

VI.—The Isis and Her Voyage

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Lucian in his *Navigium* has described one of the great Roman grain ships and given an account of one of its voyages. His remarks are to be found in all the classical handbooks for, along with the record of St. Paul's famous voyage, they form the only intimate glimpse preserved for us of that mainstay of Rome's economic life, the fleet that transported Egyptian grain from Alexandria to Rome. Yet no one has ever taken up compass and chart and studied the vessel's journey. As a result, a key passage in Lucian's account has been consistently mistranslated and, what is more important, the route followed by the grain ships and the reasons why this route was taken have never been properly worked out. Moreover, the estimates hitherto offered of the vessel's capacity range from 1100 to as high as 3500 tons burden. Re-examination of this problem will reveal that the true figure is 1200–1300.

THE VOYAGE

Lucian saw the Isis — for such was her name — in the harbor of Peiraeus, obviously hundreds of miles off her course, and from her sailing master he learned the details of the journey that had brought her there. Let us examine in detail what he tells of her voyage (*Navig.* 7–10).

After clearing Alexandria, probably sometime between the spring and early fall,¹ the vessel was carried, Lucian tells us, by a moderate wind in seven days to Cape Acamas on the west coast of Cyprus. Why head for Cyprus when Rome lay far to the west of that point? The publications of the Hydrographic Office provide the answer:

¹ Vegetius 4.39. The experience of St. Paul reveals what happened when ships cleared Alexandria late in the year. The grain ship on which he was travelling was heading for Phenice on the south shore of Crete to spend the winter there when it was struck by the storm that brought him to shipwreck at Malta (Acts 27:12). From Malta he made his way in a grain ship that had been forced to spend the winter there; cf. James Smith, *The Voyage and Shipwreck of St. Paul*³ (London 1866) 261–2. In the Middle Ages Venetian ships were prohibited by law from returning from Alexandria, Syria or Constantinople between 15 November and 20 January; cf. Auguste Jal, *Archéologie navale* (Paris 1840) 2.261–2.

"from June to September . . . the windroses between the 30th and 35th parallels, 20th to 35th meridians (i.e., from Egypt to Crete and from Cephallenia to Syria; see figure 1) show almost as steady a northwesterly direction as would be found from the north-east in many parts of the northern trade wind belts of the open ocean."² Rome lies practically due northwest of Alexandria, right in the eye of the prevailing wind. This is the worst possible course, for a sailing ship cannot travel into the path of the wind but must go at an angle to it. In the case of square-rigged vessels — and all ancient ships were so rigged — this angle was as wide as 80°; any smaller would cause a ship to lose way and eventually stop. In the language of the sea, ancient ships had to sail seven points off the wind, i.e. they could lie no closer to the direction of the wind than a course seven compass points away.³ In heading for Cyprus, the Isis was sailing NNE. The prevailing wind we know is northwesterly. And a northwesterly wind is seven compass points away from NNE.⁴

The ship must therefore have sailed for seven days on a port tack, i.e. with the wind blowing over her port bow, struggling to keep as close to the direction of the wind as possible and thereby

² *Sailing Directions for the Mediterranean* iv (United States Navy Hydrographic Office, No. 154A, Washington, D. C. 1942) 32–33. The narrative of Nelson's experiences in these waters in the months (June, July) before the Battle of Abukir is studded with references to these northwest winds; cf. Sir Edward Berry, *Authentic Narrative of the Proceedings of His Majesty's Squadron under the Command of Rear-Admiral Sir Horatio Nelson from its Sailing to Gibraltar, to the Conclusion of the Glorious Battle of the Nile* (Edinburgh 1798) 7, 8, 15.

³ Cf. Smith, *op. cit.* (note 1) 123 n. and 208; E. Keble Chatterton, *Sailing Ships and their Story*² (Philadelphia 1923) 45. The great stride in sailing against the wind was the invention of the lateen sail and its descendant, the fore-and-aft rig. The latter enables modern craft, for example, to get as close as five points off the wind.

