SOME THOUGHTS ON THE GREEK PENTEKONTER

Before the era of the *trieres* the Greek warship par excellence was the *πεντηκόντερος ναῦς*, so named for being propelled by fifty oars.[1] It is first mentioned in the Iliad, and often in later literature. Thucydides (I, 14) states that prior to the Persian War the Athenian navy also consisted of *pentekonters*. So we may recognise this type in the many low-sided warships painted on late Attic black-figure vases (cf. note 1). As far as may be judged by their silhouettes, they seem to have been sleek ships for war and piracy, fast under oars but also carrying a light mast for sailing. The bows bear rams, often similar to boars' heads in shape. There is evidence of single-level (*monokrotoi*) as well as of two-level ships. I shall leave aside the discussion about the latter ones being *ἡμιολίαι* or not[2]; at any rate, two-level ships, *δίκροτοι* in Greek, existed. Some Greek states had large pentekonter fleets in the 6th century, e.g. Samos who at the time of Polykrates or a hypothetical predecessor owned no less than 100 ships of this type.[3]

At the same time, about the middle of the 6th century, the Phokaians used pentekonters for their trade in the western Mediterranean[4] and, earlier, Battos took to sea in two *pentekonters* to found the colony of Kyrene[5]. Such voyages would call for vessels much more seaworthy than the light inshore craft on the Attic vases seem to be. It looks as if there were two different types of ships both indiscriminately called *pentekonters*. The second should have been big enough to carry a certain amount of cargo, as is implied by the use the Phokaian traders made of their *pentekonters*.

Surprisingly enough, though, we learn that these same Phokaians, when colonising Massilia about 600 BC, fought the Carthaginians in a real sea battle.[6]

Apparently their high-seas *pentekonters* were also efficient fighting vessels. The same may be inferred from Herodotus' (I, 164) mention that the Phokaians in 546 BC evacuated their city, then under Persian siege, and sailed away to Alalia in Sardinia with most of their population, their movable possessions, and even the statues of their gods. A few years later their piracy became so menacing to the Carthaginian and Etruscan shipping in the Tyrrhenian Sea that both powers joined forces against them to fight the famous sea battle somewhere near Alalia, about 535 BC[7] There the Phokaians kept *ramming* their enemies until the rams of all their own surviving ships had been "twisted off".[8] I consider it likely that these were the same ships with which Phokaia had been evacuated. The high-seas *pentekonter* apparently was proficient in combat, too.

At about this time Polykrates of Samos had at his disposition a fleet of *σάμαιναι*, vessels beamy enough for use as merchantmen but also capable of doubling as men-of-war.[9] They are said to have had rams in the shape of boars' heads - but this feature was so widespread in the 6th century that it hardly can have been diagnostic for the *σάμαινα*; see, e.g., Fig. 3,1.4 and even the Lycian ship in Fig. 3,5[10] - In my opinion, these *σάμαιναι* were identical with the Samian *pentekonters* mentioned before.

In the early 5th century the *trieres* became the standard warship of all major naval powers. Poorer states retained the *pentekonter*, however - apparently mostly in that type's inshore version. But also the bigger and stronger high-seas version seems to have survived, as a mention by Thucydides indicates. When in 413 BC the Etruscans dispatched an expeditionary force of hoplites to Syracuse in support of the Athenians' assault on the city, the hoplites were taken there by only three *pentekonters*[11]. Since at a critical moment of the fighting at Syracuse the Etruscan corps proved able to save the Athenian ships from a determined attack, the Etruscan force should have consisted of more than 150 *hoplites* - the number arising if all these *hoplites* had sailed to Syracuse in the function of rowers on single-purpose warship *pentekonters*. It seems these Etruscan ships had complements far in excess of 50.

All these literary hints combine to indicate that there were two rather different types of ships that were both called *pentekonters* by landlubber writers: a light inshore man-of-war on the one hand, and a stronger high-seas type equally suited for long-distance trade and for combat, on the other.

In the following I shall present a selection of archaeological evidence for the high-seas *pentekonter*. It should be characterised by higher sides, and a

deeper draught, than may be deduced from the Attic black-figure vase paintings (cf. note 1).

These features are best shown in an Attic early red-figure vase painting of c. 490 BC of Odysseus sailing by the Sirens (Fig. 1,1); for this reason the artist is called the Siren Painter[12]. Since most of Odysseus' voyages were located in the Far West, we may suppose the painter gave his ship some conspicuous features of the type of rowing ship then used for long-distance voyages, viz. the high-seas *pentekonter*. - The ship's side is rather high, with a pronounced sheer. The vessel is under oars, arranged in a single row however, passing through round ports somewhat below the gunnel. Above the gunnel the oarsman's bodies are visible; so the hull was not decked. Fore of the mast, *behind* two rowers, there is a structure looking like a tent-like awning rather than a raised foredeck. Whatever it is, it cannot have spanned the whole width of the hull. There is also a mast, as high and strong as those of sailing *holkades*. These features all indicate that the ship was meant for rough sailing, presumably as the primary means of propulsion during long-distance voyages.

