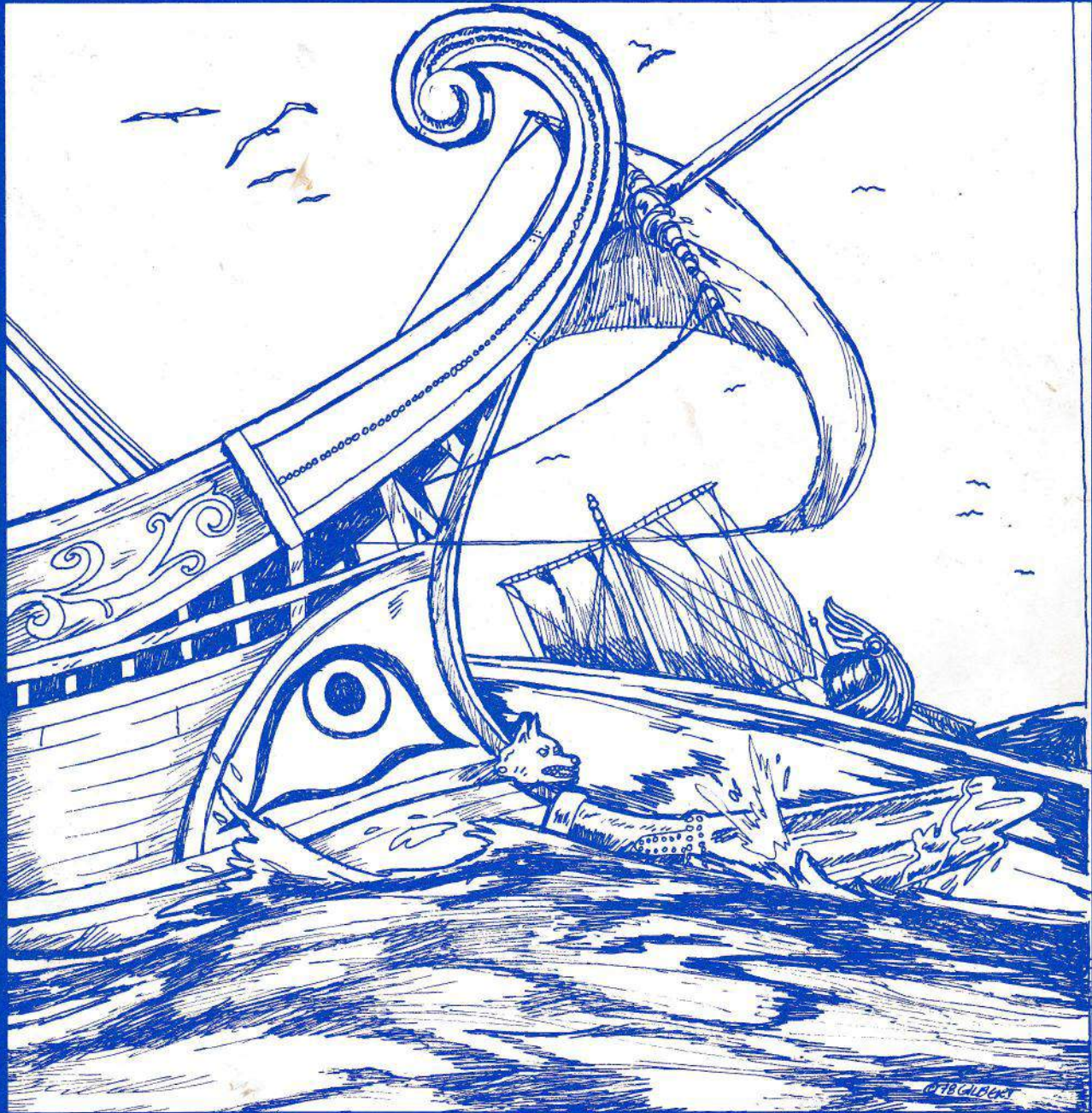


BIREME & GALLEY

NAVAL WARFARE, EGYPT TO LEPANTO



USABLE WITH *Chivalry & Sorcery*

JAN VRAPCENAK
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Fantasy Games Unlimited, Inc.

BIREME & GALLEY

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INTRODUCTION

BIREME & GALLEY is one of the more ambitious projects undertaken within the wargame industry. For this reason and the time span it covers, these rules will, at first, appear massive and frightening. Do not let the length of this rule book overwhelm you.

The first half of the book is involved with ship characteristics and statistics for historical ship types of the Ancient, Medieval, and Renaissance periods. The descriptions and data tables in this section are not rules that need be absorbed for gaming purposes, but rather, are used to set up campaigns and give the necessary information on particular ships that may be involved in a sea battle.

These rules allow for large fleet actions with the use of cut-apart ship counters (two sets, both of which can be "xeroxed") and even individual ship duels with deck action on a man-to-man scale. When a fleet action is involved, we recommend the use of the simpler mass deck action rules. For role playing campaigns or pirate attacks, the more detailed man-to-man deck action section should be used. For these man-to-man actions we have provided 25mm scale ship deck plans on which 25mm figures can be placed when detailed and scale ship models are unavailable.

In that BIREME & GALLEY has been designed by the same team that designed our popular CHIVALRY & SORCERY rules, it is only logical that these rules include a section on how to fit the naval campaign into an ongoing C & S campaign. This final section is not necessary to historical campaigns or naval actions as it relates only to campaigns based on CHIVALRY & SORCERY.

We feel certain the BIREME & GALLEY is complete in its dealing with the various aspects of naval warfare in the appropriate periods of history. It will add the much needed naval element to any campaign, be it historical or fantasy in nature.

Whether your needs are for rules to cover actions between individual ships or the massive fleet battles of Ancient times (or even Lepanto), BIREME & GALLEY has proven capable of answering these requirements. We only hope that you find these rules to be as useful and enjoyable as we do.

Scott B. Bizar
Editor

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SEAPOWERS:

"He who commands the sea has command of everything."

-Themistocles, 514-449 B.C.

Most wargames tend to concentrate exclusively upon land campaigns without reference to the sea. However, as Themistocles observed almost 25 centuries ago, a nation possessing seapower eventually dominates the lands touched by the sea.

Persia suffered disastrous defeat because the Athenian navy cut Persian lines of supply and isolated the invaders deep inside a hostile Greece. In the Wars of the Peloponnesus, Athens used her superb navy to block Spartan military power on land for several decades. Alexander the Great used his navy to support his thrust into Asia Minor and Egypt, at the same time preventing Persian flanking maneuvers and naval attacks upon Greece. Roman fleets destroyed Carthage's naval strength, and the Romans defeated their enemies in Hispania and Africa even as Hannibal ranged through Italy in apparent immunity. That same naval power maintained communication and reinforcement throughout the Roman Empire where it bordered the sea. It even guarded the northern frontiers, for not until the Danube squadrons declined were the Germanic barbarians able to break into the Empire in strength. The Byzantines added centuries to the life of their nation because their fleet guarded the sea approaches and carried reinforcements quickly to threatened provinces. The warriors of Islam learned that seapower was essential to supply their armies in their drive across Africa to Spain, and it was a mere 40 years after the death of the Prophet that Caliph Moavia was able to launch a massive, if unsuccessful, naval attack against Constantinople itself. Not until Lepanto in 1571 did Islamic seapower take second place to anyone. Similarly, the Viking raids, the Saxon, Danish, and Norman invasions of England, Genoese and Venetian domination of Mediterranean trade, Hanseatic dominance in the Baltic--all occurred as a result of naval strength. And not only historical but also purely fantasy campaigns such as the Hyborean Age can be properly waged only with a naval dimension. Too many nations border on the sea!

These rules provide the wargamer with an evaluation of the performance and important characteristics of the most common vessels from about 1200 B.C. to A.D. 1500. All hard data are derived from a great many sources. In most instances, the designers had to choose between widely conflicting data, for there is an understandable lack of information. Much "guestimating" was unfortunately necessary as a result, and for the sake of playability a stand had to be taken somewhere. There is a balance between the relative performances of the ships, and wargamers can recreate historic engagements and campaigns with some confidence that realistic conditions will be simulated. The main texts for the project were Admiral W.R. Rogers' authoritative studies: Greek and Roman Naval Warfare and Naval Warfare Under Oars. Both these books are recommended to any player desiring more detailed information and explanations.

Attention has also been given to seamanship, shiphandling, and conditions of the weather and seas. As Lao Tse remarked in the 6th century B.C., *"There is nothing in the world more soft and weak than water, yet for attacking things that are firm and strong, nothing surpasses it."* So it is also in these rules. Players have to be aware of the sea, the winds, tides, currents, and weather, and also of the way their ships will react in such conditions. Before great naval victories can be won, men must first prevail in the battle against the sea itself.

Depending upon the number of players and the size of the battles, the wargamer may wear as many as three hats: that of the fleet admiral, a squadron commander, and a warship captain. Due attention is given to crew compositions, fighting ability, permissible tactics, and artillery, missile, ramming, and melee combat. The real enthusiast may even choose to fight man to man boarding actions using 1" = 6' deck plans and miniature troops, right down to the last bloody detail. Provision has also been made for developing historical campaigns, with a point-analysis of ancient seapowers. A Chivalry & Sorcery conversion system is also provided for players involved in a C & S campaign, and this can be adapted to almost any campaign situation imaginable.

Whether it is an armed struggle between mighty naval powers or a desperate action between solitary adversaries, the designers hope that these rules will add a new and enjoyable dimension to wargaming.

Jan Vrapcokak
Ed Simbaist
Terry Cheesman

BIREME & GALLEY

The warships and merchantmen described herein are of two basic types, Mediterranean and Atlantic ships. Ship design is dictated by the conditions in which the ships must sail and fight.

The Mediterranean

The Mediterranean is a calm sea, characterized by light to moderate winds, low wave action, and sudden storms. It is bordered by many fine harbours, sheltered bays and inlets, and shelving beaches. It became traditional for mariners to beach their warships or anchor close in-shore for the night.