⁴ NW to NNE = 6 points (NW–NWxN–NNW–NxW–N–NxE–NNE); the wind must have been NWxW, just one point west of NW. The problem that faced the Isis remained until the days of steam. Nelson, for example, after the Battle of Abukir in August 1798 ordered de Saumarez, one of his captains, to return to Gibraltar with seven ships of the line and six French prizes. On 15 August de Saumarez weighed anchor and on 19 August we find him not headed west for Gibraltar at all but working NNE for he had "just gained sight of Cyprus, [on] nearly the track we followed [in a previous voyage] six weeks ago; so invariably do the westerly winds prevail at this season." (J. Ross, *Memoirs and Correspondence of Admiral Lord de Saumarez* [London 1838] 1.236–244, esp. 243–4.) He was beating against the same wind that had faced the Isis over 1500 years before. The Isis, incidentally, was a slow ship. It took her about six days to cover the ground that de Saumarez with a motley group of crippled ships did in four or somewhat less. Since the distance is 250 odd nautical miles her speed works out to less than 2 knots. Such speeds are what one would expect in view of the relatively small sail area that ancient merchantmen carried.

pass to the left of Cyprus and make straight for the coast of Asia Minor.⁵ Off Cape Acamas, we are told, the west wind "blew against" the Isis and forced her off course to Sidon. Normally a west wind would be most welcome. It would enable the ship to steer seven points away from west, due north instead of NNE, and this would increase immeasurably the chances of squeezing by to the left of Cyprus. This particular west wind, however, drove the Isis in the opposite direction. There is only one explanation: we must assume that the wind was of gale force and that the sailing master prudently decided to run before it. Probably the wind was not directly from the west but from a little north of west, for a vessel scudding from a point south of Cyprus before such a wind will be carried, precisely as the Isis was, to Sidon. Gales in these waters during the summer are very rare,⁶ so this must have been a stroke of most unexpected bad luck.

From Sidon we next learn that the Isis, although hit by a heavy storm, managed to sail through the straits between Cyprus and the mainland and reach the Chelidonian Islands off the coast of Lycia in nine days. Presumably she worked, following local offshore breezes, along the Syrian coast to Cape Andreas on the northeast tip of Cyprus and from there followed the south shore of Asia Minor. Despite the storm the ship made much better time than on the first leg to Cyprus.⁷ The coast winds must have been favorable, and along the south shore of Asia Minor she was no doubt helped by the current which there sets to the west.⁸

Off the Chelidonians the Isis narrowly avoided shipwreck. She was sailing, we are told, on a SW x S wind. Her course at that time must have been due west but, on such a wind, the best she could do would be to head WNW on a port tack. A ship sailing WNW along the south coast of Asia Minor will inevitably run ashore at some point on the starboard, and the Isis almost did precisely that. The skipper saved his ship, Lucian tells us, by turning to the open sea on his left. However, merely to have headed her to the left away from the coast would have put her too

⁵ The grain ship that St. Paul boarded in Myra (Acts 27:6) must have come this way: Alexandria — left of Cyprus — Myra.

⁶ None was recorded between 1885 and 1933; cf. *Sailing Directions* (note 2) 313.

⁷ It is 145 nautical miles from Sidon to Cape Andreas and 320 from there to the Chelidonians. The Isis made it in nine days, which works out to better than two knots. She had made less than two before (see note 4).

⁸ Cf. Smith, *op. cit.* (note 1) 68.

close to the wind, stopped her completely and left her to drift helplessly. The skipper must have spun her 160° about and sent her off SE on a starboard tack.

From this point on we are merely told that "having once fallen off her course, she made her way through the Aegean . . . beating against the Etesian winds to Peiraeus." There are two puzzling points here. Why is the Isis found in the Aegean? It is not in her line of course. Once there, why did she head into foul winds to make a destination even further off course?

Both questions can be answered if we assume that the SW x S wind that had almost spelled doom off the Chelidonians continued to blow. Such a wind would force the Isis to travel on a port tack since a starboard tack would carry her back toward Alexandria and a course with the wind aft or on the quarters would carry her back toward Asia Minor or Syria. Now, a port tack would edge her steadily northward and thrust her finally into the Aegean. Once in this area the skipper very likely decided to take a chance that this wind would hold long enough to enable him to reach Peiraeus and give his ship a much-needed rest. On a SW x S wind Peiraeus, lying roughly to the northwest, was a logical destination. However, the prevailing winds in the Aegean, the Etesian winds as the Greeks called them, are northerly.⁹ At some point after the skipper elected to head for refuge, the wind must have shifted to its prevailing direction and the Isis once again had to tack wearily against foul winds.