One might think the artist had Odysseus travel in a merchant galley, as shown in an Attic bf. vase painting[13]. But this hull differs markedly from that in Fig. 1,1. Odysseus' ship has a high vertical stempost with a metal ram in boar's head's shape jutting out at waterline level, whereas the galley prow's outline looks more martial, but unequivocally has no ram. So the painter conceived of Odysseus' ship as being able to fight by ramming whereas the merchant galley is only mimicking fighting potential. - The high stempost and marked sheer of the hero's ship, differing from contemporary single-purpose warships, should be meant to improve its seaworthiness. This was a matter of minor relevance for pure warships since fighting was avoided in foul weather until the closing years of the Peloponnesian War.[14]

Giving Odysseus' ship 25 oarports three feet apart, leads to the reconstruction in Fig. 1,2. Its high sides and ends imply seaworthiness. The gunnel may have had some sheer all over, but since the oarports had to be at uniform height above the water I preferred to reconstruct the gunnel as being horizontal too. The plan is mere conjecture. Anyway a ship with so heavy a mast should have been rather wide on the one hand whereas, on the other, her lines should have been fair in order to allow high speed in combat.

Another black-figure painting of the sirens' adventure shows a two-level rowing ship (Fig. 2,1)[15]. Its horizontal gunnel, and its bow, are like those of Attic

inshore *pentekonters* (cf. note 1). But the sides seem to be higher, and in the foreship there is again a raised structure *behind* an oarsman that in this case looks like a narrow raised deck.

A source of a different kind is a stone foundation for a real ship, formed by nine parallel walls, at Hera's sanctuary at Samos (Fig. 2.2), apparently dedicated after some unknown naval feat[16]. It is dated to c. 600 BC. Since Herodotus (IV 152) states that at about this time the Samian shipowner Kolaios by chance found his way to the kingdom of Tartessos in southwestern Spain, and returned with incredible riches, the excavator, E. Buschor, tentatively suggested that the foundation might once have carried Kolaios' ship. Herodotus does not mention such a dedication, but at any rate the base exists, and may be expected to give some idea of the measurements of the ship for which it was built.

What kind of vessel may this have been? A round-bellied *holkás* may be dismissed right away: the base is too long and too narrow. At first glance it seems to have supported a very sleek, streamlined vessel. This impression is misleading, however, since it would imply a shape of hull with a perfectly flat bottom resting right on top of the foundation. Such a shape is not known from the ancient Mediterranean. Instead, all of the many sailing freighters investigated up to now, as well as the Punic warship from Marsala[17], display cross sections with the keels jutting out prominently from the actual bottom. This is V-shaped on the Marsala ship, and on many freighters. In fact, John Coates chose a similar section when designing the *trieres* replica[18]. In my opinion, the hull once placed on the Samian foundation will also have had a cross section with the keel jutting out from its bottom.

This implies that only the keel rested on the walls. To keep the hull in balance, further supports were necessary. In my opinion, we should consider something like stanchions that rested on the surface of the walls - that would have been the easiest functional solution.

If we conceive of the hull having had a bottom V-shaped in cross section, the stanchions by necessity would have had to be placed at an angle, pointing inward in order to meet the ship's bottom at an angle, not too far from 90°. In view of the relatively short length of the walls, the hull would have been rather too slender even for an inshore craft. Moreover, obliquely placed stanchions would have exerted a lateral thrust bound to push the walls' ends outwards. Such distortions, however, are neither mentioned in the excavation report nor are they to be seen in the photographs.[19]

Such damage should even be expected if another layer of stone blocks, now missing, had once formed the surface of the walls. In my opinion, this situation calls for a hull with a bottom more or less flat in part, but incorporating a keel jutting out sharply, as is suggested in Fig. 2.2 as section B. In this case, the Samos ship's midship could have rested on short vertical stanchions which would not have needed any insertions and would not have pushed the ends of the walls out of place.

What about the longitudinal section of the foundation and the hull in question? Fig. 2,2 shows the outline of the red-figure Siren Painter's ship, dealt with before, together with the black-figure *díkrotos*, drawn to the same scale and marked grey. It becomes apparent that the *monókrotos* ship considerably surpasses in length the maximal extension, c. 23,2 m. of the foundation. This difficulty is overcome by the, as yet unpublished, suggestion by H.T. Wallinga that a *díkrotos pentekonter* might have stood on the foundation (cf. note 16). To test it I chose a scale drawing of the black-figure *díkrotos* in Fig. 2,1. It indeed fits on the foundation well enough in both sections (Fig. 2,2). Its wide beam was a surprise to me when reconstructing its cross section, but it is indispensible for placing two rowers abreast at each side of the hull. Such a short and wide hull should be better fitted for high-seas sailing, and more maneuverable in combat, than the much longer *monókrotos*. - The necessity to place two rowers abreast has been my reason for suggesting that the ship's sides turned outwards at the lower oarports' level, to serve as a kind of outrigger for the oars on the upper level. The same feature is indicated in a large terracotta model of a warship that was found in the sea off the Spartan port of Gytheion (Fig. 3,2)[21]. The Gytheion model is thought to be Roman, but - as far as my knowledge goes - it differs crucially from Roman ships known. This not only holds true for the lateral rowers' compartments just mentioned, or for the narrow central "fighting-deck" bulwark so similar to Phoenician warships of the late 7th century BC[22], but even more for the curious square fields at the sides of the stern that, in my opinion, indicate some kind of cloth hanging down from the gunnel; I propose calling them "stern blankets". They recur in a number of Archaic and Classic pictures of ships (Fig. 3)[23]. The ram also looks definitely un-Roman. All of this makes me think the Gytheion model is Archaic. If so, its sides turning out like outriggers would precede the real outriggers of the first trieres, indicating the path of development that lead to this trieres' feature.