Mediterranean merchantmen were built to depend upon the wind, for the wind is free and profits are dear to the hearts of merchants. Frequent stops also lengthened voyage times. These merchantmen tended to be stout and seaworthy, capable of spending long periods at sea.

Mediterranean warships had to be made independent of the changeable winds of the region, so they were oared. Structural strength did not have to meet the stresses of severe weather because warships stayed in port or on the beach during storms. This led to a reduction in hull weight and draft which increased speeds dramatically. Oarbanks were placed as low as 18" from the waterline, permitting several banks of rowers and increasing the power that could be generated per foot of side.

Initially, most warship crews were freemen--warriors like the crews of Viking ships. In battle, they wore leather or bronze armour as protection from enemy fire. When a boarding action started the rowers took up their arms and rose from their benches to join in the fight. As nations became "civilized," the rowers were slaves or else highly trained professionals. In either case, the combatant strength of the vessel was reduced to 10 - 20% of the total crew. The Romans made it a practice to ship 40 to 80 marines aboard their biremes, but it was not until A.D. 100 that rowing crews were returning to being fighters as well. The ships of the later Romans, the Byzantines, and medieval Europeans carried full fighting crews, the rowers being armed and sometimes armoured. Islamic vessels carried similar crews in the beginning, then reverted to slave oarsmen. By the battle of Lepanto, all nations were using slaves and criminals at the oars to reduce the immense costs of galley fleets.

THE EGYPTIANS (c. 1500 - 700 B.C.)

Despite their position on the Mediterranean, the Egyptians never attained the status of a major maritime power. They had an extensive river fleet on the Nile, mostly small sail and oar-driven transports. Yet Egyptian ocean-going vessels were limited both in numbers and in quality.

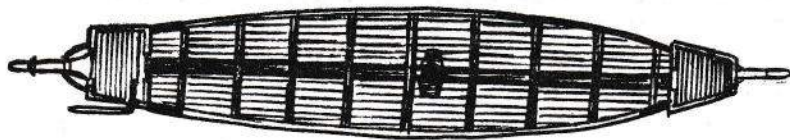
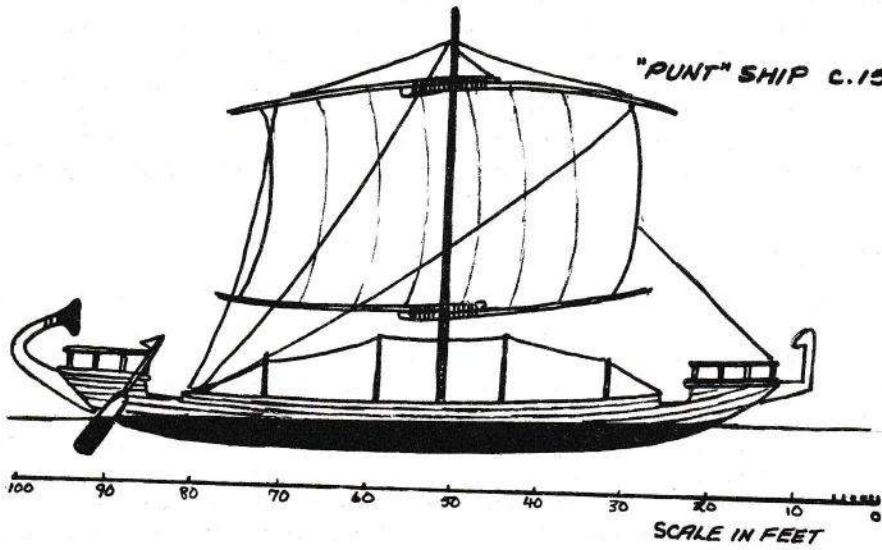
#1. The Punt Ships: s. 1500 - 600 B.C.

As importers of vast quantities of luxury goods such as myrrh and incense, the Egyptians periodically tired of paying foreigners for such goods. About 2500 B.C. the Pharaoh Sahure dispatched frail ships to "Punt", a land somewhere on the Arabian or East African coast. By 1500 B.C. such voyages were a regular occurrence, and the vessels had been considerably improved. They may have been used in the Mediterranean as well as in the Red Sea, Arabian Gulf, and the coastal waters of the Indian Ocean.

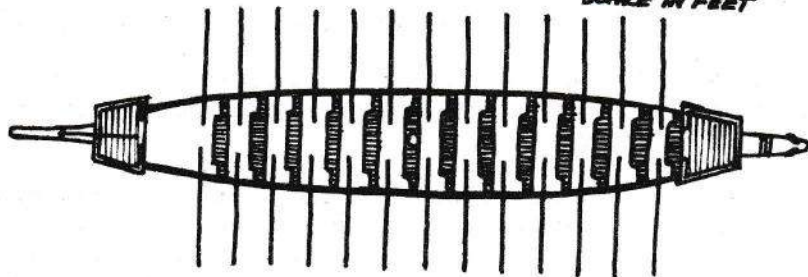
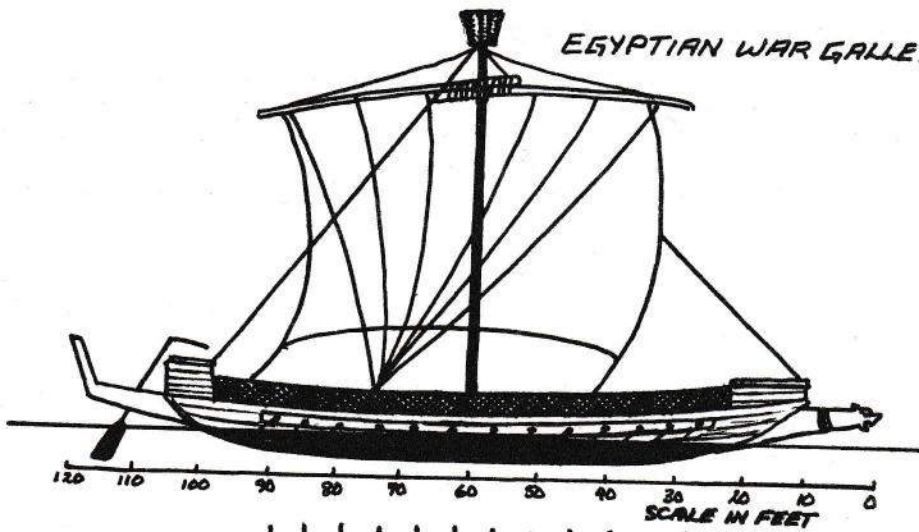
#2. The Egyptian War Galleys: c. 1200 - 600 B.C.

About 1200 B.C. the Cypriots sent both fleets and armies against Egypt. Cypriot vessels resembled Phoenician merchantmen and depended solely upon the wind. Pharaoh Rameses III ordered a fleet built to counter the threat. The Egyptian warships combined a keel, spur-type ram, a good navigating position for the steersman, a crow's nest, oars for motive power in battle, and high sides (the upper portion probably a mat of woven papyrus) to protect the crew from archery. Except for raised platforms at the bow and stern, the vessel was undecked. It outclassed its opposition, but such a warship was obsolescent by the time of Phoenician maritime dominance.

"PUNT" SHIP C. 1500 B.C.



EGYPTIAN WAR GALLEY C. 1200 B.C.



THE PHOENICIANS (c. 1500 - 333 B.C.)

Nourished by trade and governed by mercantile aristocrats too skillful and clever to waste their wealth on unnecessary wars, the cities of Phoenicia became the richest in the early Mediterranean world. The nation was small, a strip of coastal plain 100 miles long and 10 miles wide between Syria and the sea, protected from landward invasion by the Lebanon Hills. Phoenician history began about 2800 B.C. with the founding of Tyre and ended 25 centuries later with the destruction of that city by Alexander of Macedon. Phoenicia was relatively independent throughout its long history, most potential conquerors preferring to buy Phoenician loyalty and services rather than to storm the strongly fortified and almost inaccessible cities. Thus Phoenician squadrons were found as a strong mercenary contingent of the Persian fleets during the wars against Greece.

#3. The Phoenician Biremes: c. 1000 - 600 B.C.

Requiring warships to protect their commerce from pirates and their cities from attack by hostile fleets, the Phoenicians developed the first biremes. Data on the vessels is scanty and subject to disagreement. Some argue that the ships were "dug-outs" hollowed from the great trees of Lebanon and broadened by additional planks. However, the Phoenicians were using caravel construction in their merchant vessels by 1200 B.C., so it is likely that the warships were of rib and plank construction. The best theories present a vessel with a flat, shallow hull and a submerged ram extending from the keel. The rowing space is partially covered by a light fighting deck. Speeds under oars were not fast because the oars were about 12 feet in length and the rowing arrangement was imperfect. Pictorial representations show a sail of small dimensions, so sailing speeds were leisurely. However, no warships could seriously challenge them until the appearance of the Greek pentekonters and early biremes.

#4 & #5. The Phoenician Merchantmen: c. 1200 - 400 B.C.

Phoenician merchant vessels resembled in general outline the ships of the Nordics. They were completely dependent on the wind and quite fast for their time. The bilges were decked, especially in the case of larger vessels. Larger vessels may also have carried some form of shelter for the officers. Phoenician ships were seaworthy enough to voyage as far as Cornwall, England, to obtain tin for the making of bronze. In time of war, they served as transports and auxiliary warships with strengthened crews.

The Later Phoenician Vessels: c. 600 - 333 B.C.

By 600 B.C. it is probable that the Phoenicians were replacing their biremes with craft of more advanced design modelled on Greek ships. (See #6. Pentekonters and #9. Greek Early Biremes.) The bow and stern of such types would have been decked, but the rowers were still exposed amidships. The old fighting deck would have disappeared, and rowers may have been slaves or captives in part or in whole. Pentekonters greatly outnumbered the biremes.

