

BYZANTIUM AND THE SEA: BYZANTINE FLEETS AND THE HISTORY OF THE EMPIRE IN THE AGE OF THE MACEDONIAN EMPERORS, C.900–1025 CE

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WHEN Basil I (867–86), the founder of the ‘Macedonian’ dynasty, seized the throne, the Byzantine Empire was at one of its recurrent nadirs. Crete had fallen to Spanish Muslims around 824. Effective authority over Cyprus and Rhodes had been lost much earlier. Cilicia was in the hands of Muslim corsair emirs. In the North, the Empire was under pressure from the Patzinaks, Magyars, and Bulgars. In the West, Byzantine presence in south Italy was ephemeral.

By the death of Basil II (976–1025) it all looked very different. The maritime approaches to the Empire from the south and west had been secured by the re-establishment of firm rule in south Italy during the reign of Basil I and by the reconquest of Crete in 960–1, Cyprus in 965, Rhodes at some unknown date, and Cilicia and northern Syria in the second half of the tenth century. Basil II destroyed the First Bulgarian Empire in 1018 and pushed the northern frontier back to the Danube, where it remained in spite of occasional Patzinak pressure.

In all of this, Byzantine fleets played operational roles at various times. By the Macedonian era, these consisted of an ‘imperial’ fleet based on Constantinople commanded by the δρουγγάριος τοῦ πλοΐμου (*droungarios tou ploimou*), ‘admiral of the fleet’, and the thematic fleets of the Kibyrrhaiōtai based at Attaleia, the northern Aegean (theme of *Aigaion Pelagos*, Aegean Sea), and the southern Aegean (theme of Samos, based at Samos), each under their στρατηγοί (*stratēgoi*), generals/admirals. Squadrons were also stationed in the Peloponnēsos and elsewhere at various times.

The Sources

What we actually know about the ships of which Byzantine fleets were composed, and the tactics and strategies they employed, is frustratingly little. One of the major problems lies in the sources. One text which has been used by

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maritime historians in the past without adequate attention to its character is now known not to have been a description of the construction of tenth-century Byzantine war galleys, δρόμωνες (*dromōnes*) and χελάνδια (*chelandia*) at all, but rather a juvenile exercise in the philology of nautical terminology. This is the anonymous treatise, *Naval Warfare*, commissioned by Basil the Patrician and Parakoimōmenos (the work hereafter referred to as the *Anonymous*), which survives only at folios 339–42 of the manuscript Milan, Biblioteca Ambrosiana, MS B 119-sup. [gr. 139]. Hitherto edited only by Alphonse Dain, his edition was produced under the worst circumstances imaginable during the Second World War and is totally unreliable.¹ The author is now deduced to have been a young retainer of Basil the Parakoimōmenos (fl. 944–85), who ransacked sources such as the *Onomasticon* of Julius Pollux (second century CE), the *Lexicon* of Hesychios of Alexandria (fifth century CE), and a manuscript of Thoukydidēs' *Peloponnesian War* with scholia, to produce a purported description of tenth-century Byzantine war galleys that had much more in common with τριήρεις (*triēreis*) of Themistoklean Athens. His audience would have recognised his treatise for what it was, as he intended.

The other major text to which maritime historians have traditionally turned in order to understand the Byzantine navy is Constitution XIX of the *Taktika* of Emperor Leo VI (886–912). In the Ambrosiana manuscript, this constitution was excerpted from the complete text of the *Taktika* by the compiler of the manuscript and included together with the *Anonymous* in a separate section of the manuscript devoted to naval warfare. Dain's edition of Leo is just as faulty as that of the *Anonymous*.² Moreover, in spite of the fact that Leo explicitly said that, in compiling Constitution XIX, he used old or ancient tactical manuals, historians have not appreciated the extent to which the emperor's treatise was an exercise in book learning. He used Thoukydidēs and early manuals of strategy, especially the sixth-century *Stratēgikon* attributed to one Maurice and some chapters on naval warfare attributed to a certain Syrianos Magistros, also dated to the sixth century.³ Additionally, in spite of the fact that Leo said that he had also consulted with his *stratēgoi*, it can be shown that Constitution XIX fairly reeks of 'arm-chair sailing', of cute stratagems devised by the emperor in front of a fireplace in the imperial palace in Constantinople. Leo VI had no practical experience of warfare, neither at sea nor on land.

Later in the tenth century, Leo's Constitution XIX, as also his whole *Taktika*, was closely paraphrased by Nikephōros Ouranos, a practised general and

¹ *Naumachica Partim Adhuc Inedita*, ed. A. Dain (Paris, 1943), 57–68. New editions and translations of this and the other texts used here will appear as appendices to *The Byzantine Navy*. However, for the sake of convenience, references here are still given to Dain's edition.

² Ναυμαχικά Λέοντος Βασιλέως ed. Dain in *Naumachica*, 15–33.

³ G. T. Dennis and E. Gamillscheg, eds, *Das Strategikon des Maurikios* (Vienna, 1981). The chapters of Syrianos Magistros also survive only at folios 333r–338v of the same Ambrosiana manuscript. It was edited as Syrianos Magistros, Ναυμαχία Συριανοῦ Μαγίστρου, in Dain, *Naumachica*, 43–55.

magistros in land warfare, as chapter 54 of his own *Taktika*. Dain's edition of this, from the sixteenth-century manuscript Florence, Biblioteca Medicea Laurenziana, MS Laurentianus LVII–31,⁴ is equally as unreliable by comparison to the manuscript Munich, Bayerische Staatsbibliothek, Cod. Monac. 452, from which the Florence manuscript was copied in 1564 and which Dain had wished to use had his transcripts not been lost in the war. Nikephōros Ouranos reiterated many of the impractical stratagems of Leo VI, either because he had no naval experience himself or else perhaps because he was constrained by deference to the revered great-grandfather of the current emperor, Basil II, in order to have his own work accepted for 'publication' in the highest circles of Byzantine court society.

A third major text on which maritime historians have relied heavily is the supposed inventories for the expeditions to recover Crete in 911 and 949, which for some unknown reason were excerpted and included at books 44–5 in the problematic compilation attributed to the auspices of Constantine VII Porphyrogennētos and known as the *De Cerimoniis*. These inventories are incomplete, fraught with orthographical transmission problems, and were the product of non-nautical bureaucratic clerks rather than of seamen. However, at least we have a fundamentally reliable edition of this text from the unique manuscript, Leipzig, Univ./Urb., MS 28 [Rep. i.17],⁵ emendations made by scholars in recent years, and a new and definitive edition.

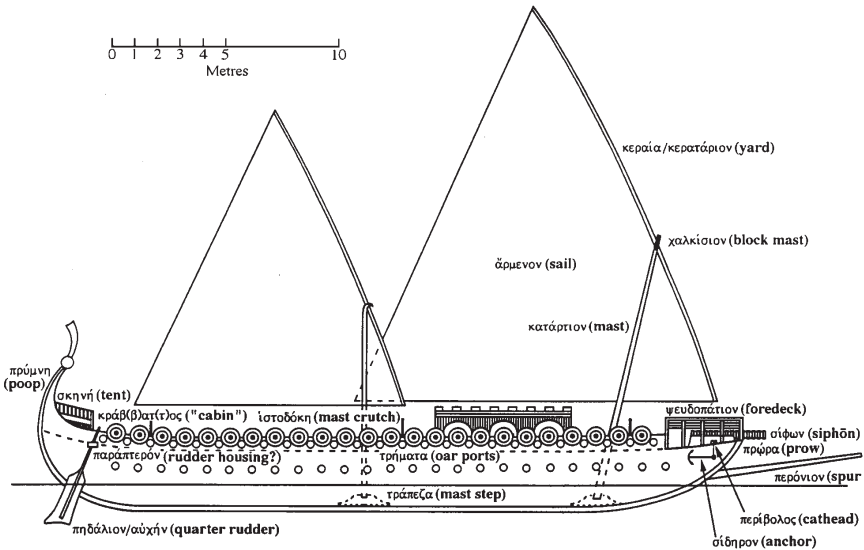
Matters of textuality may seem removed from the concerns here. However, when major texts upon which previous maritime historians have relied can be shown to have been anything but what they have been understood to be, then we must start again. In the case of the Byzantine Empire, virtually every text that survives has to be 'deconstructed'. For us, the reality is the texts, not the ships and the men. In seeking to understand a historical reality, the projection of Byzantine sea power in the interests of the Empire, we are forced at every turn back to texts whose purposes were not those for which we seek to use them.