What route would have been taken under ordinary circumstances? The sailing master finished up his account to Lucian by mentioning that the Isis was seventy days at sea. Then he adds "(the crew) should have been in Italy by this time had they traveled *τὴν Κρήτην δεξιὰν λαβόντας ὑπὲρ τὴν Μαλέαν πλεύσαντας*." This passage is of fundamental importance. Here we learn the exact route taken by the grain fleets. It is a course which in the light of the sailing conditions of the area makes excellent sense. Yet the passage has never been correctly translated.

Consider the most recent rendering, that of the Fowlers: "whereas if they had taken Crete on their right, they would have doubled

⁹ The northerly winds of the Aegean "reach the exceptional frequency of 80 per cent or more in July and August," *Sailing Directions for the Mediterranean* v (United States Navy Hydrographic Office, No. 154B, Washington, D. C. 1945) 25. Cicero tells Atticus (*Ad Att.* 6.7) that he wants to go from Rhodes to Athens "etsi etesiae valde reflant."

Malea, and been in Rome by this time."¹⁰ All other translations say more or less the same thing: leave Crete on the right and pass by Malea.¹¹ Even the nautical experts concur.¹²

A moment's study of the map will reveal one indisputable fact: a ship coming from the south shore of Asia Minor cannot both keep Crete on its right — i.e., sail south of Crete — and pass, much less double, Cape Malea. If a skipper headed south of Crete — and the winds dictated such a course, as we shall see in a moment — he would from there make straight for Malta, going nowhere near Malea. The only possible translation for the passage is "keeping Crete on the right and sailing beyond (i.e., avoiding) Malea."

After sailing along the south shore of Asia Minor the grain ships normally would put in at Rhodes or at Cnidus, as the vessel carrying St. Paul did (Acts 27:7),¹³ and as the Isis would have, had she not been driven into the Aegean. From here it is hard to resist laying a course north of Crete due west to Malea. But a sailing vessel cannot travel west on northwest winds and these are the ones, as we have seen before, that prevail in these waters. The best it can do is sail SW x W, a course that will ultimately force it ashore somewhere on the north coast of Crete. The grain ship that was carrying St. Paul to Rome cleared Cnidus and "the wind not suffering us," says Luke (Acts 27:7), "we sailed under Crete."

¹⁰ H. W. and F. G. Fowler, *The Works of Lucian of Samosata* (Oxford 1905) 4.36.

¹¹ "Creta ad dexteram relicta supra Maleam tenendo cursum" (Bourdclot [Paris 1615] 934); "laisser l'Isle de Candie à main droite, et prendre au dessus du Promontaire de Malée" (Perrot [Paris 1707] 3.146-7); "leaving Crete on their right and passing Malea" (Francklin [London 1781] 4.202); "kept Crete on the starboard and sailed round the promontory of Malea" (Tooke [London 1820] 1.174); "Creta zur Rechten hätten liegen lassen, am Vorgebirge Malea vorbeisteuern" (Pauly [Stuttgart 1830] 3.1533-4); "dextram legentes Cretam, Malea superato" (Hemsterhuys and Gesner [Amsterdam 1743] 3.254 and repeated by Lehmann [Leipzig 1829] 8.157 and by Dindorf [Paris 1867] 654); "laisser la Crète à leur droit, doubler le cap Malée" (Talbot [Paris 1857] 2.339); "keeping Crete on the right and steering past Malea" (S. T. Irwin, *Six Dialogues of Lucian* [London 1894] 65).

¹² E.g., Arthur Breusing, not a classical scholar but a professional seaman, paraphrases "Kreta zur rechten lassen und ihren Kurs oberhalb Malea vorbei nehmen" (*Die Nautik der Alten* [Bremen 1886] 153). E. Keble Chatterton, author of a shelfful of popular works on sailing and the sea, quotes Irwin's translation (see note 11) with approval (*Ships and Ways of Other Days* [London 1913] 60; cf. *Sailing the Seas* [London 1931] 78-9).

¹³ When Herod left Alexandria for Rome in 40 B.C. he first went to Pamphylia (where, like the Isis, he was nearly wrecked by a storm) and then put in at Rhodes (Joseph. *BJ* 1.280).