By 500 - 450 B.C. the Phoenicians appear to have developed triremes to counter the Greek vessels, and from all accounts they were virtually identical to Greek trieres. (See #10. Early Greek Triremes.) Such ships may have seen service as early as the Persian Wars, but they were present in limited numbers.

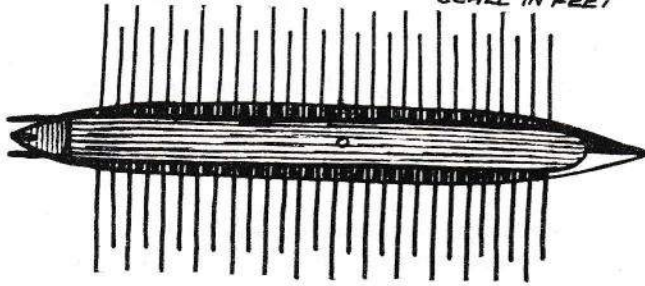
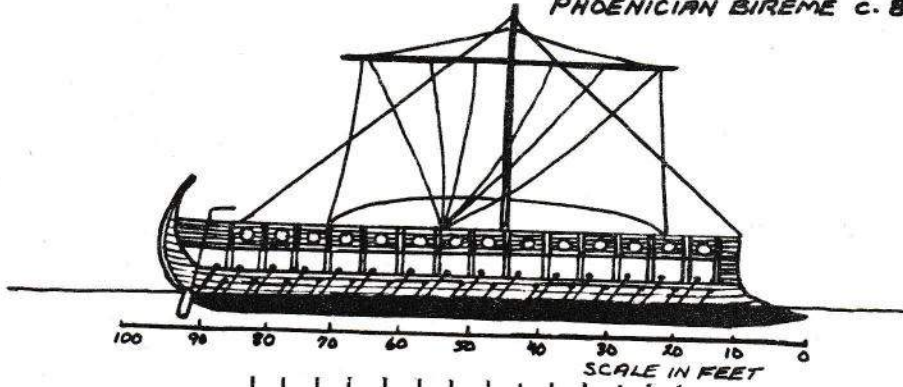
Phoenician merchantmen likely saw considerable evolution and may have been similar to Greek vessels by 600 B.C. (See #19 and #20 Mediterranean Merchantmen.) A number of the large Phoenician types would have been retained for the Atlantic trade.

THE GREEKS (c. 1200 - 146 B.C.)

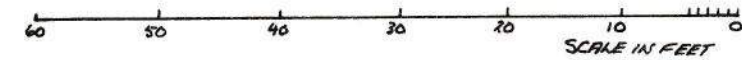
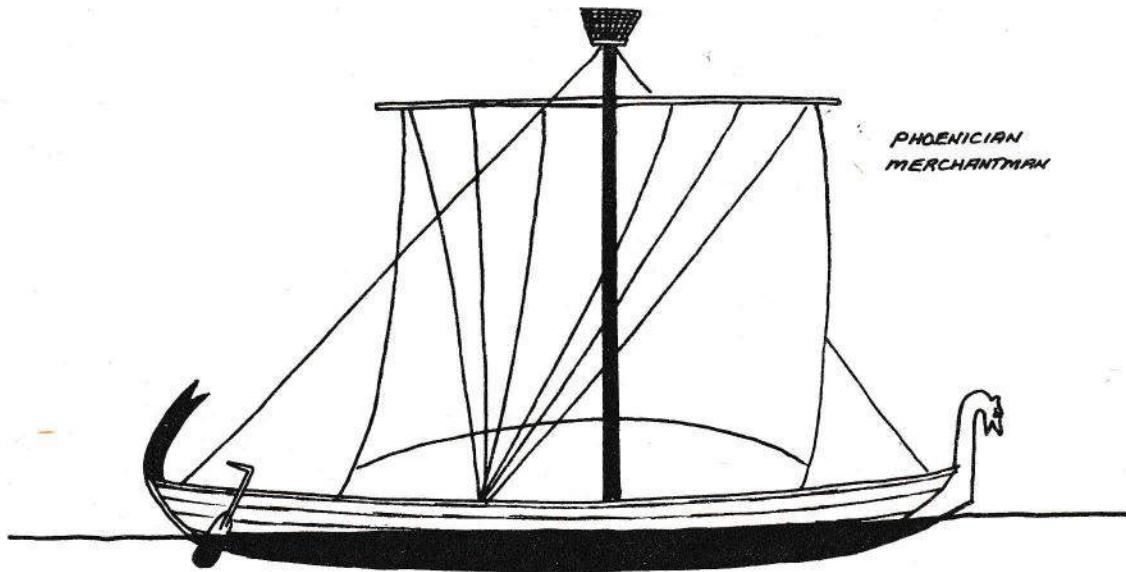
The Greeks have always known the sea. The rugged geography of their land, the presence of numerous islands along the coast and in the Aegean Sea, and the vulnerability of the coastal settlements to raids and invasions from the sea, all dictated the need for ships for commerce and war. By the height of their power, the Greeks were unequalled in both their naval technology and the strength of their navies.

Greek naval tradition stretches back into legend, with the sacking of Troy by a fleet under the leadership of the hero Heracles. A generation later, Agamemnon, Ulysses, and Achilles returned with an even larger force to repeat the deed. At that time, the sleek trireme did not exist. Rather, the Greeks were using the pentekonter, a small undecked ship rarely carrying a crew in excess of 50 to 60 men. This vessel evolved into both the bireme and the trireme.

PHOENICIAN BIREME C. 800 B.C.



PHOENICIAN
MERCHANTMAN



By the start of the Persian Wars, the trireme was replacing other types as the primary ship of war in the Greek fleets. By 470 B.C. the Athenians had completely converted to triremes and were developing advanced designs which outclassed the warships of all other nations.

Fleet compositions and the wider considerations of policy played a major role in naval history at the height of Greek power. The Athenians opted for a professional navy and built a mighty fleet of triremes. Athenian rowers were all freemen, well-trained professionals superior to those in any other navy. Corinth persisted in the use of older bireme and trireme designs and lost the naval race the moment it began. Argos, the smallest of the three principal Greek naval states, maintained a fleet incorporating both the older triremes and the latest Athenian designs. Other states maintained fleets on the Greek pattern, but more were not the equal of the Athenians. Pergamum developed a small but effective navy and cooperated with the Romans. Rhodes became a major naval power. The various provinces of Asia Minor under Persia had strong fleets as well: Caria, Ionia, Hellespont, Doris, Aeolia, and Pamphylia. So did the Cypriots. Other nations utilizing Greek-style vessels were Phoenicia, Cilicia, Lycia, and Egypt. There were small squadrons from the Aegean and Greek Islands as well.

Clearly, the Greeks, and especially the Athenians, had to have some "edge" to experience so many stunning naval successes against the larger fleets of their enemies. In the Persian Wars, according to Herodotus (VIII-60), the Greeks had larger and faster vessels, so it is probable that many of the ships of the Persian fleet were pentekonters. Still, it was also in Greek superiority in shiphandling, armaments, and crew training that the advantage lay.

Much nonsense has been written about ancient warships rowing into battle with two or three banks of oars manned. While such evolutions are possible, they properly belong, as Admiral Serre noted over a century ago, to "parade" situations such as entering and leaving harbour. Such precision rowing undoubtedly impressed the populace, and it is in this attitude that most artists would have seen the warships and so depicted them under all oars in their paintings and on pottery. At sea the speed of cruising determined which oars would be used. In a triere, slow cruising was performed on the lowest bank of oars by one man on each oar. Standard cruising would have had employed half the crew rowing on the second bank, with one or two men on each oar. Battle speeds required the whole crew at the oars, three to each oar and rowing in the upmost bank. Roman practice clearly had 1, 2, or 3 rowers at the oars, depending upon the speeds required. Large vessels can be explained only by placing a number of men on each oar. For a detailed, professional, and convincing analysis of the matter, see Admiral Rodgers' Greek and Roman Naval Warfare.

The Athenians introduced "cataphract" construction to ship building. Up to 450 B.C., most vessels were undecked or "aphracts". The interior of the ship was exposed down to the keel. The rowers sat on benches set into a frame running the length and breadth of the vessel. Only the bow and stern were "decked" to provide some open space for the fighting crew and the navigation crew..

The first stage of evolution was the "cataphract I," which saw the bilges and hold decked over to provide watertight storage for provisions and equipment. This facilitated easier movement in the middle 75% of the ship that held the rowers and gave added watertight integrity when sea was shipped through the lower oarholes. (Incidentally, the oars were run through oiled leather gaskets which were fixed around the oarholes, so far less water was taken aboard than some might think.)