The Ships

That being said, as long as we comprehend correctly the nature of the texts and the purposes for which they were originally intended, all is not lost. We can know with confidence that the standard *dromon* of the tenth century was a fully decked bireme with two superimposed banks of oars, one rowed from below deck and the other from above it. Both banks of oarsmen rowed fully seated. There were approximately twenty-five oars per side on each bank, for a total

⁴ Περί Θαλασσομαχίας ed. Dain in *Naumachica*, 69–88.

⁵ Constantine VII Porphyrogennētos, *Constantini Porphyrogeniti Imperatoris de Cerimoniis Aulae Byzantinae Libri Duo*, ed. I. Reiske, 2 vols (Bonn, 1829), here vol. I, 650–79; J. F. Haldon, 'Theory and Practice in Tenth-Century Military Administration: Chapters II, 44 and 45 of the *Book of Ceremonies*', *Travaux et mémoires*, 13 (2000), 201–352.



1. Longitudinal section of a tenth-century bireme dromon. © John H. Pryor

crew of around a hundred oarsmen, plus marines and officers up to around a hundred and fifty men. An οὐσία (*ousia*), which was the standard complement of a war galley, its crew excluding officers and marines, and which was definitely not an actual ship as has frequently been supposed,⁶ was 108 men. *Dromons* and *chelandia* had two sails, a larger one at the bow and a smaller one amidships. But there is no evidence that will stand up to scrutiny for any Byzantine galleys having either three masts or three banks of oars. There were also smaller *dromons*, which were particularly fast and used especially for scouting and message carrying, and which were known as γαλέαι (*galeai*), ‘galleys’. They probably also had two sails, but they had only one bank of oars.

Extrapolating from the length of the ‘room’ of a seated oarsman, the *interscalmum*, the distance between any two thole pins, σκαλμοί (*skalmoi*), of around one metre, the overall length of a standard *dromon* or *chelandion* was around 31.25 metres and its beam amidships by comparison to later western

⁶ See, for example, H. Ahrweiler, *Byzance et la mer: la marine de guerre, la politique, et les institutions maritimes de Byzance aux VIIe–XVe siècles* (Paris, 1966), 416–17; K. A. Alexandres, ‘Η Θαλασσία δύναμις εἰς τὴν ἱστορίαν τῆς βυζαντινῆς αὐτοκρατορίας (Athens, 1956), 73–4; E. Eickhoff, *Seekrieg und Seepolitik zwischen Islam und Abendland: das Mittelmeer unter byzantinischer und arabischer Hegemonie (650–1040)* (Berlin, 1966), 137; F. Hocker, ‘Late Roman, Byzantine, and Islamic galleys and fleets’, in J. Morrison, ed., *The Age of the Galley: Mediterranean Oared Vessels since Pre-Classical Times* (London, 1995), 86–100, here 94; C. Makrypoulias, ‘The Navy in the Works of Constantine Porphyrogenitus’, *Graeco-Arabica*, 6 (1995), 152–71, here 154–5; W. Treadgold, ‘The Army in the Works of Constantine Porphyrogenitus’, *Rivista di studi bizantini e neoellenici*, n.s. 29 (1992), 77–162, here 134.

galeae was around 4.46 metres. Its length-to-beam ratio was around 7:1; however, that is misleading, because the upper hull was flared outboard above the lower oar ports. The ratio at the waterline was approximately 8:1 (28:3.5 metres). Its deadweight tonnage was around 25 metric tonnes. The foremast was around 11.85 metres long with a masthead height of around 10.65 metres above sea level and the peak of the sail around 21 metres above the same. The smaller midships mast was only around 8.3 metres long.

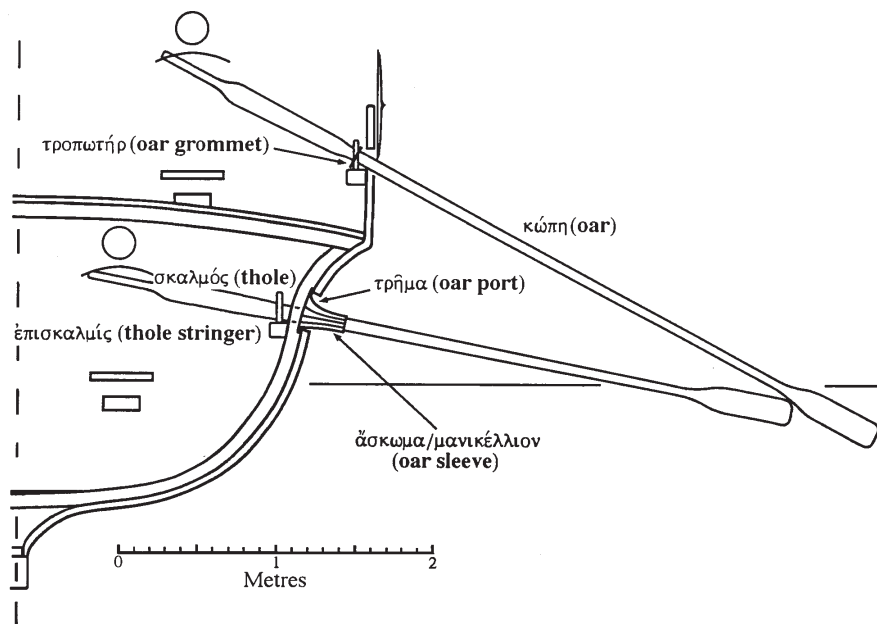
Bireme dromons almost certainly had upper hulls flared outboard so that the blades of the two banks of oars would be clear of each other when submerged. The upper oars would also have been longer than the lower ones, so that the strokes of the upper and lower oarsmen would be the same in horizontal plane, which was the important thing. These were small galleys by later medieval standards. Their crews were similar in size to those of western *galeae* of the thirteenth century, but they were packed into hulls of only around 75 per cent of the capacity of the latter. They also had a less efficient oarage system. A fully seated oarsman could not deliver as much power as one using the stand-and-sit stroke of western *galeae*. Moreover, the addition of an outrigger to western *galeae* permitted the development of oars with better gearing, mechanical advantage, and power efficiency. The *galea* replaced the *dromon* and the *chelandon* in the late eleventh century in the West, almost certainly because it was discovered that a bireme galley could be rowed from two oarage positions on the same bench above deck rather than from two superimposed benches.

Among other problems thus overcome would have been the very great one of ventilation of the hold. Fifty oarsmen working below deck would have emitted large amounts of body heat, carbon dioxide, and sweat. Removal of this and replacement of oxygen must have required some system of forced ventilation and even then the mechanical efficiency of the lower oarsmen must have been seriously compromised.

Water Supplies and Logistical Capabilities

When the final expedition of 960–1 against Crete was being contemplated, opposition in the Senate to the plans was only overcome by the arguments of the *parakoimōmenos* Joseph Bringas, who urged that the length of the voyage should not be feared.⁷ In the tenth century, even a voyage from Constantinople to Crete was a long-range expedition and a major undertaking for a large fleet. Naval warfare was a matter of coasting for very limited distances and developing strategies that combined possession of the coasts and islands with what naval forces could achieve with regards to control of coastal sea lanes. The

⁷ Theophanēs Continuatus, *Theophanes Continuatus, Ioannes Cameniata, Symeon Magister, Georgius Monachus*, ed. I. Bekker, 3 vols (Bonn, 1838); VI. Βασιλεία Ρωμανοῦ υἱοῦ Κωνσταντίνου τοῦ πορφυρογεννήτου. 9 (475), ‘... καὶ μὴ δεδιέναι τῆς ὁδοῦ τὸ μῆκος καὶ ...’.



2. Oarage system of a tenth-century bireme dromon. © John H. Pryor

stages of the voyage for the expedition of 949, as revealed by the portulan (*stadiodromikon*) inserted in the *De Cerimoniis*, were each no longer than around 145 kilometres.⁸

Supplies of fresh water were vitally important because they were the ‘fuel’ that drove any galley. Unless a galley could use its sails, it would come to a stop within hours if water supplies ran out because dehydration would quickly enfeeble the oarsmen. Naval forces had to provide for fresh water and provisions in advance or ensure that they could obtain them en route. Moving into waters off enemy shores deprived fleets of water, unless they could take it by force, which was usually not easy to do since most significant coastal water sources were incorporated into fortified habitations for obvious reasons. ‘Foraging’ for water from small streams in deserted coves or wells in isolated villages taken over by force might be possible for small flotillas, but such sources would be inadequate for large fleets. Moreover, few ports in the eastern Mediterranean were on large rivers and many had no river at all and were dependent upon wells.