Seventeen centuries later, Admiral de Saumarez, one of Nelson's captains, en route to Gibraltar from Abukir, after weathering Rhodes elected to try to pass north of Crete, although in previous journeys Nelson had led the fleet south.¹⁴ For days he beat fruitlessly against the foul northwest winds and finally gave up the attempt.

There was another excellent reason for sailing south of Crete. This is the reason that Lucian's sailing master gives but that translators have never recognized. A vessel *kept clear* of Malea that way. Malea was the sailor's nightmare; even modern steamers occasionally have trouble rounding it.¹⁵

Lucian does not go into the final leg of the journey, from Crete to Rome, but it is not hard to work out. The northwest wind leaves little choice. After traversing the south shore of Crete the ships would head west for Malta.¹⁶ This would involve constant

¹⁴ Ross, *op. cit.* (note 4) 1.249, cf. 253. Nelson knew better. On 26 August he was sailing with de Saumarez off the Chelidonians (J. S. Clarke, *The Life and Services of Horatio Viscount Nelson* [London 1840] 4th division, 135). Leaving his subordinate to his own devices, the admiral smartly shaped a course for the south of Crete as he always did (*The Dispatches and Letters of Vice Admiral Lord Viscount Nelson*. With notes by Sir Nicholas Harris Nicolas [London 1845] 3.92). While de Saumarez was fruitlessly trying to get north of Crete, the admiral pulled ahead of him (Ross, *op. cit.* note 4, 1.249-50) and eventually left him far behind, arriving off Cape Heracleum on 8 September (Nicolas, 116, n. 4), while de Saumarez did not sight Aetna until the 13th (Ross, 258).

¹⁵ For ancient references see M. Besnier, *Lexique de géographie ancienne* (Paris 1914) 459.

¹⁶ The most complete account of the Alexandria-Rome grain route hitherto available was in W. M. Ramsay's detailed article "Roads and Travel (in the New Testament)," *Hastings' Dictionary of the Bible*, Extra Volume (Edinburgh 1904) 375-402. Ramsay's only weakness is his failure to understand the importance of the direction of the wind on sailing vessels. The route went south of Crete, he says (380), because the north shore of that island had few harbors. The wind, not the harbors, dictated the course as Smith (*op. cit.* note 1, 76-81) had pointed out years before. Ramsay suggests (380) that from Crete vessels traveled to the south point of Cythera, from there to Zacynthus, and then across the Adriatic. The suggestion is repeated by H. S. Jones in his *Companion to Roman History* (Oxford 1912) 50. This is armchair navigation. Such a course is out of the question in an area of northwest winds (cf. *Sailing Directions for the Mediterranean* II [United States Navy Hydrographic Office, No. 152, Washington, D. C. 1941] 33 and 38). It took Belisarius, for example, 16 days to make the 80 miles from Zacynthus to Sicily (Procopius, *History of the Wars* 3.13.21-3). Procopius mentions only the fact that the winds were light but we may be sure they were foul as well. Compare the experiences of Philotimus, Cicero's freedman, when he carried a letter from Caesar in Egypt to his master in Brindisi (cf. Cic. *Pro Ligar.* 7). We are not told when he left Alexandria but we do know that he reached Rhodes on the 26th of May (*Ad Att.* 11.23) and did not arrive at Brindisi until August 12 (*Ad Fam.* 14.24, 23). A certain Agusius who brought Cicero advance

tacking:¹⁷ a series of long starboard tacks SW x S with shorter port tacks NE x N. From Malta a course would be shaped NNE for Syracuse (cf. Acts 28:12) and from there N x E for the Straits of Messina. If the wind held at NW, with careful handling Syracuse could be made on one long port tack but Messina would require long port alternating with short starboard tacks. From Messina

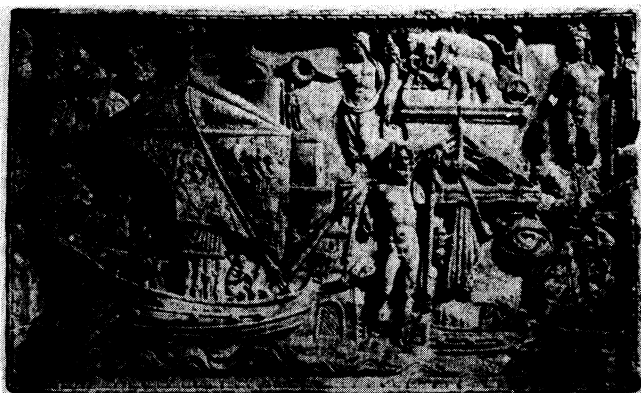


FIG. 2

to Puteoli, a course roughly NNW, a vessel would have to tack steadily unless, as happened to St. Paul (Acts 28:13), the skipper was willing to wait over at Rhegium for a southerly breeze which would carry him directly and easily northward.