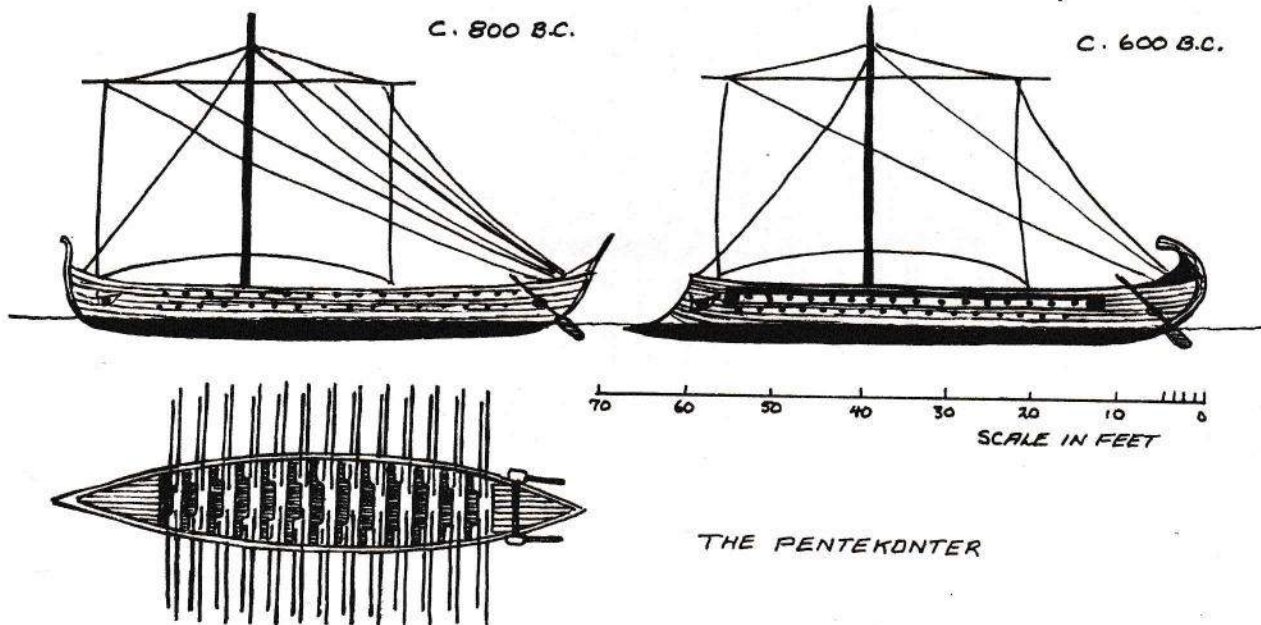
The next stage was the "cataphract II", which extended the solid sides of the vessel up above the level of the heads of the upper bank of rowers, providing protection from missile fire. It is thought that the rowers in the topmost banks of earlier vessels wore armour or else were covered by a heavy leather canopy stretched over a framework of light ribs laid across the rowing space.

The final stage was the "cataphract III", which saw the rowing space completely decked over. This gave the seaborne troops a large, relatively open fighting area. The soldiers often had to line the sides of the vessel in the midst of the rowers, an embarrassment to efficient rowing. Without a main deck covering the rowers, fighting strengths rarely could exceed 10% of the total crew. Except in the earliest stages of naval development, the vessels of the ancient world were divided into two distinct classes: soldiers and rowers. Soldiers fought: rowers rowed. Since space was limited, deckborne fighting strength was often up to 30% of the crew.

Also, artillery such as ballistae and catapults can be mounted only on decked vessels. When one also considers the improvement in seaworthiness and hull strength obtained by cataphract III construction, such vessels are seen as greatly superior to other types.

#6. Pentekonters: Homeric Period - 400 B.C.

The pentekonter was the only ship of war used by the Greeks, and then by many of their neighbors in Asia Minor, until the advent of the trireme. It was of aphract (undecked) design, small, low in the water, crowded, and lacking a ram prow until perhaps 700 B.C. The early pentekonters belong to a period in Greek history not dissimilar to that of the Vikings; for the rowers were also combatants clad in light armour who kept their shields and weapons beside them. This reduced tactics to boarding the enemy and sweeping the decks clean of resistance. However, landing parties were readily available for raids and naval invasions like the one at Troy. Later vessels used non-combatant freemen or slaves as rowers.



#7. Dispatch Boats: c. 500 B.C. - A.D. 200

Fast dispatch boats were developed from the pentekonter and were used by virtually all of the navies of the Mediterranean region for reconnaissance and message-bearing.

#8. Hecatonters: c. 850 - 600 B.C.

The hecatonter was nothing more than an enlarged pentekonter designed to take 100 rowers. While moderately fast, it was very light in construction and became outclassed by early bireme and trireme designs. For appearance, consider the pentekonter and add another 40 feet to the length.

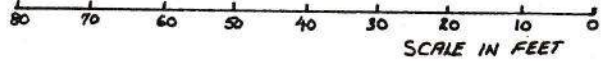
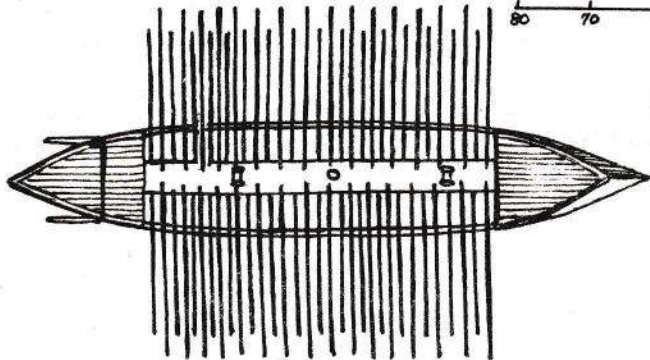
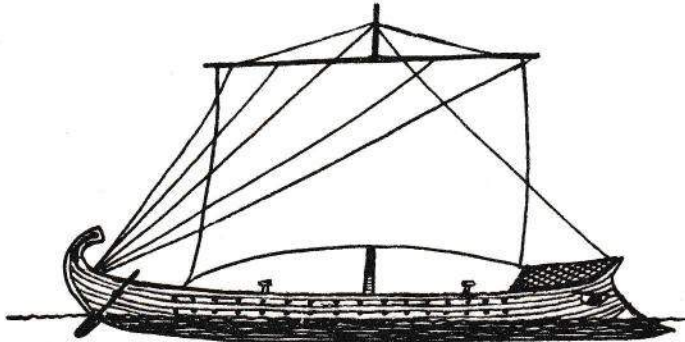
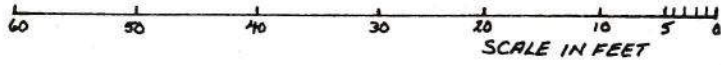
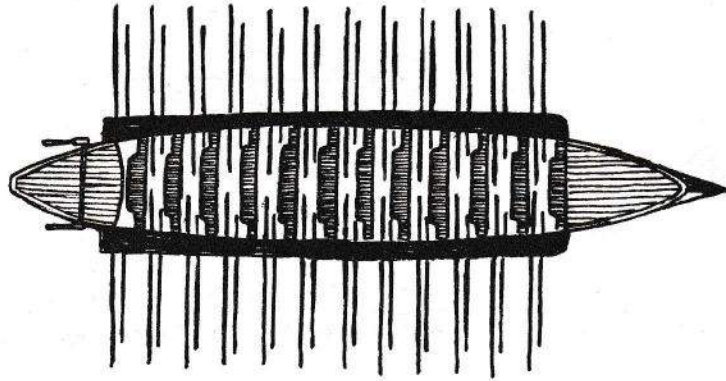
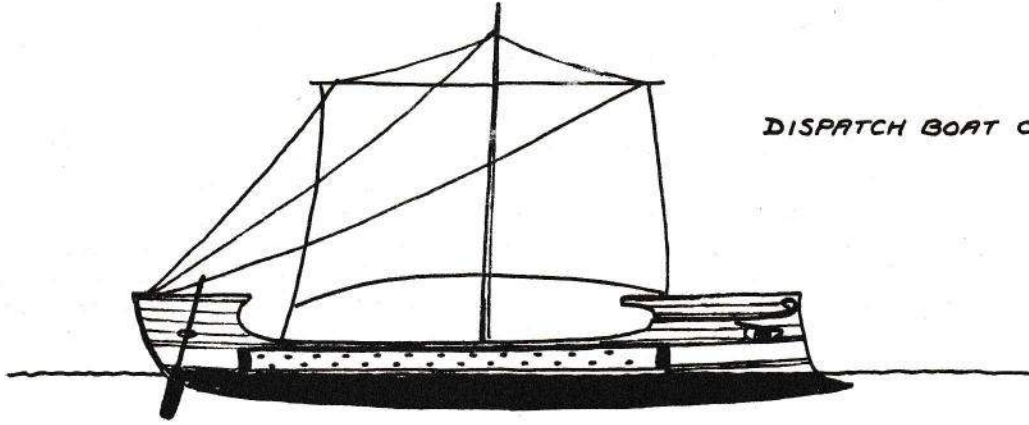
#9. Early Biremes: c. 700 - 400 B.C.

The bireme was the natural development of the pentekonter into a larger, more efficient warship. A ram bow was added and the freeboard was slightly increased to accommodate a second bank of oarsmen. The topmost rowers were exposed to enemy fire at waist height.

The Greek Triremes: c. 600 - 146 B.C.

Vessels with three banks of oars began to appear as early as the seventh century B.C., but it was not until the Persian Wars that they had replaced the biremes and pentekonters as the primary ships of war in the Greek fleets.

DISPATCH BOAT C. 400 B.C.



EARLY BIREME C. 600 B.C.

#10. Early Triremes: c. 550 - 450 B.C.

The first trieres were about 75 to 80 feet long and resembled Greek biremes in general lines, except for the three banks of oars. The rowers were exposed and may have worn light armour for protection. Such vessels were the front-line warships of the Greeks by 500 B.C. and were subsequently imitated by their neighbours, but with less success.

#11. Trireme II: c. 500 - 400 B.C.

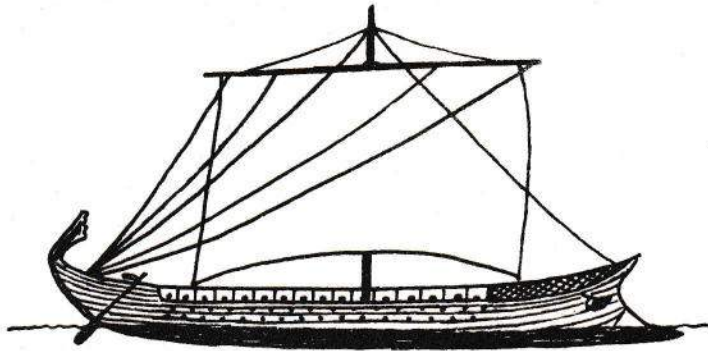
Within a short span of time, the early triremes were being replaced by vessels of longer length. The Trireme II boasted about 120 rowers and this, along with improved hull designs, permitted it to reach faster speeds under oars and sail. Most vessels of this class were still aphracts until the latter part of their time of general service.