Estimates of the amount of water crews required have been revised upwards dramatically over the past decade or so. During sea trials of the reconstructed Greek trireme *Olympias*, it has been found that oarsmen need a litre per hour,

⁸ Constantine VII, *De Cerimoniis*, vol. I, 678; Haldon, ‘Theory and Practice’, 234–5. Note that it is highly improbable that the fleet actually followed this route.

just for drinking, to prevent dehydration.⁹ More would have been needed for the soupy stew of salt meat and legumes that was the staple diet of medieval crews.

A range of evidence from antiquity to the seventeenth century increasingly supports around eight litres per day for galley crews.¹⁰ If we consider the standard *ousia* of 108 men of a Byzantine *dromon* or *chelandion*, the water requirement can confidently be expected to have been a minimum of $108 \times 8 = 864$ litres per day. Increasing that to at least 1000 litres or one tonne of water per ship per day when officers and marines are also taken into account would surely be reasonable. And this would be to discount supernumeraries, *dromons* with two *ousiai* as crews, and the various higher figures for crews reported for the ships of the Cretan expeditions.¹¹ One tonne of water per day would have been an absolute bare minimum.

By the tenth century, it is probable that Byzantine fleets were using both barrels and amphorae as water containers. One inventory for the Cretan expedition of 949 specified five *κάδοι* (*kadoi*) per *dromon* and *kados* was a word used commonly since antiquity for a shipboard water amphora.¹² The *kadoi* depicted on the *Cista Ficoronica* of c.300 BC, in a representation of Jason and the Argonauts watering at the spring of the Bebrycians, are estimated to have weighed around 18 kg with a capacity of 27 litres.¹³ Five *kadoi* such as those of the *Cista*

⁹ B. Rankov, 'Reconstructing the Past: The Operation of the Trireme Reconstruction *Olympias* in the Light of Historical Sources', *Mariner's Mirror*, 80 (1994), 131–46, here 138; S. Platis, 'The Greek Crew Trials with *Olympias* in 1988', in Τρόπις III/Tropis III: 3rd International Symposium on Ship Construction in Antiquity, Athens 1989. Proceedings (Athens, 1995), 335–45, here 340; J. Morrison, J. F. Coates, and N. B. Rankov, *The Athenian Trireme: The History and Reconstruction of an Ancient Greek Warship*, 2nd edn (Cambridge, 2000), 238.

¹⁰ Earlier estimates of water requirements, as low as 2.25 litres per day, are now regarded as hopelessly inadequate. See A. W. Sleeswyk and F. Meijer, 'The Water Supply of the *Argo* and Other Oared Ships', *Mariner's Mirror*, 84 (1998), 131–8, here 133–5; J. Dotson, 'Economics and Logistics of Galley Warfare', in Morrison, *The Age of the Galley*, 217–23; J. H. Pryor, *Geography, Technology, and War: Studies in the Maritime History of the Mediterranean, 649–1571* (Cambridge, 1988), 75–85; J. H. Pryor, 'From Dromōn to Galea: Mediterranean Bireme Galleys AD 500–1300', in Morrison, *The Age of the Galley*, 101–16, here 114; J. H. Pryor, 'The Geographical Conditions of Galley Navigation in the Mediterranean', in Morrison, *The Age of the Galley*, 206–16, here 210.

¹¹ The figures for the two expeditions of 911 and 949 and for various types of ships vary considerably: *chelandia pamphyla* of 120 or 150 men, *chelandia ousiaka* of 108 and 110 men, *chelandia* and *dromons* of 220 men, *dromons* of 200 or 220 men. Crews were tailored to suit circumstances and expedition objectives and in many cases the ships obviously carried supernumeraries either as landing assault troops or to provide two 'watches' to keep the galleys moving around the clock if necessary.

¹² Constantine VII, *De Cerimoniis*, vol. I, 671; Haldon, 'Theory and Practice', 226–7.

¹³ Sleeswyk and Meijer, 'The Water Supply of the *Argo*', 133. The 'Cista Ficoronica' is a bronze water urn from Palestrina (Praeneste) south-east of Rome, dated to the second half of the fourth century BC and of Greco-Etruscan workmanship. It was acquired by the antiquarian Francesco Ficoroni in 1738. It is now in the Villa Giulia museum of Etruscan antiquities in Rome, inv. no. 24787. See T. Dohrn, *Die Ficoronische Ciste in der Villa Giulia in Rom* (Berlin, 1972).

Ficoronica would contain only around 135–50 litres of water and, therefore, they cannot have been the main storage receptacles of *dromons* for water. The inventories did not specify barrels or any other items that might have been. However, a letter from the Cairo Geniza dated to the mid-eleventh century mentioned buckets that contained a ‘half a Byzantine barrel’. This is one of the earliest known reference to barrels in Byzantium, but, from it, it is clear that by that period Byzantines were well known to use barrels.¹⁴ How much earlier than this they had been doing so is unclear.

Amphorae were less efficient as water containers and also much heavier as containers in relation to their contents. Their dry weight to capacity ratio was around 1:1.5. Barrels are much more efficient than this. Traditional oak wine barrels weigh between 50 and 65 kg for 225 litres capacity. Their dry weight to capacity ratio is around 1:3.5–4.5.

On bireme *dromons*, both the storage of water and also its weight must have been a problem. Thirteenth-century Sicilian galleys, the earliest for which we have construction details, had only around 50 centimetres freeboard amidships and a tonne of water would sink them by a centimetre or so.¹⁵ No more than a quarter or so of their 40 tonnes of deadweight tonnage could have been used for water because of the weight of the food, armaments, equipment, spare gear and myriad other essentials required. It is extremely improbable that the smaller 25-tonne Byzantine *dromons* could have carried much more than around 5 tonnes of water. Later evidence from Genoa suggests that the larger war galleys of the fourteenth and fifteenth centuries could carry between 4 and 8 tonnes of water,¹⁶ but they had no oarsmen rowing in the hold.

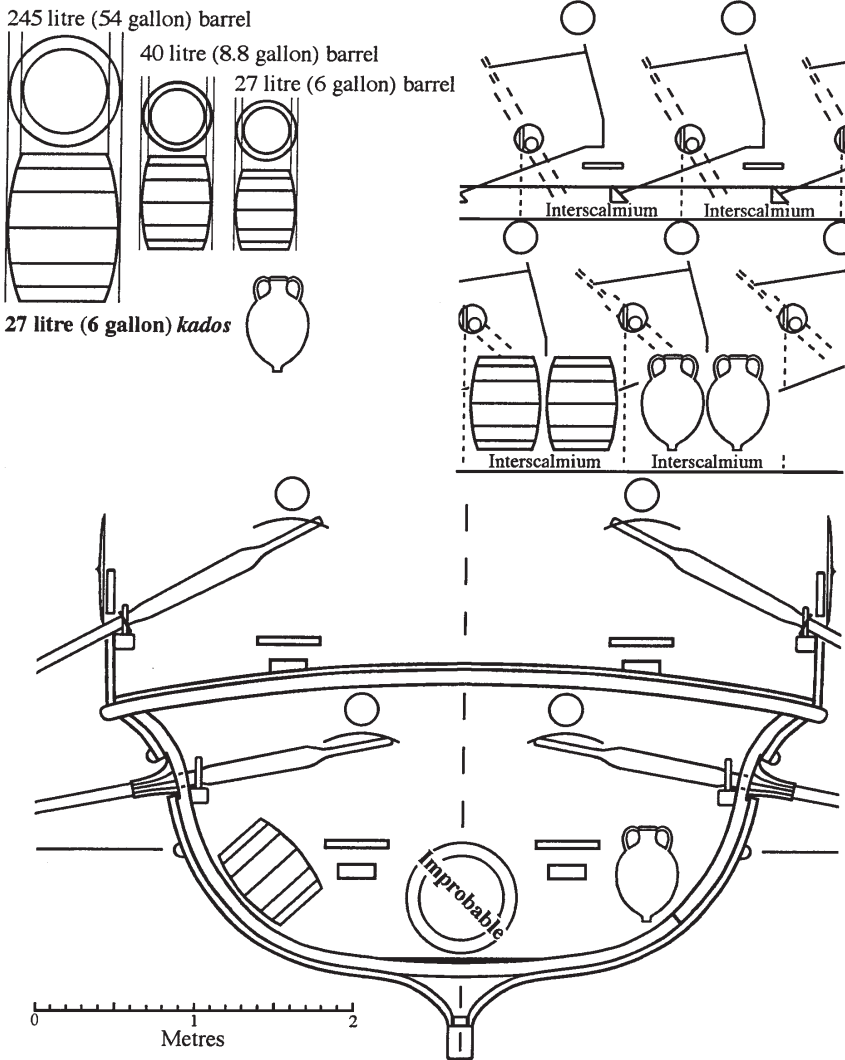
With two files of oarsmen rowing below deck, where could water have been stored? A 245 litre (54 gallon) capacity oak cask has a maximum diameter at its pitch of 28 inches (71 centimetres), a head diameter of 23 inches (58.5 centimetres), a height of 36.5 inches (92.5 centimetres), and would occupy a cylindrical space of around 370 litres.¹⁷ The only place in the hold of a bireme *dromon* that casks such as that could have been stowed would have been on the floor down the centre-line of the ship, and that space would surely have had to have been reserved for the long spare gear that had to be carried: rudders, oars,