The voyage, then, from Alexandria to Rome was a continuous fight against foul winds. We have seen (footnote 4) that, sailing against the wind, the *Isis* averaged two knots. The course we have

news of Philotimus did somewhat better. He left Rhodes sometime after the 27th day of May and arrived at Brindisi 8 July (*Ad Att.* 11.23). E. Keble Chatterton, a seaman, knew better than Ramsay; he suggests that from Crete vessels took long tacks over toward the North African shore (*Sailing the Seas*, 76). Ramsay further assumes (380) that the *Isis* had actually sailed south of Crete, had doubled its west tip for the leg to Cythera and then was driven by southerly winds into the Aegean. This is an explanation that shows a cavalier disregard for the requirements of Lucian's Greek as well as for those of navigation. St. Paul's story (Acts 28:11) is evidence that the grain ships put in at Malta.

¹⁷ Sir Edward Berry (*op. cit.* note 2, 9) mentions that Nelson was forced to steer "along the south side of Candia carrying a press of sail both night and day with a contrary wind." The northwest winds continue to Malta (cf. the previous note). Around Syracuse they are replaced by northeast winds while northeast and northwest winds are common around Messina (*Sailing Directions for the Mediterranean* II, 37, 38).

just worked out, excluding the ground covered in tacking port and starboard, is about 1700 nautical miles. The minimum time for the journey, even allowing for the fewest and shortest stopovers along the way, could not have been much under the seventy days mentioned by the sailing master.

The outward journey, on the contrary, was a sailing master's dream. Alexandria lies roughly southeast of Rome. The prevailing northwest winds that made the return such an uphill battle were beautifully fair the other way. Once past Messina a course was set directly for Alexandria across the open sea and the distance that way is but 1000 nautical miles.¹⁸ The trip could probably be made in twenty to twenty-five days.¹⁹

THE SHIP

Let us turn now to the question of how much cargo a grain ship could carry.

Lucian has preserved for us Isis' exact dimensions (*Navig.* 5). Her length was 120 cubits (180'), her beam more than a quarter of that (45' plus), and the distance from the deck to the bottom of the hold 29 cubits (43½'). Both classical scholars and nautical experts have tried by using these figures to work out the vessel's capacity. The variation in their conclusions is so great that it is hard to believe that they are all dealing with the same ship. Here are, in rough chronological order, the estimates of Isis' burden that have been put forth so far: Jal²⁰ ca. 1500 tons, Graser²¹ 1575

¹⁸ Pliny, *NH* 19.3 cites the case of a vessel that made Alexandria from Puteoli in 9 days. This gives an average speed of 5 knots if we assume that she traveled over the open sea direct for Alexandria. The distance that way is 1000 nautical miles. If we assume any longer route the average speed would work out to one beyond the capabilities of ancient sailing vessels. Venetian ships in the Middle Ages traveled down to Crete and then over the open sea to Egypt; cf. K. Kretschmer, *Die italienischen Portolane des Mittelalters* (Veröffentlichungen des Instituts für Meereskunde und des geographischen Instituts an der Universität Berlin, Heft 13, 1909) 30. Mediaeval vessels traveling from Marseilles to Accon went over the open sea; cf. A. Schaubé, *Handelsgeschichte der romanischen Völker des Mittelmeergebiets bis zum Ende der Kreuzzüge* (Below's *Handbuch der mittelalterlichen und neueren Geschichte*, III. Abteilung, Munich 1906) 153.

¹⁹ The ship that Pliny mentions (see n. 18) must have been a fast dispatch boat. In the Middle Ages Benjamin of Tudela traveled from Messina to Egypt in 20 days; cf. Schaubé, *op. cit.* (note 18) 153-4. A Venetian vessel made Venice-Alexandria in 23 days; cf. Wilhelm Heyd, *Geschichte des Levantehandels im Mittelalter* (Stuttgart 1879) 2.447, n. 2.