#12. Trireme III: c. 466 - 146 B.C.

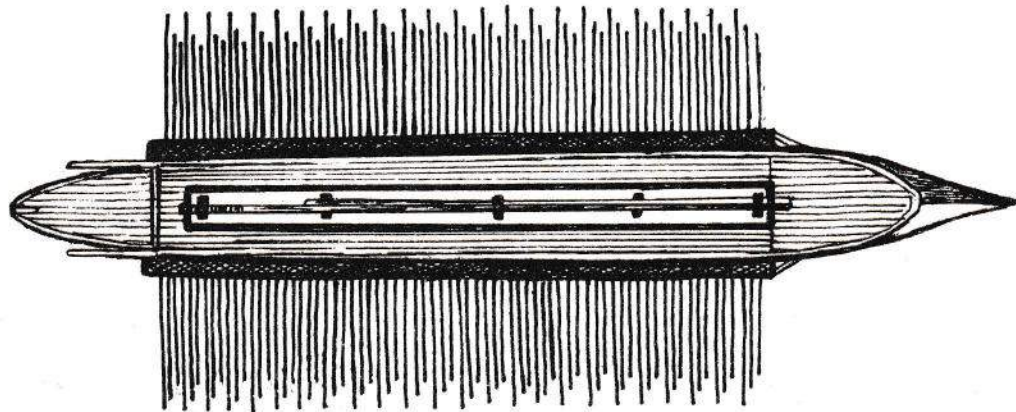
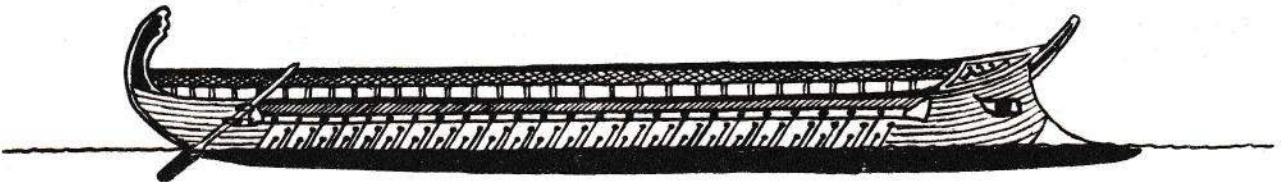
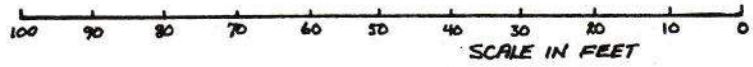
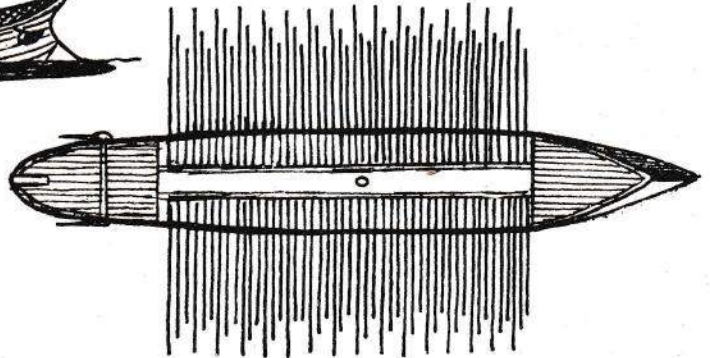
With the adoption of cataphract construction, the Athenians forged ahead of their enemies in naval design. Initially, the bilges were decked over and a frame was placed over the rowing space to support the leather canopy protecting the rowers from missile fire. The hull was further improved and additional rowers provided, which increased speeds. Speed under sail also increased. Later versions extended the hull upward to protect the rowers from the side, and eventually the full deck was added.

#13 & #14. Trireme IV and V: c. 440 - 146 B.C.

Soon after the Trireme III's began to appear, larger vessels were designed to serve as squadron flagships and long-range cruisers. Their evolution closely parallels that of the Trireme III's, with first the bilges and holds being decked over, then the raising of the hull over the rower's heads, and finally the complete decking of the hull. The rowing crews were very large, permitting very efficient relief on long rowing cruises. Increase "slow" and "standard" cruise times by 2 hours and 1 hour, respectively to reflect this factor. Also, with two masts in many of the ships, they were capable of attaining excellent sailing speeds. Adequate space in the holds permitted the shipping of up to 20 days' provisions for long voyages.



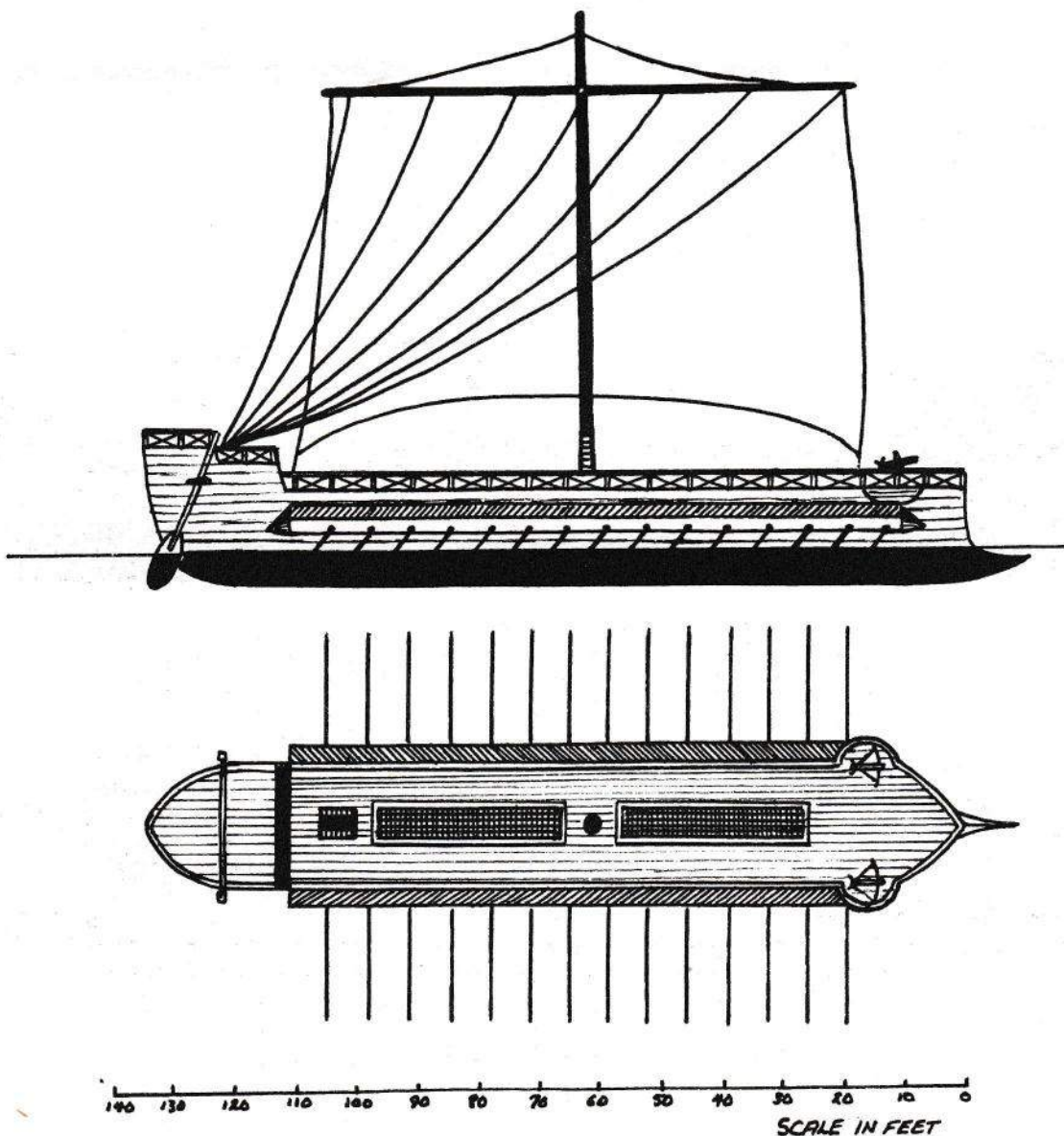
TRIEME c. 500 B.C.



TRIEME c. 400 B.C.

#15 & #16. The Penteres: c. 413 - 300 B.C.