¹⁴ S. D. Goitein, *A Mediterranean Society: The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza*, vol. I: *Economic Foundations* (Berkeley and Los Angeles, 1967), 321. The letter is in the Taylor-Schechter collection of Cambridge University Library, MS TS 12.241. It is written in Judaeo-Arabic, medieval Arabic written in Hebrew script. The relevant lines are recto 6–7, transliterated as follows: ‘. . . n‘ml fy ‘l‘nbb’ b‘lnwb’ kmsyin dlw w‘ldlw ‘ldy ystq’ bh nsf bty’ rwmy’ . . .’, translated as ‘. . . we laboured at bailing by turns of fifty buckets and each bucket that was used for scooping [water] was half a Byzantine barrel [in size] . . .’. Here the Arabic *dlw* meant a ‘bucket’, *bty* ‘a barrel’, and *rwmy* ‘Roman’ or ‘Byzantine’.

¹⁵ Pryor, ‘From Dromōn to Galea’, 112–13.

¹⁶ Pryor, *Geography, Technology, and War*, 77–9.

¹⁷ K. Kilby, *The Cooper and His Trade* (Fresno, 1971), 61.



3. Stowage of barrels or amphorae. © John H. Pryor

yards, even masts.¹⁸ Such gear could obviously not have been carried above deck on a warship.

In the case of galleys, such as classical *triēreis* and Byzantine *dromons*, we are forced to conclude that each oarsman carried his own water supply in a *kados* or a small barrel. It is tempting to associate an optimum size for a small

¹⁸ Leo VI, *Ναυμαχικὰ Λέοντος Βασιλέως*, §5 in Dain, *Naumachica*, 19–20.

portable barrel with that of the size of the Genoese *quartarolo* (39.75 litres) or the Neapolitan *barile* (43.625 litres). Barrels much bigger than 40 litres (8.8 gallons) would be too heavy and large to be handled by a single man. Forty litres is also about double the size of a normal bucket and buckets containing more than that and weighing over 20 kg become extremely difficult to manoeuvre. 40 litres would weigh 40 kg (88 lbs), plus around 10 kg (22 lbs) for the weight of the barrel, making a total of 50 kg (110 lbs), and the barrel would measure approximately 35.5 centimetres across the head, 44.5 centimetres at the pitch (circumference of 140 centimetres), and 54.5 centimetres high.¹⁹ A man could not get his arms around anything much bigger than that to lift it in any case.

It would be just possible to stow two 27-litre *kadoi* or two 40-litre barrels alongside the thwarts of the oarsmen of the lower bank between them and the hull, two for each oarsman. Half of the barrels or *kadoi* may well have been stowed similarly above deck for the oarsmen of the upper bank, but obviously they could not have stayed there during battle and there must have been room to stow them below if necessary. Either that, or they were jettisoned before battle.

After reflection, the only logical conclusion to the problem of the water supply of *dromons*, a supply which then governed their cruising range, is that they could stow away around one hundred 40-litre barrels, weighing around 5 tonnes when full, or around one hundred 27-litre amphorae weighing around 4.5 tonnes. This would give a *dromon* a minimum range under oars in summer, using one tonne of water per day, of three days.

The speed that oared ships of all kinds could maintain under oars is a matter of considerable debate. Different scholars have directed their attention to different periods and various types of oared ships and have produced results that are very difficult to reconcile. What one would like, of course, is reliable historical data for voyages made by Byzantine fleets of *dromons* in pressing circumstances in conditions which would suggest that the voyages were made under oars in calm conditions or at worst against light breezes. However, the Byzantine sources contain precious little data and, for the most part, we are compelled to have recourse to that from the sources for classical antiquity and the western Middle Ages and, then, to proceed by analogy. Nevertheless, there is sufficient consistency in the data to suggest that in favourable conditions fleets could maintain around 3–4 knots while at sea. According to his *Life of St Theoktistē of Lesbos*, the narrator, Nikētas Magistros, was told on Paros, by a hermit called Symeon, that from Paros he would sail to Naxos, lie there in harbour for one day, sail for Crete on the second day and reach it on the third.²⁰ Since, at the time, Nikētas was accompanying the expedition of Himerios to Crete in 910, he was probably on a war galley, a *dromon*, and the voyage predictions read like a reflection of what could normally be accomplished by a *dromon* sailing before the prevailing northerlies of summer south to Crete. Naxos to Chandax

¹⁹ Kilby, *The Cooper and His Trade*, 61.

²⁰ *Acta Sanctorum Novembris*, 4 (Brussels, 1925), 224–33; §13, trans. A. C. Hero in A.-M. Talbot, ed., *Holy Women of Byzantium* (Washington, 1966), 95–116, here 107–8.

(Iráklion) in Crete, via Ios and Thēra is only around 120 nautical miles; easy sailing before the prevailing northerlies of summer in, say, thirty hours at an average speed of around 3.5 knots.

With a figure of that order and an average of around fourteen hours of daylight during summer campaigning seasons, three days' water supply would give Byzantine fleets a range of no more than 170 miles under oars. All things were variable of course. Conditions made all the difference, as also would have using the sails when possible, cool weather, and human endurance, strength, and skill. Fleets could also proceed by night, if out to sea away from coasts and islands, or if the skies were clear and the moon was full, or even if the need was great. But, in normal circumstances, Byzantine fleets would not have ranged much more than around 170 miles without watering. When packed to the gunwales with supernumeraries, as they were for the assaults on Crete, that figure would have to be lowered dramatically.

No wonder that Syrianos Magistros, followed by Nikēphoros Ouranos, recommended that not only a *stratēgos*, but also each and every ship in a fleet should have aboard seamen familiar with the coasts and where fresh water could be obtained. As Nikēphoros wrote:

It is appropriate for a *stratēgos* to have with him men who have accurate knowledge and experience of the sea in which he is sailing, which winds cause it to swell and which blow from the land. They should know both the hidden rocks in the sea, and the places which have no depth, and the land along which one sails and the islands adjacent to it, the harbours and the distance such harbours are the one from the other. They should know both the countries and the water supplies;²¹ for many have perished from lack of experience of the sea and the regions, since winds frequently blow and scatter the ships to one region and another. And it is appropriate that not only the *stratēgos* should have men with this knowledge we have discussed, but also each and every ship should have someone knowing these things to advise well when appropriate.²²

²¹ By ὕδατα (*hydata*), Nikēphoros Ouranos and Syrianos Magistros almost certainly meant 'fresh water'. The knowledge required was of where to obtain precious fresh water, rather than knowledge of the 'waters'; i.e. the seas.

²² Nikēphoros Ouranos, 'Εκ τῶν τακτικῶν Νικηφόρου Οὐρανοῦ κεφάλαια ρηθ'–ρκγ', §§119.1.1–3, in Dain, *Naumachica*, 93: 'Ἀρμόζει τὸν στρατηγὸν ἔχειν μεθ' ἑαυτοῦ τοὺς γινώσκοντας ἀκριβῶς τὴν πείραν τῆς θαλάσσης εἰς ἣν πλέει, τὸ ποιοὶ ἄνεμοι κυμαίνουσιν αὐτὴν καὶ τὸ ποιοὶ φρυῶσιν ἀπὸ τῆς γῆς· ἵνα δὲ γινώσκῃ καὶ τὰς κρηπτομένας πέτρας εἰς τὴν θάλασσαν καὶ τοὺς τόπους τοὺς μὴ ἔχοντας βάθος καὶ τὴν παραπλεομένην γῆν καὶ τὰς παρακειμένας αὐτῇ νήσους, τοὺς λιμένας καὶ τὸ πόσον ἀπέχουσι οἱ τοιοῦτοι λιμένες εἰς ἀπὸ τοῦ ἄλλου ἵνα δὲ γινώσκῃ καὶ τὰ χωρία καὶ τὰ ὕδατα πολλοὶ γὰρ ἐκ τοῦ ἔχειν ἀπειρίαν τῆς θαλάσσης καὶ τῶν τόπων ἀπώλοντο, ἐπειδὴ φρυῶσι πολλάκις ἄνεμοι καὶ σκορπίζουσι τὰ πλοῖα εἰς ἄλλον καὶ ἄλλον τόπον. Καὶ ἀρμόζει ἵνα μὴ μόνον ὁ στρατὸς ἔχῃ τοὺς γινώσκοντας ὅπερ εἶπαμεν, ἀλλὰ καὶ ἐν ἑκάστῳ πλοίῳ ἵνα ἔχῃ τὸν ταῦτα γινώσκοντα, πρὸς τὸ βουλευέσθαι καλῶς τὸ συμφέρον.' Cf. Syrianos Magistros, *Ναυμαχία Συριανοῦ Μαγίστρου*, §§5.1–3 in Dain, *Naumachica*, 45–6.