To come back to the Samos foundation, I think the arguments named above entitle us to believe it was built for a relatively short, and squat, *díkrotos pentekonter* that in its fore and aft sections would have provided some space for stowing cargo,

and thus fits the specifications implied by Herodotos' mention of the Phokaian dual-purpose high-seas pentekonters.

I would like to put another find into the same context, viz. a fragment of a terracotta model found in a mixed context of the late 6th century at the acropolis of Lipari (Fig. 4)[24]. At first glance the model's clearly indicated *proembólion* reminded me of Classic triereis. But there is a sheer that is absent from all warship representations prior to the grave stele of the marine Demetrios, now at Munich, from the early 3rd century[25]. I had thought at first it should be dated to this time. But archaeological evidence, not only stratigraphical but also in its technical execution and polychrome painting, leaves no doubt about its date at the end of the 6th century BC.

The model's bow is considerably less sharp than of the Punic "Sister Ship" sunk near Marsala in 241 BC[26]. On the other hand, it comes rather close to what has been suggested above, on purely technical grounds, for both the Siren Painter's ship and the one that once stood on the Samos foundation (Fig. 2,2). Both are likely to be referred not to sleek single-purpose inshore warships but rather to a more seaworthy dual-purpose type of ship. I thus dare propose the suggestion that the Lipari model fragment should be taken as evidence of the high-seas pentekonter's features just prior to the moment when this type was eclipsed by the emergence of the triere.

To come to a conclusion, I hope to have been able to present arguments for the idea that there were two constructionally different types of ships, both indiscriminately called *pentekonters* by the ancient writers. They were no naval architects and so will have been content with rather vaguely describing the types of ships they talked about - not too different from present writers still speaking of "steamers".

In my opinion, there is reason to think that the high-seas dual-purpose version of the pentekonter might by naval people of Antiquity have been called *kérkouros*[27]. The name goes back to Semitic "*kirkarrah*", meaning a kind of dual-purpose vessel fitted for trade and combat.[28] Such Phoenician vessels would have been perfectly appropriate predecessors for the Greek type whose characteristics I tried to demonstrate.

ADDENDUM

When I prepared this paper, basing myself on archaeological sources only, I did not yet know John Coates' paper *"Pentekontors* and *Triereis* Compared", at a later date most graciously sent me by the author and now published in *TROPIS II* (pp. 111-116). The technical, tactical, and economic advantages of the two-level *pentekonter* over the single-banked one are neatly defined here. I am not quite sure, though, if Coates does not underestimate the dual nature of this type indicated by the ancient writers. The same applies to Sleeswyk's reconstruction of the two-banked ship (n. 1).

If lateral "troughts" are reckoned with for accommodating the lower-level oarsmen (in its turn leaving room for stowing the payload), beam data may differ from those of a hull with straight sides. There even might be intricate variations in the beam depending on whether the ship is on an even keel (only the central hull being immersed) or is listing to one side. In the latter case the added resistance of the one "trough" now immersed would seem likely to bring the ship off course. Such bad habits are unfavourable for any kind of ship. Nevertheless, in my opinion, our Figs 2,1 and 3,2 leave little doubt that lateral "troughs" actually existed.

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ABBREVIATIONS

AS	O. Höckmann, *Antike Seefahrt* (München 1985, Italian edition: "La navigazione nel mondo antico": Milano 1988).
GOS	J.S. Morrison - R.T. Williams, *Greek Oared Ships 900-322 BC* (Cambridge 1968).
Hdt.	Herodotus
MIMA	L. Basch, *Le musée imaginaire de la marine antique* (Athènes 1987).
SSAW	L. Casson, *Ships and Seamanship in the Ancient World* (Princeton 1971; paperback reprint with Addenda and Corrigenda: Princeton 1986.)
Thuc.	Thucydides

NOTES

1 Ancient writers (e.g.): Homer, I1., 2, 718 f.; 8,34 ff.+48; 16,169 f. - Hdt. 3,59. - Thuc. 1,14. Recent discussions (e.g.); P. Gille, Les navires à rames de l'antiquité. *Journal des Savants* 1965, (36-72) 54 ff. - GOS 46 f.; 109 ff.; 131; 133; 155; 194 f.; 200 f. (complement c. 80). - *SSAW* 58 f.; 61 ff. - J. Alvar, Los medios de navegación de los colonizadores griegos. *Archivo español de arqueologia 52*, 1979, (67-83) 71.- J. Morrison, *Long Ships and Round Ships* (London 1980) 14 ff. A.W. Sleeswyk, A New reconstruction of the Attic trieres and bireme. *IJNA* 11, 1982, 35 ff. - MIMA 197 f.; 216; 222.

Vase paintings (e.g.): *GOS* pl. 13-19; 20. a-d. - *SSAW* Fig. 81-85; 88-90. - *AS* 98 Fig. 70-71. - *MIMA* 205 ff. Fig. 425 - 472.