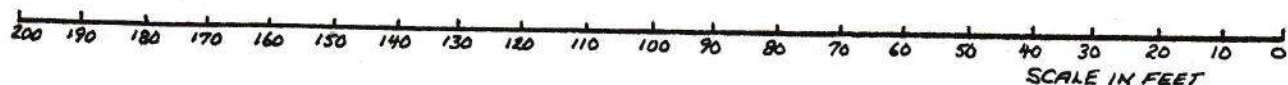
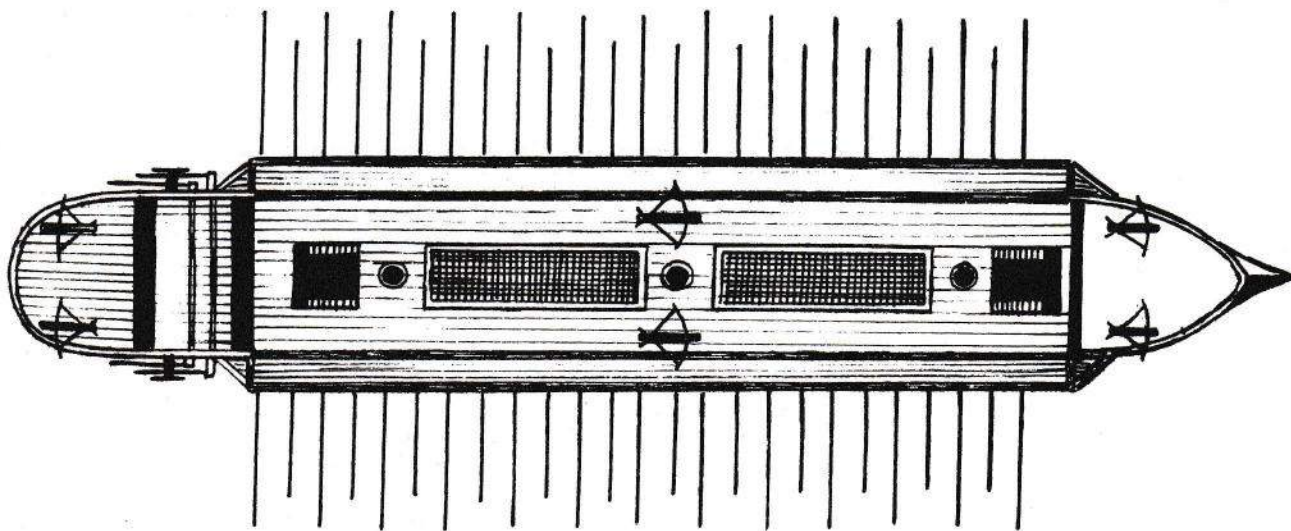
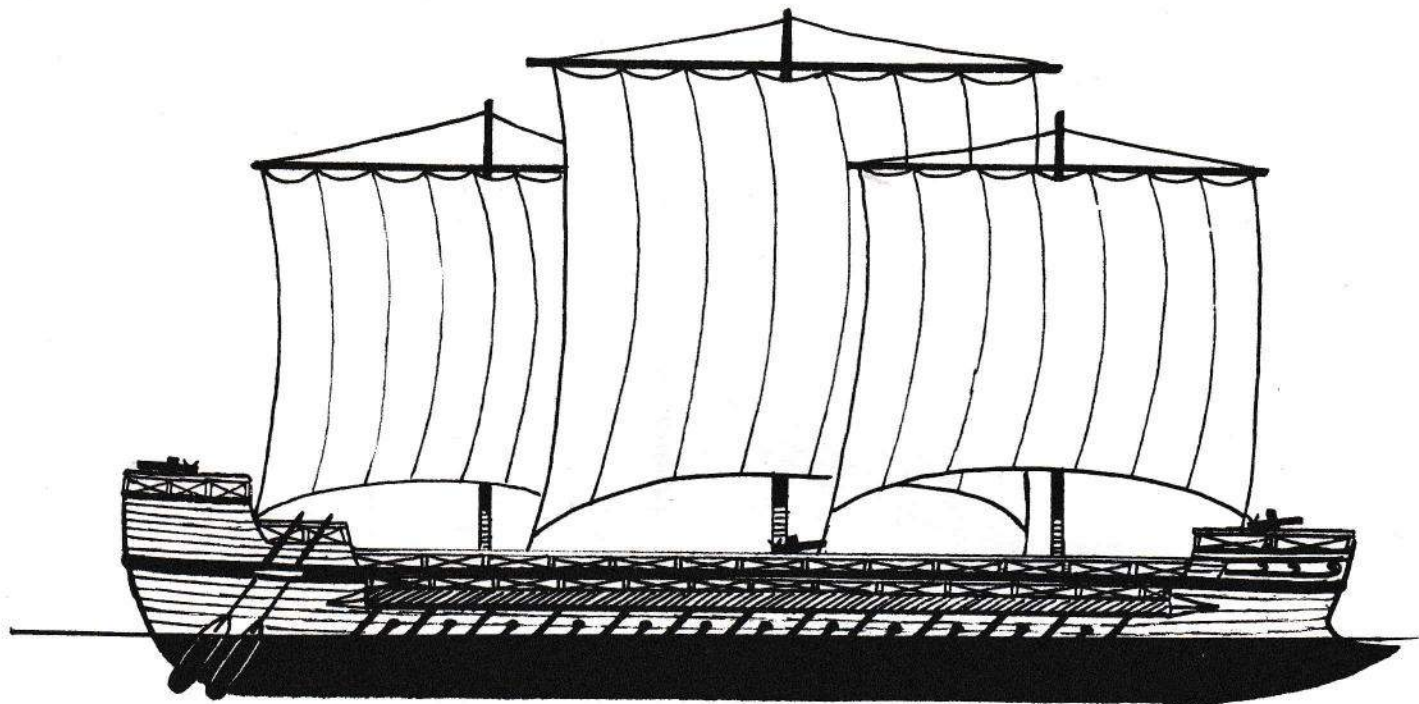
The penteres occupies the same relationship to the bireme and trireme as the battleship does to the cruiser. Following Rodgers, we assume that 5 men were assigned to each oar rather than there being 5 banks of oars with 1 man per oar. Early types were relatively small (see #22 Carthaginian Penteres and #24 Roman Quinquereme for design specifications), but they soon increased in size. The penteres of Dionysius of Syracuse are perhaps the most representative of the type at its peak development. While slower and less maneuverable than the trireme or bireme, the penteres had the singular advantage of carrying a strong force of soldiers or marines. Later models also mounted ballistae. The earliest models were cataphract I's, with the holds and bilges decked over and the bow and stern areas raised above the rowing space--the rowers being exposed overhead and to the side. The improved versions evolved into the fully decked type shown in the illustration.



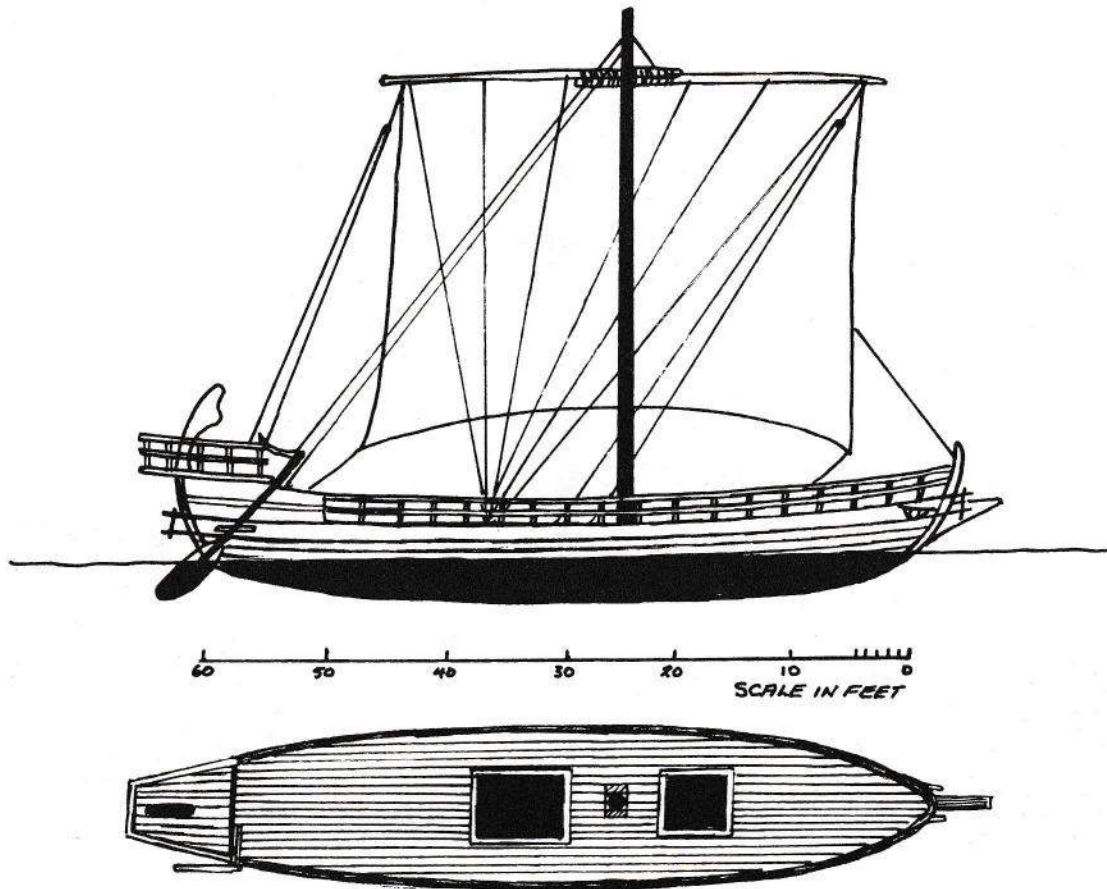
SUCCESSOR CATAPHRACT PENTERES c. 300 B.C.

#17 & #18. The Levantine Behemoths: late 4th Century B.C.

These naval oddities were developed during a period in which the Successors to Alexander endeavored to outbuild and overwhelm their opponents. Like the naval races of modern times, the Successors tried their hand at designing as many "battleships" as could be afforded. Few were built because the costs were immense. They made little tactical sense, and it is unlikely that they saw extensive action. Their great size was a means of impressing the populace and intimidating unknowledgeable neutrals. True seamen probably just shook their heads in disbelief and prayed for service in a proven trireme or dispatch vessel. Still, for the wargamers of the "battleship school" the authors offer the Octere and the 16-er for consideration. It should be noted that Ptolemy designed a monster of a ship, 3000 tons. His tesserakonter probably never ventured far from Alexandria, for it was structurally too weak to survive even a moderately lively sea. (Iron bracing was not developed until the 19th century A.D.)



16-ER OF DEMETRIUS POLIORCETES C. 300 B.C.



GREEK MERCHANTMAN C. 400 B.C.