Consider what the problems of water supplies must have really involved. According to the inventories for the expedition of 949 to Crete, the imperial navy was composed of 150 *ousiai*. Not all of these took part in the expedition, since some were deputed for other duties. However, there were definitely 20 *dromons* in the fleet, each carrying 2 *ousiai*. There were also at least 40 *chelandia* of one *ousia* each. For the rest, the figures are arguable, but being exact does not matter here. For the sake of argument, let us postulate 20 *dromons* and 40 *chelandia*, with 80 *ousiai* between them, and halve the water ration for the second *ousia* of the *dromons* on the grounds that both *ousiai* cannot have rowed at once. If they moved under oars, they would require a minimum of 70 tonnes of water per day, 210 tonnes for a three-day supply for the fleet or 280 tonnes for four days.

No rivers anywhere en route were large enough for fleets to sail up them beyond the salt water zone, so that they could water by lowering buckets overboard. Fleets were dependent on ports for water, but, in the tenth century, most of these would have been merely sheltered roadsteads. Developed port facilities were few and far between. Fleets as large as this would have had to anchor offshore or, at best, come in by turns in small numbers to whatever docks existed. Moreover, it is doubtful whether any ports, even Constantinople, had reticulated water supplies fed to any docks that did exist. The earliest known attempt to do this was Genoa's building of an aqueduct along her docks during the thirteenth century. Galleys could be beached; however, to then load tonnes of water onto them would not be such a bright idea in the largely tideless Mediterranean. Water would have to be loaded manually by bucket into *kadoi* or barrels from wells, springs, or streams, and then transported by men, by carts, or by boats to the ships afloat. Admittedly, there were many men in the crews, but that would be useful only if they could pull into a large fresh-water river, and there were very few of those. Only one barrel at a time can be filled from a well. Watering a large fleet in this way must have been a laborious and time-consuming exercise.

In 911 and 960, the final staging port for the last voyage to Crete was Phygela, now Kuşadasi in Turkey. But in 949 the fleet apparently travelled from Mitylênē to Chios, Samos, Fournoi, Naxos, Ios, Thēra, and Christiana, to Dia opposite Chandax (Iráklion) in Crete. These were small islands, where watering would have to be done from wells or small streams. With portable barrels of 40 litres, watering the 80 *ousiai* of 949 would have needed around 1750 barrel-manlifts per day. A full supply of 210 or 280 tonnes would have needed 5280 or 7000 barrel-manlifts.

Then, there is the problem of wells. How big were well buckets? Again, there would have been an ergonomic optimum. The bigger and heavier the full bucket, the more men needed, or the longer the time taken, to raise it by rope and windlass and empty it. An optimum size for a bucket may have been around 20 litres. A bucket with an internal diameter of 28 centimetres and a height of 32.5 would have a capacity of 19.7 litres and its size seems to be about right. If so, the number of well-lifts required would be double that of the barrel-lifts. How long would 14,000 well-lifts in Samos harbour have taken?

These figures could be varied considerably without affecting the obvious conclusion. Watering large fleets must have been extremely laborious and time-consuming and this helps explain why extended expeditions were regarded as such monumental undertakings. In fact, I believe that we barely begin to comprehend the enormousness of galley warfare in the Middle Ages. During the First Crusade, only the small Genoese fleet attempted the voyage to the East in a single sailing season, and it just barely made it in four months before the onset of winter. The larger Pisan and Venetian fleets left in the autumn, intending to winter en route, despite the considerable expense that would have involved. So also did the large Venetian Crusader fleet of 1122. They apparently did not consider it possible for their fleets to make the voyage in one sailing season. Only that can explain why they were prepared to assume the enormous expense of wintering en route.²³ When horses were also transported, as they were for the Cretan expeditions of 911, 949, and 960–1, the problems must have been exacerbated enormously. Horses consume large amounts of water but cannot load it themselves.²⁴

Crews

In spite of the fact that some crews in Byzantine fleets at various times were well regarded, for example the Mardaïtes of the theme of the Kibyrrhaiōtai, there is little evidence to suggest that, in general, Byzantine seamen were so skilled that this gave Byzantine fleets any edge over their opponents. It is true that Byzantine squadrons managed to defeat the Russians on all occasions when they attacked Constantinople: in 860, probably in 907 under Oleg of Kiev, in 941 under Igor, and in 1043 under Jaroslav. A fleet also defeated the Russians on the Danube in 972. However, rather than being attributable to any qualities of Byzantine seamen, these victories were due to the triple advantages of Greek Fire, *dromons* and *chelandia* being much larger than the Norse river boats of the Russians, and (except in 972) being able to fight in home waters against an enemy far from home. The last is true also of the defeat of the Muslim assaults on Constantinople in 674–80 and in 717–18. In both cases, it was the advantage of home waters against the disadvantage of campaigning hundreds of miles from sources of supplies, the problems faced by the Muslims of surviving on campaign through the winter, and Greek Fire that proved decisive. The same is probably true of the victories over the fleets of Thomas the Slav in 822–3.

²³ See J. H. Pryor, ‘“Water, water everywhere, Nor any drop to drink”: Water Supplies for the Fleets of the First Crusade’, in *Dei Gesta per Francos: études sur les croisades dédiés à Jean Richard* (Aldershot, 2001), 21–8. This does leave unexplained, of course, how the Byzantines managed to send a massive fleet to Vandal Africa under Belisarios in 533, including horse transports, and then to do it again in 697 with a fleet of unknown size under John the Patrician, sent to recover the province from the Muslims.

²⁴ Limitations of space preclude further consideration of the transport of horses here. The issue is addressed at length in *The Byzantine Navy*.

In general, the record of Byzantine fleets from the seventh to the tenth centuries was hardly impressive.²⁵ To be sure, they did achieve some notable victories: the defeat of the Tunisians off Syracuse in 827–8, the defeat of a Muslim fleet under Abū Dīnār off Cape Chelidonia in 842, the victory of Nikētas Ooryphas over the Cretans in the Gulf of Corinth in 879 and of Nasar over the Tunisians off Punta Stilo in 880, the victory of Himerios on the day of St Thomas (6 October), probably in 905, the defeat of Leo of Tripoli off Lemnos in 921–2, the victory of Basil Hexamilitēs over the fleet of Tarsos in 956, and the defeat of an Egyptian squadron off Cyprus in 963. Against that record, however, have to be balanced many disastrous defeats: of Constans II at the battle of the masts off Phoenix in 655, of Theophilos, the *stratēgos* of the Kibyrrhaiōtai, off Attaleia in 790, a defeat off Thasos in 839, the defeat of Constantine Condomytēs off Syracuse in 859, the annihilation of a fleet off Milazzo in 888, a defeat off Messina in 901, the disastrous defeat of Himerios north of Chios in 911, the defeat of a Byzantine expedition in the Straits of Messina in 965, and of fleets off Tripoli in 975 and 998.

Although the tide of Byzantine naval success ebbed and flowed over the centuries, as other circumstances dictated, nothing suggests that the quality of the Empire's seamen was in any way decisive. Indeed, there are occasional pieces of evidence that suggest that all was not always happy in the fleets. Some time between 823 and 825, John Echimos, the 'deputy governor', ἐκ προσώπου (*ek prosōpou*), the acting *stratēgos*, of the theme of the Kibyrrhaiōtai, confiscated the properties of seamen of the fleet. After he had become a monk and taken the name Antony, later to become St Antony the Younger, he was interrogated as to his reasons for doing so on the orders of the new emperor, Theophilos (829–42). According to the author of his *Life*, his explanation was that they had been partisans of Thomas the Slav in his rebellion of 821–3 and were 'hostile to Christians', thus implying that they were iconoclasts, and that he had confiscated their property and given it to supporters of Theophilos' father, Michael II (820–9). In spite of this explanation, the emperor initially imprisoned him and had him interrogated, suggesting that there was more to the story and that he rejected the explanation.²⁶ The fleet of the Kibyrrhaiōtai had, indeed, joined Thomas the Slav, as it was also later to join the rebellions of Bardas Sklēros in 976–9 and Bardas Phōkas in 987–9, and it is clear that, at times, there must have been serious disaffection in what was the front-line fleet of the Empire in the ninth and tenth centuries.