²⁰ Jal, *op. cit.* (note 1) 2.154; cf. 150-1. Jal based his figures on the rather close resemblance of the Isis' dimensions to those of a French third-rate. Comparison with

(also found in some of the handbooks²²), Smith²³ 1100–1200, Breusing²⁴ 2672, Assmann²⁵ 2000, Köster²⁶ 3000–3500 (accepted by Miltner in the latest article in Pauly-Wissowa²⁷). Torr in his discussion of Roman merchantmen, although avoiding the issue directly,²⁸ gives the impression that he considers the largest ships as a rule no greater than 250 tons.²⁹

To make the picture a little more concrete, let me point out that the estimates of 1100–1575 tons would make the Isis roughly the size of a heavy frigate such as our famous *Constitution*; 2672, the equivalent of one of the heaviest ships of the line such as

later ships is, as we shall see below, the only proper procedure. For plans of a standard French third-rate see F. E. Paris, *Souvenirs de marine. Collection de plans ou dessins de navires et de bateaux anciens ou modernes existants ou disparus*, Part 5 (Paris 1892) no. 249.

²¹ *De veterum re navali* (Berlin 1864) 47.

²² Cf. J. Marquardt, *Das Privatleben der Römer*² 406 and n. 9; L. Friedländer, *Darstellungen aus der Sittengeschichte Roms*¹⁰ 1.425, n. 10.

²³ *Op. cit.* (note 1) 181–4. Smith arrived at his conclusion by comparing the Isis with two British ships of known dimensions and tonnage. However, he chose his ships rather arbitrarily: he took one of one shape and a second of another, compared the Isis with both, derived two possible figures and chose the middle between the two.

²⁴ *Op. cit.* (note 12) 157. A. C. Johnson (*ESAR* 2.402, n. 42) gives 2700, a figure arrived at by a member of the Princeton engineering department to whom he had submitted the problem and who probably used the same formula as Breusing.

²⁵ S.v. "Seewesen" in Baumeister's *Denkmäler des klassischen Altertums* (Munich and Leipzig 1888) 1622.

²⁶ *Das antike Seewesen* (Berlin 1923) 165.

²⁷ S.v. "Seewesen," *RE*, Supplbd. 5 (1935) 921–2.

²⁸ *Ancient Ships* (Cambridge 1895) 25.

²⁹ *Ibid.* 25, cf. 30. This statement by Torr is responsible, I believe, for the statements occasionally found that the average capacity of Roman grain ships was 250 tons; cf., e.g., G. S. Laird Clowes, *Sailing Ships. Their History and Development as Illustrated by the Collection of Ship-Models in the Science Museum*³ (London 1948) part 2, 11–12. R. M. Blomfield, who wrote the article on "Ships and Boats" in *Hastings' Dictionary of the Bible*, Extra Volume (Edinburgh 1904), on page 366 actually assigns the Isis that capacity. If there is one thing that is certain it is that the Isis was not that small. Jules Sottas, writing on "A Model of the Portus Ship" in *Mariner's Mirror* 21 (1935) 144–152, claims (149–50) that "we know that the average load of the merchant ships employed in the provisioning of Rome in the first centuries of the Roman Empire was 10,000 modii or 86 tons." We know nothing of the sort. This singular statement, I suspect, arises from a misunderstanding of a certain edict of the Emperor Claudius which is always mentioned in connection with the history of the grain service. Claudius offered special benefits to navicularii who would furnish the grain fleet with ships that could carry 10,000 modii or more (Suet. *Claudius* 18–19 and Gaius 1.32c). To conclude from this that ten thousand modii was the average size is to misunderstand the passage completely. The figure gives the floor that Claudius is establishing; he will accept no ship smaller. The interesting point here is that the Emperor was willing to accept such diminutive craft. It indicates that some crisis was at hand and he was scraping the bottom of the transportation barrel.

Nelson's flagship *Victory*; and 3000–3500, the equal of the greatest 19th-century clipper ships.