2 *GOS* 109; 245 f. - *SSAW* 61 f.; 128 ff. - W. Nowag, *Raub und Beute in der archaischen Zeit der Griechen* (Frankfurt 1983) 125 f. (noteworthy ideas about *hemioliai* being normal *dikrotoi* but for a short phase during piratical attack on merchant vessels). - AS 100.

3 Hdt. 3,39. Cf. *GOS* 129; 131. - R. Tölle-Kastenbein, *Herodot und Samos* (Bochum 1976) 20; 22. - Nowag (n. 2) 120.

4 Hdt. 1, 163.

5 Hdt. 4, 150 ff.

6 Thuc. 1,13. Cf. *GOS* 139.

7 Hdt. 1,166, 1 f. Cf. *GOS* 131.

8 Hdt. 1,166, 2. Cf. *GOS* 131; 133. - L. Basch, Another Punic wreck in Sicily: its ram. 1. A typological sketch. *Internat. Journal of Nautical Archaeology* (henceforth *IJNA*) 4, 1975, (201-228)

9 Hdt. 3,59. - Plutarch, Per 26,3. - Suda s.v. Σαμίων ὁ δῆμος. Cf. GOS 130. - *SSAW* 63 f. - G. Dunst, Archaische Inschriften und Dokumente der Pentekontaetie aus Samos. *Athenische Mitteilungen* 87, 1972, (99-163) 159 ff. - B. Freyer-Schauenburg, *Samos* XI (Bonn 1974) 187. - Nowag (n. 2) 120.

10 A.S. Toby, A Warship from Elmali, Turkey. *IJNA* 8, 1979, 7-12. - AS 101 fig. 74.

11 Thuc. 6,103.

12 GOS 114 Arch. 94; pl. 21 e. - F. Brommer, Odysseus (Darmstadt 1983) pl. 35. - *MIMA* 270 fig. 574.

13 SSAW fig. 91. - AS 58 fig. 45. *MIMA* 28 fig. 474.

14 Xenophon, Hellenika 1, 6, 19.

15 Brommer (n. 12) pl. 33 b; 34. - *AS* 99 fig. 72.

16 E. Buschor, *Archäologischer Anzeiger* 1935, 328. - id., *Arch.Anz.* 1937, 204 (+ photograph); 211 f. fig. 7. - D. Ohly, Holz aus dem Heraion . Athen. Mitt. (cf. n. 9) 68, 1953, 111 (length erroneously "60 m"). - E. Buschor u. O. Ziegenaus, *Heraion* 1959. *Athen.Mitt.* 74, 1959, Beilage 1. - E. Homann-Wedeking, *Samos* 1964. *Arch.Anz.* 1965, 432+428 fig. 2. - H. Walter, *Das Heraion von Samos* (München 1976) 50+47 fig. 47. - H. Kyrieleis, Führer durch das Heraion von Samos (Athens 1981) 88 ff.+89 fig. 65. The connexion with Kolaios (Hdt. 4, 152) has first been suggested by Buschor 1935 (above). It was explicitly put forward in a lecture, held at Mainz in 1979, by Prof. B.B. Shefton (Newcastle upon Tyne), and has since been published (in: H.G. Niemeyer/ed./, Phönizier im Westen. *Madrider Beiträge* 8/Mainz 1082/337 ff. particularly 344). The plan, hitherto unpublished, has kindly been supplied by Dir. Dr. H.J. Kienast (German Arch. Institute, Athens). I express my appreciation of his gracious permission to cite his idea of a dikrotos pentekonter once having stood on the foundation.

17 H. Frost et al., *Lilybaeum. Notizie dei scavi 8th ser.*, 30, 1976 (Roma 1981). Supplem., 248 fig. 156.

18 J.S. Morrison - J.F. Coates, *The Athenian Trireme* (Cambridge 1986) 203 fig. 59.

19 cf. n. 16 above.

20 L. Basch, Un modèle de navire romain au Musée de Sparte. *Antiquité classique* 37, 1968, 136-171. - Basch 1975 (n. 8) 213 fig. 222. - A Göttlicher, *Materialien für ein Corpus der Schiffsmodelle im Altertum* (Mainz 1978) 89 No. 478. - I had no access to the book by W. von Mondfeld, *Das große Piratenbuch* (München 1976; p. 32), cited by Göttlicher; according to him, the author calls the Gytheion model "Greek". - P. dell' Amico, La nave de Gyteion. *Archeologia viva* 4 no. 11, 1985, 40-43. - AS 97 fig. 67. - *MIMA* 427; 432 ff. fig. 936 ff.

21 Galerie Nefer. Katalog 6 (Zürich 1988) no. 6 (correctly dated to 6th cent. BC).

22 *GOS* 162; pl. 22 a. - *SSAW* fig. 76. - Basch 1975 (n. 8) 212 fig. 19. - AS 97 fig. 66. - *MIMA* 180 fig. 379; 311 ff. fig. 655 ff.