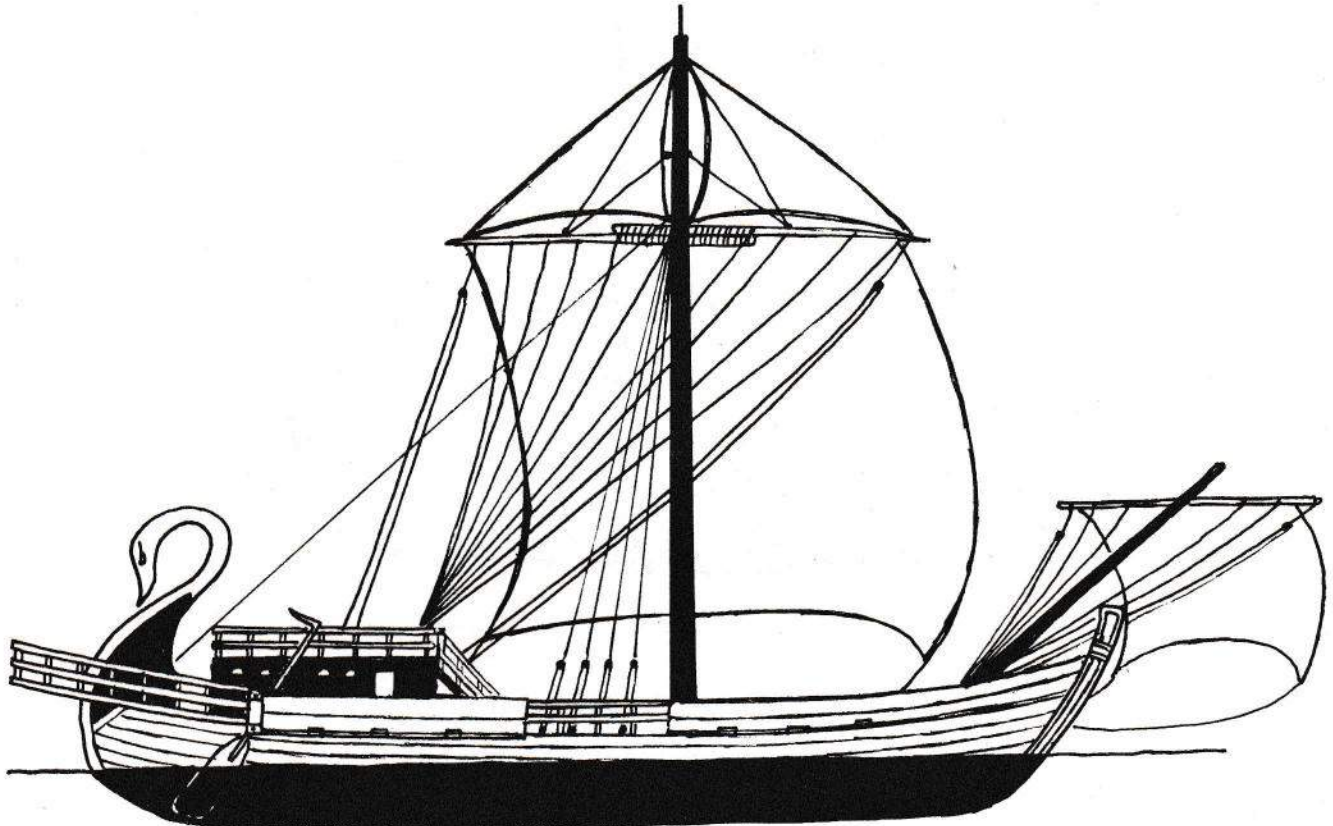
MEDITERRANEAN MERCHANTMEN: 1000 B.C. - Christian Era

A great many designs appeared for merchant vessels in classical times and to deal with them all is impossible in the space available. Basically, all of the merchant ships larger than coasters would have exhibited similar dimensions, cargo capacities, and sailing speeds. Most were quite seaworthy, and Roman vessels were capable of voyages into the Atlantic.

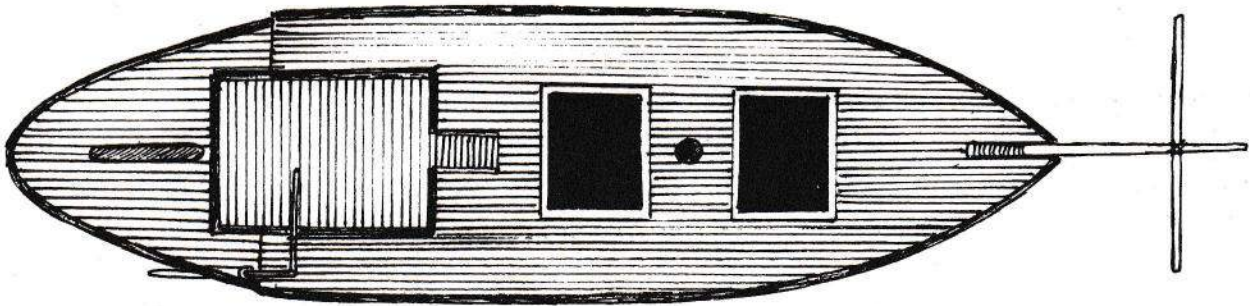
The data tables give statistics on such ships under #19 and #20. Not included in the Data Tables are the great corn vessels of Rome. Use the data for #48 Great Cogs for an approximation of these vessels' dimensions and sailing characteristics. Appearance would be similar to the usual Roman merchantman.

Some mention is made in classical sources of "fast merchant vessels. Such vessels may have been oared. If they did exist, the "fast" merchantmen would have had to carry rich cargoes and important personages to justify their great expense. If wargamers desire a few of these vessels, assume the dimensions of the Trireme IV, with several more feet of beam and a crew of 7 officers, 25 sailors, and 100 rowers. Sailing speeds would be those of the Trireme IV but rowing speeds would be 25% slower, with no relief bonuses for slow and standard cruising speeds.

Byzantine merchantmen and military transports tended to be on the Roman model. Large vessels were used to transport the horses of the Cataphractic cavalry, with a ship able to carry one horse, man, and equipment plus provisions for two weeks per 3 tons of cargo capacity. With the adoption of lateen rigging in the Dark ages, Byzantine vessels were also capable of sailing closer to the wind than earlier, square-sailed merchant vessels.



90 80 70 60 50 40 30 20 10 0
SCALE IN FEET



ROMAN MERCHANTMAN C. 100 A.D.

THE CARTHAGINIANS: 400 - 147 B.C.

With the decline of Phoenicia, many merchants of Tyre resettled in the colony of Carthage. The city grew rapidly in power and extended its influence into the hinterland of North Africa, then into Hispania and Sicily. War became inevitable with Rome, for the Republic was at that time expanding into Southern Italy.

#21. The Carthaginian Bireme: c. 350 B.C.

The Carthaginian bireme was an improved version of the type discarded by the Greeks in favor of

the trireme. It was of cataphract II design, with considerable structural strength and speed. However, while the fighting complement may have reached 20-25 soldiers, it was inadequate when facing the 40 to 60 marines shipped aboard a comparable Roman vessel.

#22. The Carthaginian Pentere: 400 - 250 B.C.

Coming into contact with Syracuse in Sicily, the Carthaginians "borrowed" the idea of using the pentere as a heavy vessel. The design presented here is probably the same as the early Syracusan models. The ship was broad in beam and had but one bank of oars, with 5 rowers per oar. It was able to carry a lot of canvas, however, and while it was slow under oars it could make respectable speeds under sail. By the Second Punic War, a few penteres of the fully decked type (see #15 Penteres, above) were undoubtedly in service.

#23. The Carthaginian Trireme: 400 - 250 B.C.

The Carthaginians also possessed a few triremes in their fleets, probably little different from Greek Trireme I's and II's, with an occasional III. These vessels were in a clear minority, however, with the bulk of Carthaginian strength residing in their biremes.

THE ROMAN REPUBLIC: (350 - 31 B.C.)

Not having a navy nor naval experience of any kind, the Romans suffered a grievous disadvantage at the start of the First Punic War. They were not slow to construct a fleet when it was needed, however, and the Romans learned by much suffering and loss how to use it. The Romans suffered the frustration of coping with the vastly superior seamanship of the Carthaginians. Realizing that they would be unable to beat the Carthaginians on their own terms, the Romans devised methods of bringing land warfare onto the sea--for in that the Romans excelled. The grappling hook had been used in naval warfare for some time, but only sparingly, for archery and ramming were preferred to desperate boarding actions. The ships of Rome chose to lay alongside the enemy, hold him fast, and draw him in close enough to permit 40 to 60 heavily armoured marines to storm the decks. The Corvus or "Crow," an 18-foot long, 4-foot wide boarding gangway with a spike at the end to fasten onto enemy decks, was also used to facilitate the rapid passage of large numbers of marines onto the hapless enemy vessel. Learning from the Syracusians, the Romans mounted scorpions, vallistae, and catapults on their larger ships to cripple or burn opposing vessels at long range, or to rake the decks just before boarding. They also shipped increasingly larger numbers of archers.

Disposing of their naval enemies one by one, the Romans became the dominant force on the seas by the middle of the second century B.C. They were seriously outnumbered by the combined naval strength of the Greeks, but chronic Greek disunity prevented them from outfacing the Roman threat. With the conquest of Greece, organized resistance to the Roman will had ceased in the Mediterranean. A century later, the Roman squadrons under Pompey disposed of the pirates operating out of Illyrium in the Adriatic. From that point on, Roman had only Roman to fight.

The Early Roman Bireme: c. 260 B.C.