In 880, the expedition sent under the command of Nasar, the *droungarios tou*

²⁵ It is obviously not possible to be exhaustive here. What follows is intended to be a limited, but balanced, representative example of the more important Byzantine victories and defeats in fleet engagements.

²⁶ Anonymous, Βίος καὶ πολιτεία τοῦ ὁσίου Ἀντωνίου τοῦ Νέου ('Life and Conduct of the Holy Antony the Younger'), ed. A. Papadopoulos-Kerameus, in Συλλογὴ Παλαιστίνης καὶ Συριακῆς ἀγιολογίας, Православный Палестинский сборникъ, 19.3 (St Petersburg, 1907), 186–216, here 209.

ploimou, to counter an attack in the Ionian sea by a Muslim fleet from Tunisia was forced to a temporary halt at Methōnē by the desertion of a large part of the crews.²⁷ Why they deserted is unknown, but we can be fairly sure that it was not a simple question of their having ‘lost their nerve’, as the *Vita Basilii* suggested.

Tactics and Strategies

Since the chronicles and other sources are devoid of all but the most spare and sketchy descriptions of battles, we are primarily dependent on the *Naumachika* of Leo VI and its paraphrase by Nikēphoros Ouranos for our knowledge of tactics and strategies.

It is clear that, by the heyday of the *dromon*, naval tactics and strategies were very different from what they had been during the age of the *triērēs*. Reduced to a fundamental, these differences can be attributed to the disappearance of the only ‘ship-killing’ weapon ever known before the invention of explosive projectiles: the waterline ram. For all its potency in some circumstances, Greek Fire was never the ship-killer that the ram had been and no system of battle tactics was ever built around it.²⁸ The weapon was obviously effective in certain circumstances, but there are many uncertainties about what those circumstances were. Byzantine chroniclers frequently attributed fleet victories to the use of Greek Fire; however, they rarely mentioned its use when fleets were defeated, even though it is obvious that it must have been used unsuccessfully on many such occasions. The spur, which had replaced the waterline ram by the sixth century, was not designed to puncture a hull and sink a ship, but rather to destroy its motive power by smashing its oars. No other weapons, neither projectiles nor any other, now had ship-killing capabilities. Battle tactics, therefore, had to change. Objectives changed from attempts to deliver a ‘knock-out’ blow to degrading attrition. Rather than manoeuvring to obtain a position to ram and sink, tactics became to degrade an enemy ship’s ability to resist, so that it could be boarded and captured. The preliminary phases of battle, therefore, became extensive exchanges of missiles of various types.

Naval warfare became more unpredictable than ever. No longer could any power hope to have such an advantage in weaponry or in the skill of crews that success could be expected. Weaponry and skill could still make a difference, of course, but rarely a decisive one. More often than not, victory or defeat became a matter of circumstances, admirals, and numbers. To commit to battle was to risk the unpredictable fortunes of war and really decisive victories were hard to achieve in any case. A victor could rarely prevent large sections of defeated

²⁷ Theophanēs Continuatus, V.62 (302–3).

²⁸ To characterise Greek Fire as comparable to ‘the atomic bomb in our own day’, as did Ellis Davidson, is grossly misleading. See H. R. Ellis Davidson, ‘The Secret Weapon of Byzantium’, *Byzantinische Zeitschrift*, 66 (1973), 61–74, here 61.

fleets escaping the 'field' of battle and the Mediterranean powers could replace ships and crews remarkably quickly in any case.

Expeditionary objectives could frequently be achieved best by preserving one's forces intact and actually avoiding battle, since naval warfare was essentially amphibious warfare whose purpose was to secure control of terrestrial objectives rather than to attempt to control maritime space. The latter was an unrealistic and vain hope given the limitations of medieval naval technology with respect to the vast expanses of the sea.

With foremast masthead height 10.65 metres above sea level, the theoretical horizon of a lookout at the masthead of a *dromon* would be only around 11.8 kilometres. Theoretically, the head of a sail 21 metres above sea level could be seen a further 51.7 kilometres away, but, of course, no man could see 63.5 kilometres away with unaided sight. In all probability, around 15–20 kilometres would have been the limit of visibility from the masthead of a *dromon*.²⁹ Scout ships could not, therefore, patrol a space more than 30–40 kilometres in advance of a fleet and probably no more than 30, since they were smaller than battle *dromons* and would have had lower mastheads. In fact, in order to be able to actually read signals with unaided eyesight and communicate them back to the fleet, the distances must have been much less than this. Syrianos Magistros advised that a fleet should always proceed with scout ships out ahead, up to 6 *milia* or so. Two scout ships should be 6 *milia* ahead and another two should be between them and the fleet to relay any messages.³⁰ 6 *milia* was only around 8 kilometres. If the forward scouts then had a range of visibility of another 8–16 kilometres, then the real maritime space that could be 'controlled' had a radius of only around 25 kilometres at best.

Moreover, even if scouts descried an enemy fleet 25 kilometres away from a fleet, it would take hours for the fleets to come to engagement, even if they both cooperated and sailed at full speed to engage. If the weather conditions were favourable for one fleet, they would almost invariably be unfavourable for the other. If either fleet sought to avoid engagement, they could never be forced to do so unless trapped somehow.

Even narrows, such as the Straits of Otranto, are approximately 110 kilometres wide and the entrance to the Aegean between Crete and Rhodes is approximately 180 kilometres wide, although Karpathos does straddle the gap. No medieval power could ever hope to control ingress and exit through such maritime spaces, contrary to the nonsense often written about such matters. Galleys which were incapable of staying at sea in heavy weather and which had limited water supplies and cruising ranges, which lacked any weapon capable of

²⁹ From the masthead of *Olympias*, which is approximately 11.5 metres above sea level, the horizon is 11.25 kilometres distant. A man can just see the deck of a similar low-hulled ship at a range of 16.1 kilometres. See J. Coates, in J. S. Morrison, *Greek and Roman Oared Warships, 399–31 BC* (Oxford, 1996), 258. No data are given for the visibility of sails over the horizon.

³⁰ Syrianos Magistros, *Ναυμαχία*, §§6.1–3 in Dain, *Naumachica*, 46.

quickly destroying enemy ships, and whose performance capabilities were inadequate to force an enemy to engage if he did not wish to do so, could never control maritime space. In such circumstances, naval forces could rarely be more than an adjunct to land forces, sea power to land power.

Byzantine naval forces were always very secondary to the land armies and the use of sea power was merely an adjunct to that of the land. By themselves, they rarely achieved very much. The reconquest of Crete in 960–1 was an exception to the rule, but that followed at least four failed previous attempts. The history of the Empire reveals that most naval expeditions accompanied terrestrial expeditions. Naval forces ferried land forces and protected their maritime flanks and supply lines. Most naval engagements occurred in these circumstances, rather than in those of opposing fleets seeking each other out. Control of the land meant control of the sea, because control of the land carried with it both control of the refuges to which all galley fleets had to have recourse in inclement weather and also control of the water supplies, without which no naval forces could operate for more than a few days. It also helps to explain the extensive record of fleets lost when caught at sea in inclement weather off coasts that were either geographically or humanly hostile. Reading the record of Byzantine and also Muslim fleets destroyed at sea by storms, and contemplating the horrific loss of human life involved, gives a sobering perspective on the essential futility of naval warfare in the Byzantine-Muslim period. Rarely did naval victories lead to long-term or extensive political gains.

Caution became the first priority. Syrianos Magistros advised that a *stratēgos*, an admiral, should always have good intelligence of the enemy, that he should engage the enemy only if he had superior numbers and not even if the forces were equal, unless the enemy forced the engagement, and that one should not engage at all unless the enemy posed a danger. Nikēphoros Ouranos later repeated some of these recommendations.³¹ Leo VI advised planning attacks with forethought, being wary of committing to general engagements, only doing so when confident of superiority over the enemy. He cautioned against becoming overconfident.³² The first priority of a *stratēgos* was to preserve his own forces intact and then to search for any opportunity or strategy that would enable him to attack the enemy with the least risk to his own forces. Thus, Leo VI recommended giving battle in waters of one's choice off enemy coasts and laying ambushes.³³ The recommendation to engage off enemy coasts so that

³¹ See Syrianos Magistros, *Ναυμαχίαι*, §§6.1–3, 9.8, 9.10–11, 9.14 in Dain, *Naumachica*, 46, 49, 50; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§38, 51, *ibid.*, 79–80, 82.