23 "Stern blankets", Archaic Greece: 1) Protocorinthian aryballos, Boston: *GOS* Arch. 39; pl. 12 b. - 12 b. - Brommer (n. 12) 84 fig. 40. - *MIMA* 238 fig. 497. 2) Gytheion model: see n.20 above. 3) "Zürich" model: see n. 21 above. 4) Fresco from Kizilbel near Elmali, Lycia: Toby (n. 10) 10 fig. 4. - AS 101 fig. 74. 5) Attic bf. amphora from Tarquinia, Italy: *Corpus Vasorum Antiquorum Tarquinia* 1 (a cura di G. Jacopi; Firenze 1955) pl. 5,3= Italia 1137. 6) Attic bf. vase paintings of Dionysus in wheeled boat: A. Frickenhaus, Der Schiffskarren des Dionysos in Athens. *Jahrbuch des Deutschen Archaologischen Instituts* 27, 1912, 61-79 + Beil. 1 ff. - P.F. Johnston, Ship and Boat Models in Ancient Greece (Annapolis 1985) 141 ff. Rep. 2-5. - *MIMA* 228 fig.475, 1-3. 7) Attic rf. amphora by Siren Painter: see n. 12 above. Some of these finds are mentioned by Basch as formal parallels to the Gytheion find in spite of the latter being dated to the 1st cent. BC. - "Stern blankets" on Classic coins, *Phoenicia* (e.g.): *MIMA* 321 fig. 675.676.678 (Sidon, since end of 5th cent. BC); 322 fig. 680 (Sidon, 380-374 BC). Representations of "stern blankets" from the Hellenistic or later periods are not known to me. - The closest parallel for the long and narrow shape of the Gytheion ram, cut off vertically at its tip, that I know is on a boat-shaped necklace pendant from Saite Egypt, now in the Louvre: *MIMA* 335 fig. 719-720. A model at Oxford, "from Cyprus, probably Hellenistic", might also be taken into closer consideration: *MIMA* 340 fig. 724. Evidence from the Roman period is scanty and differs from the Gytheion ram insofar as the rams are bent upwards in a continuous curve *(MIMA* 452 fig. 996; 456 fig. 1011 = 458 fig. 1016.- *AS* 117 fig. 102), so coming close to the "Liburnian ram" identified by Basch (n. 8). On the ram of a river warship from Cologne (Author, Jahrbuch Röm.-German. Zentralmuseum 33, 1986, pl. 51,3) the upper edge forms a similar curve while the lower is horizontal. The resulting high vertical "working edge" seems to be adapted to the task of fighting small boats as the Germans on the Rhine then used.

24 Johnston (n. 23) 78 f. Clas. 1; 79 fig. ("from bothros"). I express my gratitude to dott. ssa M. Cavalier (Lipari) for supplying the scale drawing and archaeological data, and for her gracious permission to publish them here.

25 AS 107 fig. 80. - *MIMA* 300 fig. 638. - B. Vierneisel-Schlörb, Glyptothek München. Katalog der Skulpturen III. Grabdenkmäler und Votivreliefs (München 1988) 59 ff. no. 11; pl. 24. A similar upward curve of the foremost section of the gunnel towards the akrostolion is to be found on a great many Hellenistic, Punic, and Republican Roman representations (e.g.): *MIMA* 275 fig. 583-584; 355 fig. 743-745; 367 fig. 794-796.798 (=AS 112 fig. 92); 388 fig. 810; 391. 816.817; 396 fig. 823 (= AS 111 fig. 85).

26 H. Frost, Another Punic wreck in Sicily: its ram. 2. The ram from Marsala. *IJNA* 4, 1975 (219-228) 224 fig. 35. - id. (n. 17) 267 ff. fig. 168. The discovery of the Athlit ram (e.g. J.R. Steffy, The

Athlit ram. *Mariner's Mirror* 69, 1983, 229-246) has, however, shown that the "Liburnian ram" of the Sister Ship was not the only type known in antiquity.

27 Pauly-Wissowa, Real-Encyclopädie der classischen Altertumswis senschaft 3 (Stuttgart 1899) col. 1969 s.v. Cercurus (Assmann). Admittedly a definition as a rather small oared vessel is predominant, but there should also be noted those by Pliny, nat. hist. 7,57 ("merchantman from Cyprus"), and *Nonnos* 533 ("oversize Asian ship").

28 Pauly-Wissowa (n. 27 above). - A. Salonen, *Die Wasserfahrzeuge in Babylonien* (Helsinki 1951) 51. - R.D. Barnett, Early shipping in the Near East. *Antiquity* 32, 1958, 229.

ILLUSTRATIONS

Fig. 1.1 Attic early red-figure vase painting by Siren Painter (early 5th c. BC): high-seats rowing ship with strong sailing mast and metal ram. Ropes are dark red in original, grey sections are light brownish (redrawn after GOS).

Fig. 1.2 Hull of same, reconstructed as *monókrotos* pentekonter. Cf. note 12.

Fig. 2.1 Attic late black-figure vase painting (late 6th cent. BC.): high-seas rowing ship with oars at two levels (after AS).

Fig. 2.2 Hull of the same, reconstructed as *díkrotos* pentekonter (light grey), placed on stone ship foundation at Samian Heraion (dark grey) together with *monókrotos* of fig. 1 (outline only). In the cross sections the left half refers to the latter, the right one (light grey) to the former (foundation walls are dark grey). Drawing of foundation walls provided by Deutsches Arch. Institut, Athens. Cf. note 15.

Fig. 3 Archaic representations of ships with "stern blankets" (cf. note 23).

Fig. 3.1 Aryballos at Boston.

Fig. 3.2 Terracotta model from Gytheion.