By this time one point must be abundantly clear: Lucian's three dimensions, although precise and unambiguous, are in themselves not enough for determining the vessel's capacity. An additional figure is necessary, namely the length of the keel. If Isis were a stubby bluff-bowed craft like a British East Indiaman, for example, her keel would be very long and as a consequence she would have roomy cargo holds fore and aft as well as amidships. But if she were built with a keel much shorter than her overall length she would have enormous overhangs fore and aft, much like the ships of the 16th century, and the only area where she could accommodate sizeable amounts of cargo would be amidships.³⁰ We must determine the length of the Isis' keel. To do that we must gain some idea of what the ship looked like.

There are a number of representations of Roman sailing ships preserved. They include two that are especially fine, one on a relief found at Ostia (figure 2),³¹ the other on a sarcophagus from Sidon.³² The ships in these two reliefs are practically identical in general shape and rigging. Other representations, although not nearly as well preserved or as detailed, clearly show ships that in all important respects are the same as those on the reliefs.³³ In other words, merchantmen of the Roman Empire ran to type much as tramp steamers do today. The question is whether this is particularly true of grain ships. Here numismatics comes to our aid. A coin issued by Commodus to celebrate his care for the grain service bears a picture of a ship which, in shape of hull and rigging, is the sister of those in all the other representations.³⁴

³⁰ A Portuguese carrack captured by the British in 1592 had an overall length of 165' and a length along the keel of 100'. The famous *Sovereign of the Seas* was practically the same length overall as the carrack (167') but had a keel 128' long; cf. G. C. V. Holmes, *Ancient and Modern Ships* (London 1906) 1.96, 101 and 110.

³¹ Reproduced in numerous handbooks in line drawing. Photograph is taken from M. Rostovtzeff, *The Social and Economic History of the Roman Empire* (Oxford 1926) plate 21, no. 1.

³² Described, with photograph and line drawing, by G. Contenau in "Mission archéologique à Sidon (1914)," *Syria* 1 (1920) 16–55.

³³ E.g., Torr, *op. cit.* (note 28) plate 6, nos. 26, 27; cf. Contenau, *loc. cit.* (note 32) 42; F. Moll, *Das Schiff in der bildenden Kunst* (Bonn 1929) B.IV.93 (relief), B.VII.11 and 11a (lamp), B.Xa.11 (mosaic), C.I.52 (Christian sarcophagus), E.III.8690 (gem).

³⁴ Harold Mattingly, *Coins of the Roman Empire in the British Museum* IV (London 1940) p. 808, no. 588, plate 106.11 and cf. p. clxiii; Harold Mattingly and E. A. Sydenham, *The Roman Imperial Coinage* III (London 1930) p. 422, no. 487, plate 16.331 and

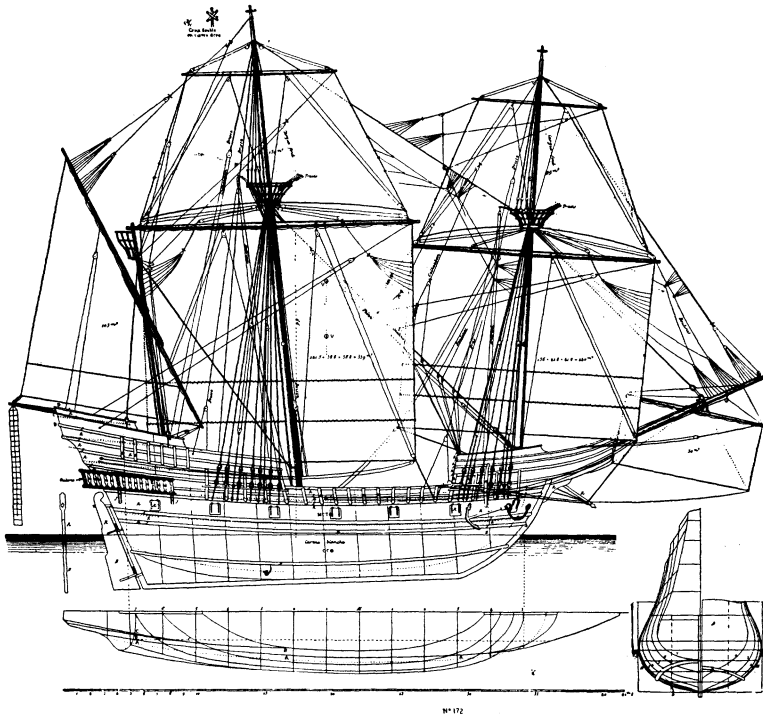


FIG. 3

The Isis, then, looked like the vessel pictured in figure 2. Our next step is to find some sailing ship from any period of history which has the same general shape as these Roman merchantmen and whose length of keel and other dimensions are known. We can then by proportion deduce the length of the Isis' keel. It is not necessary to search for a ship with exactly the same or even with approximately the same dimensions as the Isis. One in which the relation between the dimensions is the same will do as well.

