhodians specialised in smaller warships; the standard heavy units were *tetrereis*, and the largest warships attested were *pentereis*, but they also developed smaller types such as *trihemioliae*. The latter were used by the Rhodians as guard-ships (which would be particularly appropriate at Alimnia), but so also were *tetrereis*. The “double narrow” shipshed interpretation would fit *trihemiolia*, but nothing larger; while single wide shipsheds would be unnecessarily wide for *tetrereis*.

If the “wide shipshed” interpretation is correct, we should look for other possible explanations: for example, could we have here a small naval base developed by one of the other Hellenistic powers? If so, it is more likely to have been a power friendly to Rhodes, since the Rhodians would hardly have allowed an enemy or potential enemy to operate from an island so close to the island of Rhodes itself¹¹. But none of the Hellenistic powers were long-term friends of the Rhodians, not even the Romans. One is therefore forced back to the conclusion that the Rhodians themselves probably developed this naval station, in a strategic position close to the south-eastern approaches to the Aegean; and that if the shipsheds were wide, then the Rhodians had some larger ships than we had thought hitherto. Further work at the site is highly desirable, and could cause these preliminary conclusions to be revised.

This discovery is a salutary reminder of how much remains to be discovered or studied in the more remote corners of the Aegean¹².

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NOTES

1. D.J. Blackman, "Some Problems of Ship Operation in Harbour", *Tropis III* (1995) 73-81. The final report on the Rhodes shipsheds has been submitted to the Deutsches Archaeologisches Institut for publication; preliminary reports: Blackman, *Deltion 27* (1972, published 1977) 686-7; Blackman and P. Knoblauch, *Akten des XIII. Internationalen Kongresses fuer klassische Archaeologie, Berlin 1988* (1990) 499 and pl. 75.1-2; cf. Blackman, *Tropis II* (1990) 42f. Possibly the wider type at Rhodes was a development of the trireme shipshed specifically to fit the *tetreres* which had become the standard unit in the Rhodian navy.
2. W. M. Murray and Ph. M. Petsas, *Octavian's Campsite Memorial for the Actian War*, *TAPS 79.4* (1989); Murray, *Tropis IV* (1996), pp. 333-348.
3. I am grateful to Henry Hurst for this detailed information, not yet published. It is already clear on published plans that two ramps (nos 25-6) are wider than the rest: e.g. Hurst, *AntJ*, 57.2 (1977) Fig. 4.
4. Quoted in Murray and Petsas, *op. cit.* 5-6 and n. 29; cf. 99, 125. I prefer to translate *dekanaiia* as "set of ten" rather than "squadron of ten". One wonders whether any of the substructure might have survived.
5. K. Lehmann-Hartleben, *Die antiken Hafenanlagen des Mittelmeeres*, *Klio Beiheft 14* (1923, reprinted 1963) 113. Lycurgus: Diodorus, 16.87-8; Plutarch, Vit. X or. 7.853. *Tetrereis* appear in the Naval Lists for the first time in the list of 330/29, but may have been introduced some years before: eight are recorded in the *neoria* and ten at sea (*IG II²1627.22*), By 325/4 there were more *tetrereis* (43 in the *neoria* and 7 at sea), and *pentereis* had been introduced (7 in the *neoria*): *IG II²1629.808*.
6. B. Graser, 'Meine Messungen in den alt-athenischen Kriegshaefen', *Philologus* 31 (1872) 1-65, with table opposite p.62; D.J. Blackman, in J.S. Morrison and R.T. Williams, *Greek Oared Ships, 900-322 BC*, 183n.; I expressed similar caution in *IJNA* 11.3 (1982) 206: 'there is no clear evidence that the latter (sc. quadriremes and quinqueremes) required new or remodelled shipsheds'. Wachsmuth, however, to whom I referred in 1968 (*loc. cit.*), was prepared to follow Graser and believe in shipsheds for wider and narrower ship types than triremes: *Die Stadt Athen im Alterthum*, II.1 (1890) 72-3. Remains of shipsheds found on the east side of Zea in 1973/74 may be of a narrower type, which would give some credence to Graser's claim; a ramp 4.7m wide is reported, but it is not certain whether that was the total clear width: O. Alexandri, *Deltion 29* (1973/74, published 1979) *Chron.* 151 & Figs 34-5 (indicating a clear width just over 5m).
7. A Sampson, *Deltion 35* (1980, published 1988) *Chron.* 561-3, with plans (Fig. 11, p. 562) and plates 354-6; this was not seen by me until after the 1989 Symposium. I am most grateful to the Ephor, Mr. Ioannis Papachristodoulou, for permission to study the remains and to discuss them at the Symposium. I visited Alimnia on 25 August, immediately before the Symposium. I am grateful also to Mr. Sampson, who has generously agreed to my working further on this discovery. The results of his survey of prehistoric sites in the Dodecanese have now been published: *Η νεολιθική περίοδος στα Δωδεκάνησα* (Athens 1987); his excavation of structures of a very late Neolithic phase on the Kastro at Alimnia are described there (79-86) and in *Deltion 35*, 558-9. There was a settlement on the Kastro in the Hellenistic and Roman periods also. Sampson lists other prehistoric finds on the island: from Pontikovounaro, a hill between the bays of Emporio and Agios Georgios; from the south shore of Emporio; and from near the Agios Minas promontory (*op. cit.* 106-7 & Fig. 96).
8. My visit was brief and only a limited number of measurements was possible. Sampson's plan is a good basis for further work, which must include a detailed survey and if possible the controlled clearance of the earth fill and clearance of undergrowth, to check for evidence of interior walling or roofing, or fixtures for installations such as capstans, etc.
9. Sampson mentions ashlar walls in the sea to the east of AG IX-X, 'which must have been