³² See Leo VI, *Ναυμαχικά* Λέοντος Βασιλέως §§17, 36–7, 40, 75–6 in Dain, *Naumachica*, 22, 25–6, 32; Cf. Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§15, 34–6, 67–8, *ibid.*, 75, 79, 96; Anonymous, §3.1, *ibid.*, 66.

³³ See Leo VI, *Ναυμαχικά*, §40, 53 in Dain, *Naumachica*, 26, 28; Cf. Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§38, 51, *ibid.*, 79–80, 82. Note that in §40, even though he was following Syrianos Magistros quite closely at this point, Leo VI actually reversed the advice of Syrianos, who had advised setting up a battle close to shore if off one's own territory so that there would be a refuge if defeated, and out to sea if off enemy territory. See Syrianos

enemy crews would not fight to the death but would seek safety in flight confirms the fact that almost all medieval galley warfare was coastal. Both Syrianos Magistros and Nikēphoros Ouranos also made that perfectly clear.

Appreciation of the fact that all medieval naval warfare was essentially coastal and amphibious warfare is important, since many of the recommended strategies and tactics were devised in that context. ‘Ambushes’, for example, are easily comprehensible in coastal warfare. Reserve squadrons might be hidden behind islands or promontories. They are more difficult to envisage on the high seas. How could one hide reserve squadrons on the high seas, except behind fog banks which are unusual in the Mediterranean, or if one came out of the sun catching the enemy with the sun in his eyes? It should be added, however, that to do so was indeed a favourite tactic.³⁴

In the approach to battle it was essential to draw up a fleet in formation. Syrianos Magistros emphasised the importance of this and discussed how the commander should maintain the formation.³⁵ A disorganised fleet dared not engage, because its ships would be unable to lend support to each other and would be overwhelmed. This was the cardinal sin that Constans II committed in 655, when he went into battle off Phoenix without bringing his fleet into formation and was annihilated, barely escaping with his life.³⁶ In 904, the *droungarios tou ploimou*, Eustathios Argyros, had to break off his attack on the fleet of Leo of Tripoli, because he had not been able ‘to draw up in a counter-formation’, ἀντιτάξασθαι (*antitaxasthai*), his own fleet.³⁷ Leo then went on to sack Thessalonikē. The reverse occurred in 956 or 957, when Basil Hexamilitēs, the *stratēgos* of the Kibyrrhaiōtai, successfully beat back a fleet from Tarsos larger than his own because he managed to form his own fleet into a counter-formation, ἀντιπαράταξις (*antiparataxis*), before engagement.³⁸ One of the classic battle tactics was to disorganise an enemy’s formation by feigning flight until the enemy ships in pursuit became strung out and then either to send in fresh

Magistros, Ναυμαχίαι, §§9.42–4 in Dain, *Naumachica*, 55. The emperor seems to have been influenced by another sentence of Syrianos which said that off foreign territory ships positioned at the sea end of a line would be most likely to desert while off one’s own territory it would be those at the landward end. Ibid., §9.23 in Dain, *Naumachica*, 52.

³⁴ Roger of Lauria did so at the Battle of the Gulf of Naples on 5 June 1284. See J. H. Pryor, ‘The Naval Battles of Roger of Lauria’, *Journal of Medieval History*, 9 (1983), 179–216, 192.

³⁵ Syrianos Magistros, Ναυμαχίαι, §§9.4–7 in Dain, *Naumachica*, 48–9.

³⁶ Theophanēs the Confessor, *Theophanis Chronographia*, *Annus Mundi* 6146, vol. I, 346: ‘τοῦ δὲ βασιλέως μηδὲν ποιησαμένου πρὸς παράταξιν ναυμαχίας’. On the battle see V. Christides, ‘The Naval Engagement of Dhāt as-Sawārī AH 34 / AD 655–6: A Classical Example of Naval Warfare Incompetence’, *Byzantina*, 13 (1985), 1329–45.

³⁷ Theophanes Continuatus, V.20 (366–7): ‘ἀποστέλλει οὖν ὁ βασιλεὺς τὸν Εὐστάθιον τὸν τηρικαῦτα δρουγγάριον μετὰ στόλου κατὰ τοῦ Τριπολίτου ὃς μὴ δυνηθεὶς ἀντιτάξασθαι τούτῳ ἀντεστράφη κενός’.

³⁸ Theophanes Continuatus, VI. Αυτοκρατορία Κωνσταντινου. 29 (453).

reinforcements against the disorganised enemy or to turn around in formation and overwhelm the disorganised enemy ships one by one.³⁹

According to Leo VI, the standard formation was the line abreast in a shallow, crescent-moon semi-circle, with the flagship at the centre of the line in its 'deep', and the stronger and larger *dromons* at the ends of the line. This was also supposedly the best formation for making a fighting retreat by backing water.⁴⁰ The objective was to overwhelm the end of an enemy line, so that the galleys at the end of one's own line could turn in on the exposed flanks of the enemy galleys and attack them where they were most vulnerable, at their sides. Other formations may also have been used in various circumstances: a straight line, or several lines or squadrons, some of which could attack from the flanks or the rear once the enemy was engaged by the main formation.⁴¹ This latter would seem to have been dependent upon having an overwhelming superiority in numbers. As Leo VI himself said, in what must be something of a classic understatement, the same was true of the tactic to disengage a formation that had fought the enemy to a standstill and then to send in reinforcements.⁴²

For lack of any ship-killing weapon, it is highly improbable in fact that any tactical manoeuvres whatsoever could prove decisive. By the tenth century, naval battles became a matter of approach in formation, attempts to hold formation above all costs in order to protect the vulnerable sides and sterns of the ships, and then an initial phase of engagement characterised by extensive exchanges of missiles at a distance designed to degrade the enemy's manpower. This continued to be the case into the High Middle Ages throughout the Mediterranean.⁴³ That was why *dromons* had a forecastle, a 'false floor', ψευδοπάτιον (*pseudopation*), above the Greek Fire tube, σίφων (*siphōn*), at the prow, from which marines could hurl missiles against an enemy ship.⁴⁴

Such missiles included the same 'processed' fire material for Greek Fire as used in the *siphōnes* but hurled by catapult, either in pottery jars or in the form of caltrops wrapped round with tow and soaked in it.⁴⁵ There can be no doubt that the former at least were used because examples survive.⁴⁶ Quite probably

³⁹ See Leo VI, *Ναυμαχικά*, §§54, 56 in Dain, *Naumachica*, 29; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§52–3, *ibid.*, 82–3.

⁴⁰ See Leo VI, *Ναυμαχικά*, §§2, 28, 42, 49, 50, 79 in Dain, *Naumachica*, 19, 24, 27, 28, 33; Leo VI, *Ἐκ τοῦ κυροῦ Λέοντος τοῦ Βασιλέως* §2, *ibid.*, 38; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§26, 32, 47, 48, 71, *ibid.*, 77, 78–9, 82, 87.

⁴¹ See Leo VI, *Ναυμαχικά*, §§51, 52 in Dain, *Naumachica*, 28; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§49, 50, *ibid.*, 82.

⁴² See Leo VI, *Ναυμαχικά*, §55 in Dain, *Naumachica*, 29; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §52, *ibid.*, 82–3.

⁴³ See, for example, Pryor, 'Naval Battles of Roger of Lauria', 179, 186–7, 207. See also Alexandres, *Ἡ θαλασσία δύναμις εἰς τὴν ἱστορίαν τῆς βυζαντινῆς αὐτοκρατορίας*, 62.

⁴⁴ See Leo VI, *Ναυμαχικά*, §6 in Dain, *Naumachica*, 20; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §5, *ibid.*, 72.

⁴⁵ See Leo VI, *Ναυμαχικά*, §§64, 66 in Dain, *Naumachica*, 30; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §60, *ibid.*, 84.

⁴⁶ See V. Christides, 'New Light on Navigation and Naval Warfare in the Eastern

the jars of unslaked lime mentioned by Leo VI were also used, but one may have one's doubts about the practicality of the suggestion of jars full of poisonous reptiles.⁴⁷ From his tone, even the emperor seems to have had doubts about that one. However, the most effective missiles, and those which formed the bulk of those exchanged, were rocks, ordinary caltrops, arrows from bows, the small arrows or bolts known as 'flies' or 'mice' shot by the bow-ballistae, and then javelins when closed up somewhat more.⁴⁸ The large numbers of such missiles mentioned in the inventories for the Cretan expeditions, and the absence from these of the more 'exotic' projectiles, prove that this was so: in particular, 10,000 caltrops, 50 bows and 10,000 arrows, 20 hand-bow-ballistae and 200 'mice', and 100 javelins per *dromon*.⁴⁹

The great importance of proper management of the preliminary missile phase was indicated by the emperor's insistence on using them effectively, not wasting them against an enemy protected by shields, and ensuring both that supplies were not exhausted and that crews did not exhaust themselves in hurling them.⁵⁰ He appears to have appreciated that battles were not won in missile phases. These might influence the outcome but hand-to-hand combat decided it.