cf. p. 359. The relief from Ostia (figure 2) includes a representation of the lighthouse at Portus and, in the upper lefthand corner, a female figurine with a lighthouse on her head, no doubt the tyche of some harbor city. She has generally been taken to symbolize Alexandria. Because of the presence of these two symbols it has been assumed that the ships represented were used in the Rome-Alexandria run. The numerous representations of Bacchus in the relief point to the wine trade. Perhaps the ships carried wine to Alexandria and returned with grain. See K. Lehmann-Hartleben, *Die antiken Hafenanlagen des Mittelmeeres*, *Klio*, Beiheft 14 (1923) 235-6 and Moll, *op. cit.* (note 33) p. 24.

A Venetian man-of-war of the 16th century (figure 3),³⁵ so far as I can see, fits all our requirements perfectly. Its shape is precisely what we want. It is in general a much smaller ship than Lucian's, but its proportions are astonishingly similar:

	Isis	Venetian Man-of-War
Overall Length	180'	ca. 119'
Beam	45' = 25% of length	29½' = 25% of length
Bottom of Hold to (presumably) Highest Deck	43½' = slightly less than beam	28½' = slightly less than beam

The keel of this Venetian ship is 75½' long or ca. 63½% of its overall length. The length of the Isis' keel works out therefore to ca. 114'.

We must be sure in computing the Isis' capacity to use the formula traditionally used in determining the size of sailing ships. When our schoolchildren learn that the *Bon Homme Richard* and the *Serapis* were about 1000 tons burden, or British schoolboys are told that Nelson's *Victory* was about 2700 tons, they are not being given the actual measured capacity of these ships. Size of sailing vessels has traditionally been computed by a rough very simple formula:³⁶

$$\frac{\text{length of keel} \times \text{beam} \times \text{one half of beam}}{94}$$

We are now in a position to calculate the tonnage of Lucian's ship:

$$\frac{114' \times 45' \times 22\frac{1}{2}'}{94} = 1228 \text{ tons}$$

The Isis thus was not 1500 or 2000 or 2700 or 3500 tons but 1200 to 1300,³⁷ just about the estimate that Smith had offered a century ago. This by no means makes her a small ship. Since her time, 1200-ton ships were unheard of until the age of Henry VIII and then such a size was to be found only in warships. Merchant

³⁵ Figure 3 is taken from Paris, *op. cit.* (note 20) part 3, no. 172.
³⁶ See David Steel, *The Elements and Practice of Naval Architecture* (London 1822) 210, and cf. 212–3; cf. Smith, *op. cit.* (note 1) 182.
³⁷ In computing the tonnage I used the actual length of the keel of the Venetian ship instead of the "length of keel for tonnage" (cf. Steel, *op. cit.* note 31, 210). The latter involves certain dimensions which we do not have for this ship. Had I used it, the ultimate tonnage would not be much different from the 1228 worked out above, perhaps a bit larger. It was to cover this and other possible chances for slight error either way that I have given Isis an approximate figure, 1200–1300 tons burden.

vessels this large were not built again until the carracks of the 16th century, and large carracks were the exception rather than the rule and eventually died out. The merchantman of 1200 tons first appears in any considerable numbers in the fleets of the East India Company around the end of the 18th and the beginning of the 19th century. The *Isis* was a sizeable vessel. She was but a bit smaller than the heavy American 44-gun frigates and almost as large as the largest East Indiamen. Her size was not really surpassed until the building of the great 19th-century clipper ships in the last days of sail.

Nor was the *Isis* an isolated example of a great vessel like the huge monsters that were specially built to carry stone obelisks to Rome. In a subsequent article I shall show that she was but one of a fleet of similar ships and that this fleet was of a magnitude unsurpassed until the 19th and 20th centuries.