connected with the ancient harbour'.

10. One can argue that the slips were originally longer, and that a relative rise in sea level has increased the marine erosion of their lower ends (sic R. Prescott in the discussion at the Symposium). However, I wonder whether, even assuming that, one reaches a plausible length for "polyremes". Furthermore, the ancient remains on the promontory in the harbour of Agios Georgios have foundations which are now just submerged; if they are roughly contemporary with the shipsheds (not proved, but plausible), and if they are harbour installations, then the relative rise cannot have been very great. Perhaps, as Casson has suggested to me, some at least of the Hellenistic warships had a much broader beam with relation to length than we are expecting, over influenced by what we know of the classical trireme.
If we accept the "double narrow shipshed" explanation, then the apparent length is much more appropriate - for small warships; but on first inspection of the two sites I could see no evidence for double construction.
11. L. Th. Lehmann suggested in the discussion that the base might have been established by Demetrios Poliorketes when he was preparing his attack on the city of Rhodes in 305. But it seems too small and too distant to have been of much use in that massive attack: Demetrios had 200 warships of varying sizes, plus more than 170 auxiliary vessels as troop-transports.
12. The ancient name of Alimnia was almost certainly Eulimna: see G. Susini, 'Eulimna', *La Parola del Passato* 89 (1963) 129-31; and with fuller topographical description: *idem*, *Annuario N.S.25/26* (1963/64, published 1965) 260f.; cf. *RE* Suppl.XII (1970) 364-5 s.v. 'Eulimna'. For an earlier description see G. Gerola, 'Carchi e Limonia', *Annuario 2* (1916) 6-12, esp. 11f. Island visited by L. Ross in 1844, who reported that it was previously inhabited and had a fine harbour, calling it Limonia: *Reisen auf den griechischen Inseln III* (1845) 114. Wrongly identified with ancient Teutlussa by Hiller von Gaertringen, *IG* XII.3 (1898) p.5; correction by him and D. Chiavaras: *Ost. Jahreshefte 7* (1904) 90-92.
The island must have been part of the chora of ancient Chalke, on which see: L. Ross, *op. cit.* 14-20; *IG* XII.1 (1895) pp. 158-61 (Hiller von Gaertringen); *RE* III (1899) 2066 s.v. 'Chalke 2' (Bürchner) - inadequate; H. van Gelder, *Geschichte der alten Rhodier* (1900) 181-3; Gerola, *loc. cit.*; *ATL* I 436-7, 561; II 83; III (see IV, Index); P.M. Fraser & G.E. Bean, *The Rhodian Peraea and Islands* (1954) 144-5, 153-4; G. Klaffenbach, *Festschr. C. Weickert* (1955) 94-96; Susini, *op. cit.* 247-60; *RE* Suppl. XII (1970) 148 s.v. 'Chalke 2' (E. Meyer); Sampson, *op. cit.* (1987) 113-15 & Fig. 153a.
For a geographical description of the islands see A. Philippson - E. Kirsten, *Die griechischen Landschaften* IV (1959) 307f.

ILLUSTRATIONS

1. A. Sampson's plan of the shipsheds at Alimnia (reproduced with his permission from *Deltion* 35, Fig. 11).
2. Emporio Bay from the west; in the distance, the mainland of Rhodes.
3. Emporio: shipsheds XI (left) to VIII (right), viewed from the bay.
4. Emporio: shipshed IX from the west; beyond are visible shipsheds X-XI.
5. Emporio: shipshed VIII from the east; beyond, shipshed VII.
6. Agios Georgios: shipsheds X-VII (left distance), VI (centre) and V (right), viewed from the bay.
7. Agios Georgios: shipsheds V (left) to II (right), viewed from the bay.
- 8-9. Agios Georgios: shipshed VI, looking south-west.
- 10-11. Agios Georgios: shipshed IV, looking south-west.