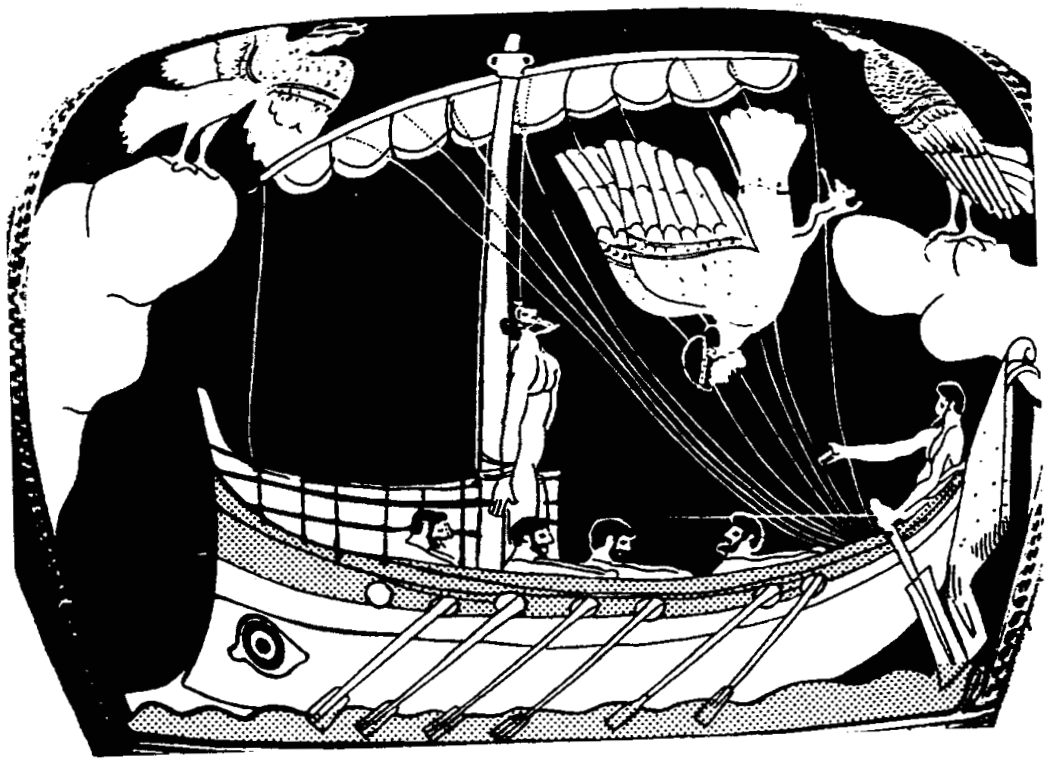
Fig. 3.3 Terracotta model formerly at Zürich.

Fig. 3.4 Vase painting of Dionysus' ship cart.

Fig. 3.5 Fresco from Kizilbel near Elmali, Lycia.

Fig. 3.6 Vase painting from Tarquinia (redrawn after sources named in note 23; not to scale). See also fig. 1.1.

Fig. 4 Bow fragment of Archaic terracotta model (late 6th c.BC) from acropolis of Lipari, Italy. Upper wales are rising towards stern, forming kind of a *proembólion.* Grey sections are painted red in original. Drawing provided by Museo archeologico di Lipari. Cf. note 24.



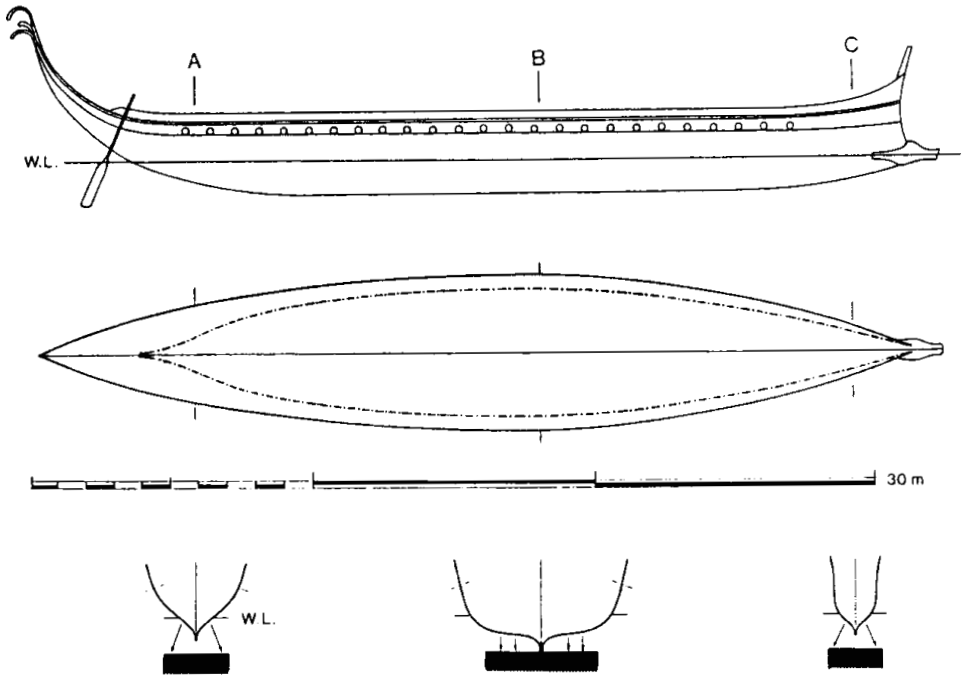
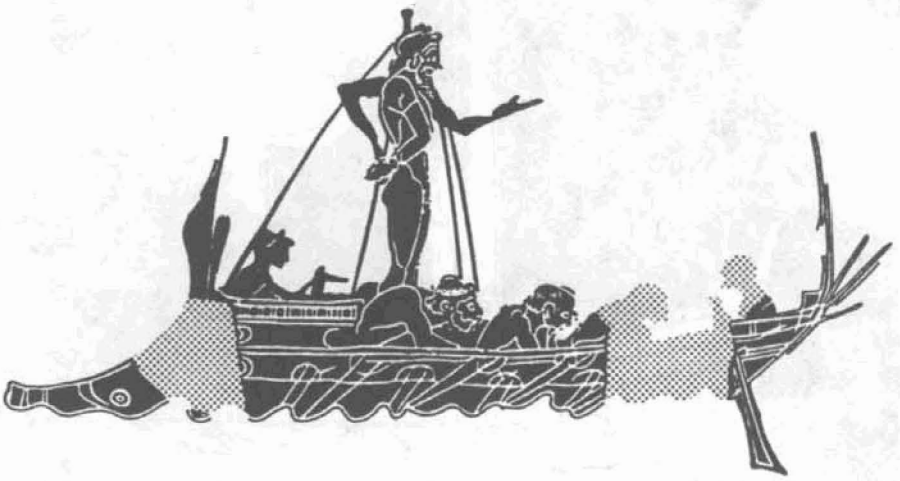