In the final phase of battle, the opposing ships grappled. The words used by the *Anonymous*, Leo VI, and Nikēphoros Ouranos to describe this phase were δεσμός (*desmos*), a bond, and δεσμεῖν (*desmein*), to bond or fetter, both connected to δεσμεύειν (*desmeyerin*), to bind or fetter or tie together. 'Couple' and 'to couple' are perhaps the closest English translation of what was intended. When it was apparent that the crew of an enemy ship was sufficiently degraded to make boarding and capturing a realistic possibility, iron rods, καμάκες σίδηροι (*kamakes sidērai*), no doubt with grappling hooks at both ends, were used to grapple with it and couple it so that it could not escape. The tactic used in defence against enemy ships trying to grapple and couple in the same way was to keep the ships apart by using even longer poles: ἀκόντια (*akontia*) or κοντάρια (*kontaria*).⁵¹ Coupling and preventing coupling were apparently procedures that required considerable practice and exercise, to judge from Leo

Mediterranean, the Red Sea and the Indian Ocean (6th–14th centuries AD)', *Nubica*, III/1 (1994), 3–42, here 19–25.

⁴⁷ See Leo VI, Ναυμαχικά, §§60–2 in Dain, *Naumachica*, 30; Nikēphoros Ouranos, Περί Θαλασσομαχίας, §§57–8, *ibid.*, 83–4. Or did the emperor have a recollection of the report of John Malalas that the asp that killed Cleopatra was one of those that she carried in her ships for purposes of battle? See John Malalas, *The Chronicle of John Malalas: A Translation*, trans. E. Jeffreys *et al.* (Melbourne, 1986), 116.

⁴⁸ See Leo VI, Ναυμαχικά, §§14, 60, 63 in Dain *Naumachica*, 21–2, 30; Nikēphoros Ouranos, Περί Θαλασσομαχίας, §§12, 57, 59, *ibid.*, 74, 83–4.

⁴⁹ Constantine VII, *De Cerimoniis*, vol. I, 669–70; Haldon, 'Theory and Practice', 224–5.

⁵⁰ See Leo VI, Ναυμαχικά, §§15–17 in Dain, *Naumachica*, 22; Nikēphoros Ouranos, Περί Θαλασσομαχίας, §§13–15, *ibid.*, 75.

⁵¹ See Leo VI, Ναυμαχικά, §§68, 69, esp. 28 in Dain, *Naumachica*, 24, 30–1; Nikēphoros Ouranos, Περί Θαλασσομαχίας, §§61, 62, esp. 26, *ibid.*, 77, 84–5. Cf. *Anonymous*, §5.2, *ibid.*, 76.

VI's insistence on the point and his words of warning that the procedure was not always advantageous.⁵²

From this point, the fully armed marines on the upper oar banks of the *dromons* came into play.⁵³ During the missile phase, they were almost certainly stationed on those parts of the decks called by the *Anonymous* (by analogy with the half-decks of *triēreis*) κατάστρωματα (*katastrōmata*), along the sides behind their shields slung on what he called the 'pavesade', καστέλλωμα (*kastellōma*); although, neither of these were words used by Leo VI and Nikēphoros Ouranos. At this point, fights must have degenerated into hand-to-hand mêlées. The only potentially decisive weapons left at this point were the 'cranes', called γερανία (*gerania*), which, if we can believe Leo VI, could pour Greek Fire already alight onto the deck of an enemy ship coupled alongside, and the rocks or iron weights hurled from the castles in attempts to smash the deck and ultimately the hull of the enemy ship.⁵⁴ However, there must be reservations about the practicality of both of these suggestions of the emperor. Both sinking and especially setting fire to an enemy ship coupled alongside would pose obvious dangers to one's own ship.

Conclusion: the Navy in the Byzantine Polity

It is no accident that only two Byzantine 'admirals' ever became emperor: Apsimaros (Tiberios II, 698–705), who had been *droungarios* of the Kibyrrhaiōtai, and Rōmanos I Lekapēnos (919–44), who had been *droungarios tou ploimou*. Nor is it an accident that only once did an emperor take command of the navy as a whole and attempt to seek out and destroy an entire enemy fleet: Constans II at the Battle of the Masts in 655.⁵⁵ As opposed to this, emperors took command of land armies on many occasions. The secondary character of the fleets in the Byzantine polity is reflected in the rank accorded to their commanders in the various lists of precedence compiled in the ninth and tenth centuries. In the *Taktikon Uspenskij*, composed around 842–3, the *droungarios tou ploimou* of the imperial fleet in Constantinople ranked only in eighty-fourth position among the officers of state and the *stratēgos* of the Kibyrrhaiōtai, although ranked twenty-fifth overall, ranked only eleventh among the eighteen *stratēgoi* of the themes. In the *klētorologion* of Philotheos of 899, he ranked thirty-eighth out of sixty and the *stratēgos* of the Kibyrrhaiōtai, although ranked

⁵² See Leo VI, *Ναυμαχικά*, §§28, 37, 69 in Dain, *Naumachica*, 24, 25–6, 31; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§26, 35, 62, *ibid.*, 77, 79, 84–5. Cf. *Anonymous*, §5.2, *ibid.*, 76.

⁵³ See Leo VI, *Ναυμαχικά*, §§9, 14, 20, 74 in Dain, *Naumachica*, 21–2, 23, 32; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§8, 12, 18, 66, *ibid.*, 73, 76, 86. Cf. *Anonymous*, §§2.7, 5. pr., 5.1, *ibid.*, 65, 67.

⁵⁴ See Leo VI, *Ναυμαχικά*, §§7, 68 in Dain, *Naumachica*, 20, 30–1; Nikēphoros Ouranos, *Περὶ Θαλασσομαχίας*, §§6, 61, *ibid.*, 72, 84.

⁵⁵ See Christides, 'The Naval Engagement of Dhāt aṣ-Sawārī'.

twenty-first overall, was only the fifteenth of twenty-five *stratēgoi* of the themes. The other two *stratēgoi* of naval themes, those of Samos and of the Aegean Sea, were third and fourth-last among the *stratēgoi*, ranking only above those of far-off Dalmatia and Chersōn. In the *Taktikon Benešević* of 934–44, the *stratēgos* of the Kibyrrhaiōtai was only the twenty-first of thirty-two *stratēgoi* and those of the Aegean Sea and Samos were fourth and fifth-last respectively. The *droungarios tou ploimou* ranked a further seventeen places below the *stratēgos* of the Aegean Sea. By the time of the *Taktikon* of the Escorial (971–5), the *stratēgoi* of the Kibyrrhaiōtai, Samos, and the Aegean Sea ranked fifty-fifth, sixty-seventh, and sixty-eighth respectively, with the *droungarios tou ploimou* in a miserable hundred and thirtieth position, below even such essential dignitaries as the palace doorkeepers, ὀστιάριοι (*ostiarioi*).⁵⁶

That Mahanian theory of naval warfare is not applicable to the centuries of galley warfare in the Mediterranean has now become a commonplace of maritime history.⁵⁷ Nevertheless, the parameters of just how inapplicable it is have still to be mapped out fully. In the case of the Byzantine Empire, it is perfectly clear that the limitations of the technology of shipping and armaments from the sixth to eleventh centuries meant that the defence of the Empire could never rest on wooden walls. The authorities realised this perfectly clearly and that is why the fleets always remained greatly inferior to the armies in the polity of the Empire. It had nothing to do with such cultural factors as Byzantine conservatism or dislike of the sea, as has sometimes been asserted. The fleets were never able to control maritime space or to maintain maritime frontiers. They could never prevent large scale incursions by Muslim and even Russian fleets into Byzantine home waters. They could never even control corsairs operating in the Aegean. The fleets were important in so far as they were an adjunct to land armies that they ferried or operated in conjunction with, but it was the latter on which the defence and advance of the Empire rested.

⁵⁶ See N. Oikonomides, *Les Listes de préséance byzantines des IXe et Xe siècles* (Paris, 1972), 57, 102–4, 246, 264–8.

⁵⁷ See in particular J. F. Guilmartin, *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the Sixteenth Century* (Cambridge, 1975); Pryor, *Geography, Technology, and War*.