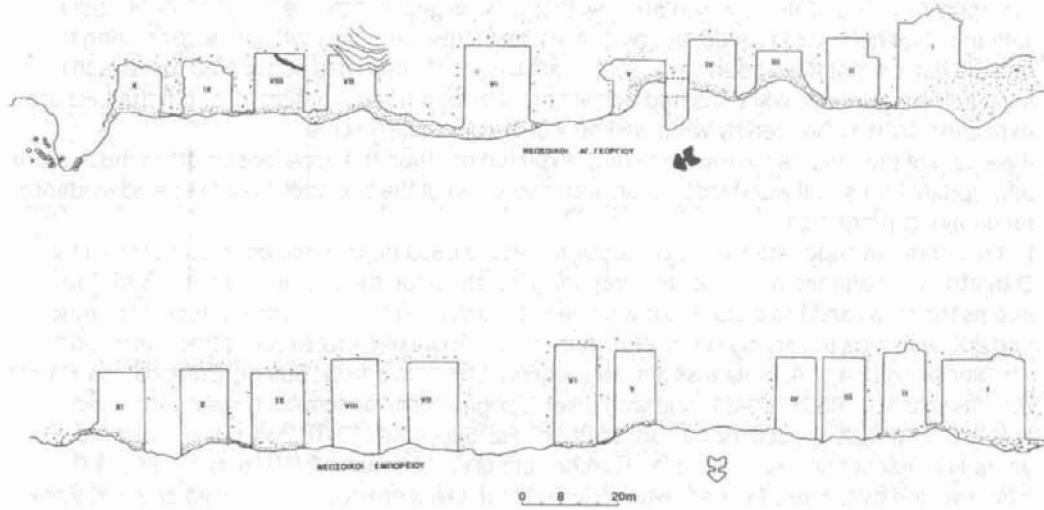


Fig. 1

Fig. 2



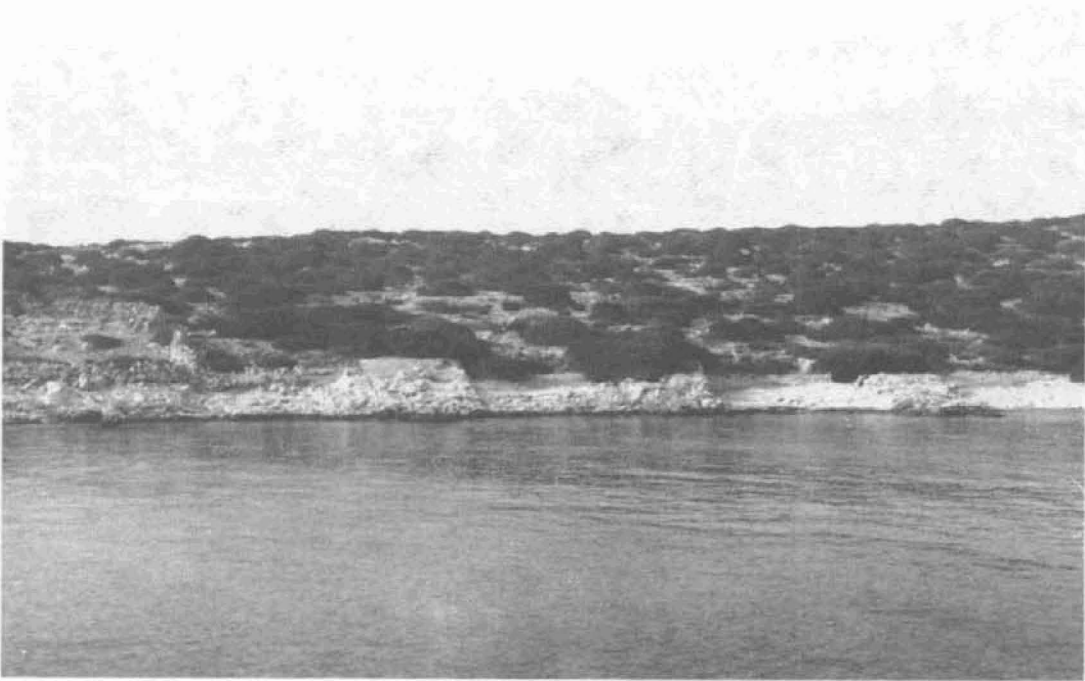


Fig. 3

Fig. 4





Fig. 5



Fig. 6



Fig. 7

Fig. 8





Fig. 9

Fig. 10





Fig. 11

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