Fig. 1



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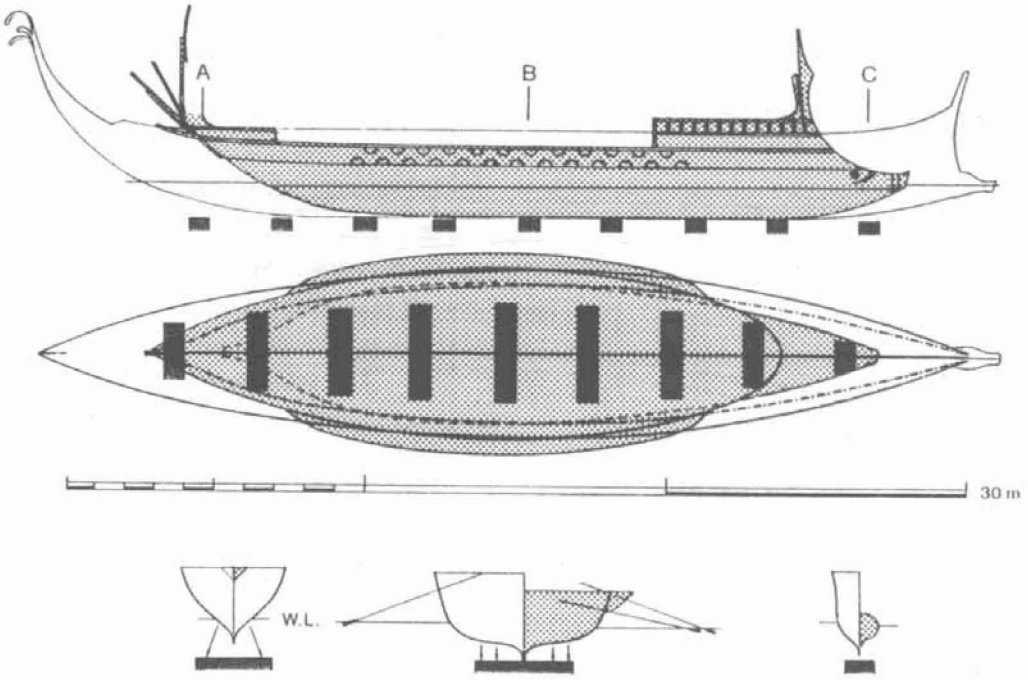

2

g. 2

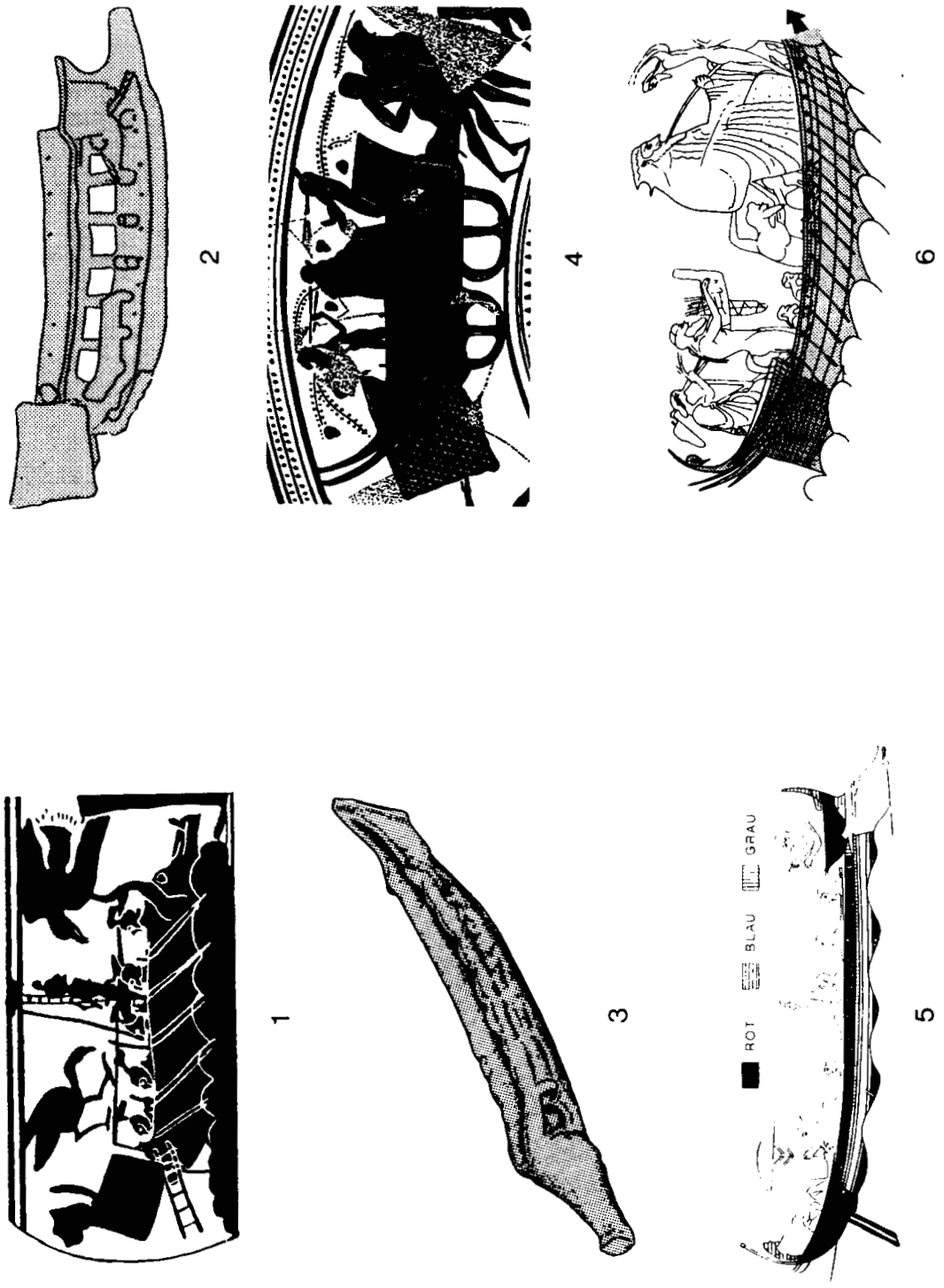

Fig. 3

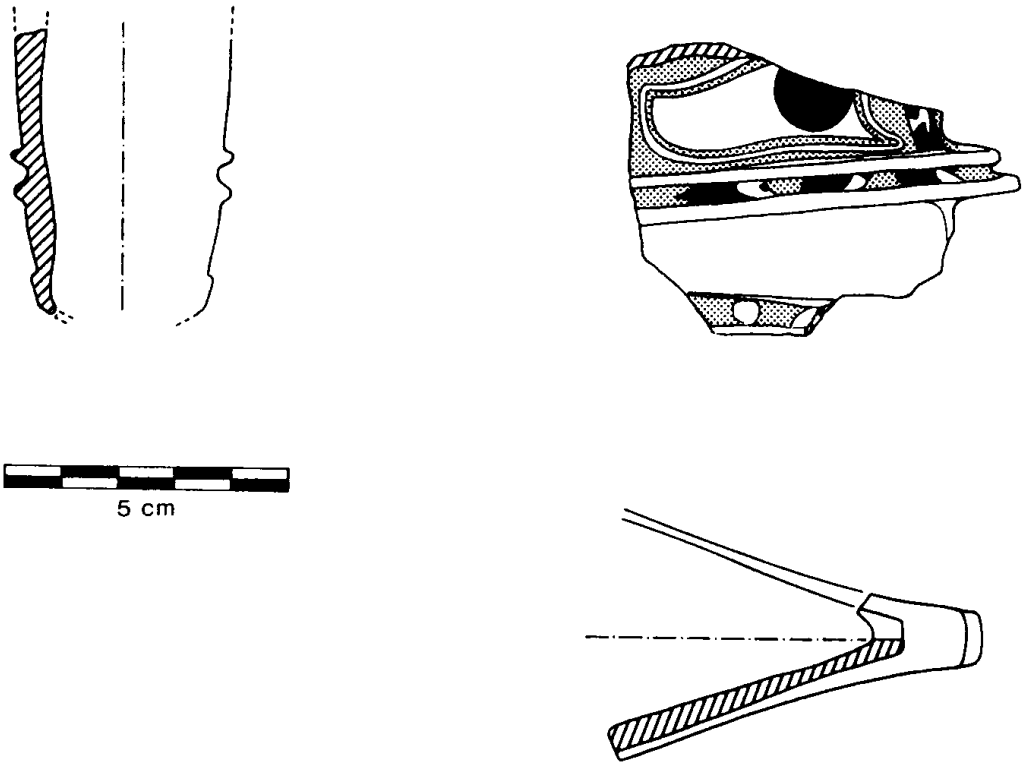

Fig. 4