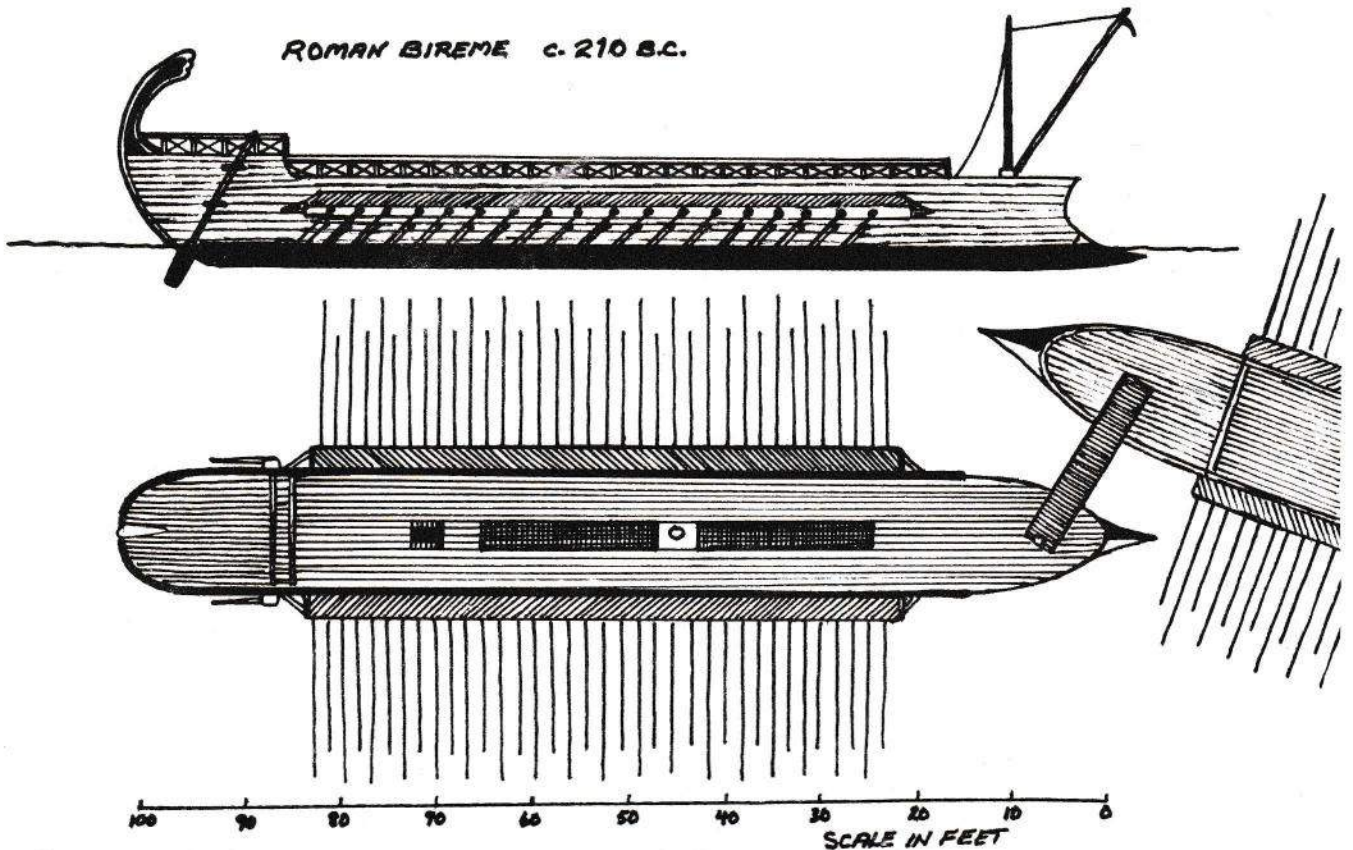
Initially, the Romans used biremes identical to those of Carthage, the only difference being the addition of 15 to 20 soldiers, bringing the fighting complement to 40.

The Roman Trireme: c. 250 B.C.

The Romans apparently built a few triremes on the Carthaginian-Greek model, but these vessels did not seem to meet with Roman approval--probably because they required trained rowing and sailing crews which were sadly lacking. As usual, Roman fighting strength was increased so that the Marines numbered 40 to 60 men.

#23. The Roman Bireme: c. 210 B.C.

As the Romans came to terms with the sea, their own designs began to take to the water. The Roman biremes were fully cataphracted, the rowers being completely decked over to permit as many marines as possible to line the sides. The Corvus or else a ballista was mounted at the bow on a swivelling mast. The marine complement was now standardized at 60 men--one-half of a "maniple". Excellent hull design gave the ship surprising speed despite a relatively small rowing crew. With improvements, the class was to last well into the Imperial period.



#24. The Roman Quinquereme: c. 250 B.C.

The Roman quinqueremes were identical copies to the Carthaginian penteres, except for the addition of a Corvus on the bow and close to a 100% increase in the fighting complement. Because of poor construction and errors in copying the Carthaginian models, Roman quinqueremes were slower under oars. The design was dropped by the end of the First Punic War in favour of biremes.

#25. The Augustan Bireme: 36 B.C. - 200 A.D.

During the Roman Civil War following the death of Julius Caesar, Octavius' admiral, Agrippa, designed and commanded a much improved version of the bireme. The vessels carried mechanical artillery in the form of scorpion or ballistae, and had two fighting castles placed fore and aft to give archers advantageous firing positions. The fighting complement of the vessels was increased to 80. Seakeeping was improved, and this galley type was able to operate in the coastal Atlantic in all except heavy weather or high seas. It remained the "battleship" of the Roman fleets for several centuries.

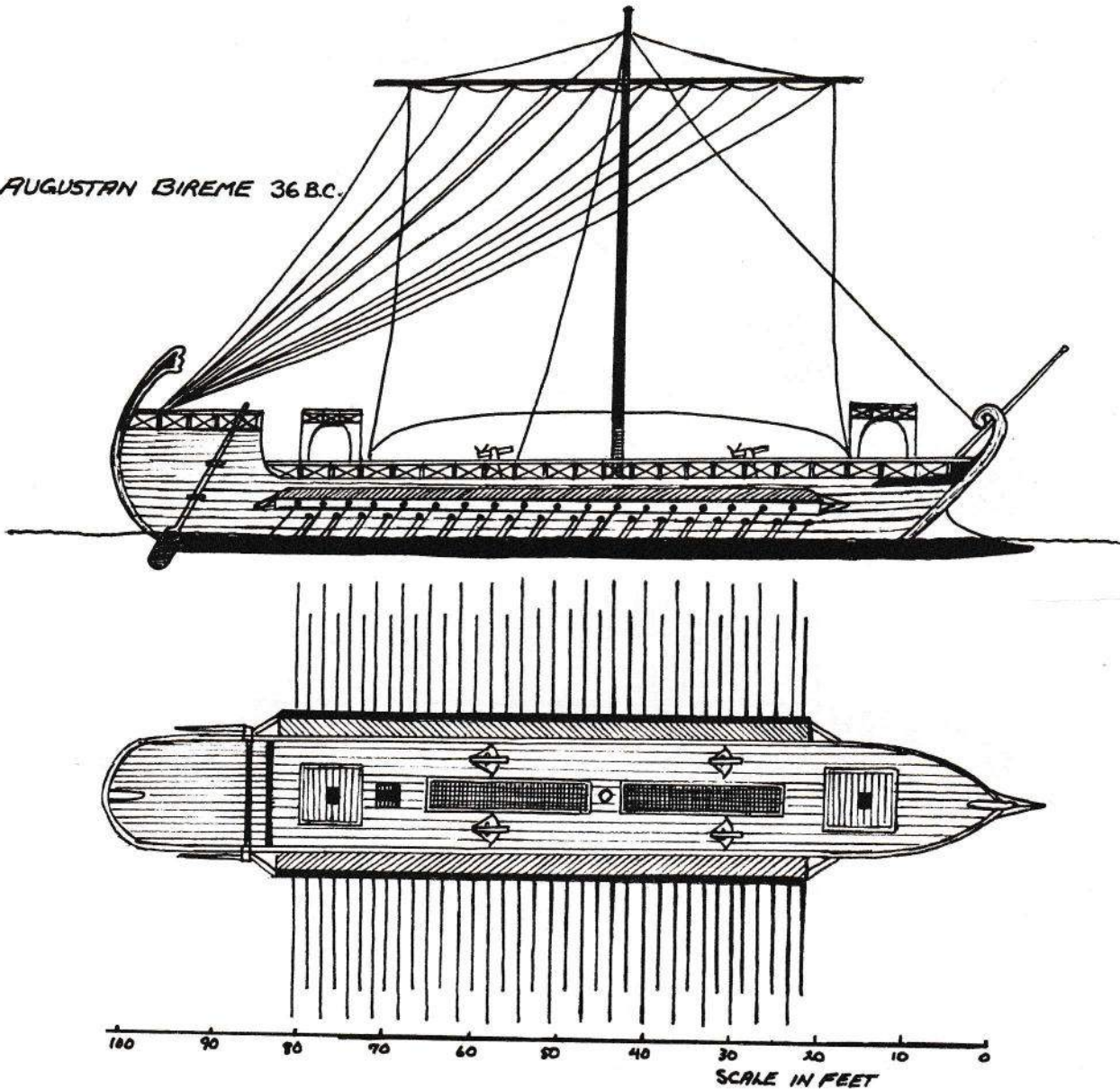
Large Roman War Vessels: Later First Century B.C.

The Romans did not build ships of war larger than their bireme types. However, in the later stages of the Roman Civil War, Antony had a number of the old Levantine models constructed in the mistaken belief that Agrippa's naval victories during the Sicilian campaign of 36 B.C. were due to his having larger ships. The largest of Antony's ships carried high towers bearing mechanical artillery and archers. These tetreres (4-ers), penteres (5-ers), octeres (8-ers) and deceres (10-ers) were generally too clumsy to maneuver for ramming attacks against their smaller, more agile opponents. Thus they relied on grappling and boarding the enemy. To simplify the wargamer's task, assume the same general data applies as for the Successor penteres (#16, above) when dealing with tetreres and penteres, and for Successor octeres (#17, above) when dealing with the octeres and deceres. Fighting towers tended to be 10 to 15 feet above deck level.

THE ROMAN EMPIRE (30 B.C. - A.D. 400)

When Octavius Augustus Caesar found himself sole master of Rome and her far-flung Empire, he had in his service the strongest fleets seen in ancient times. However, with no serious threat to her supremacy on the seas, Rome allowed the Mediterranean navy to decay over the following cen-

AUGUSTAN BIREME 36 B.C.



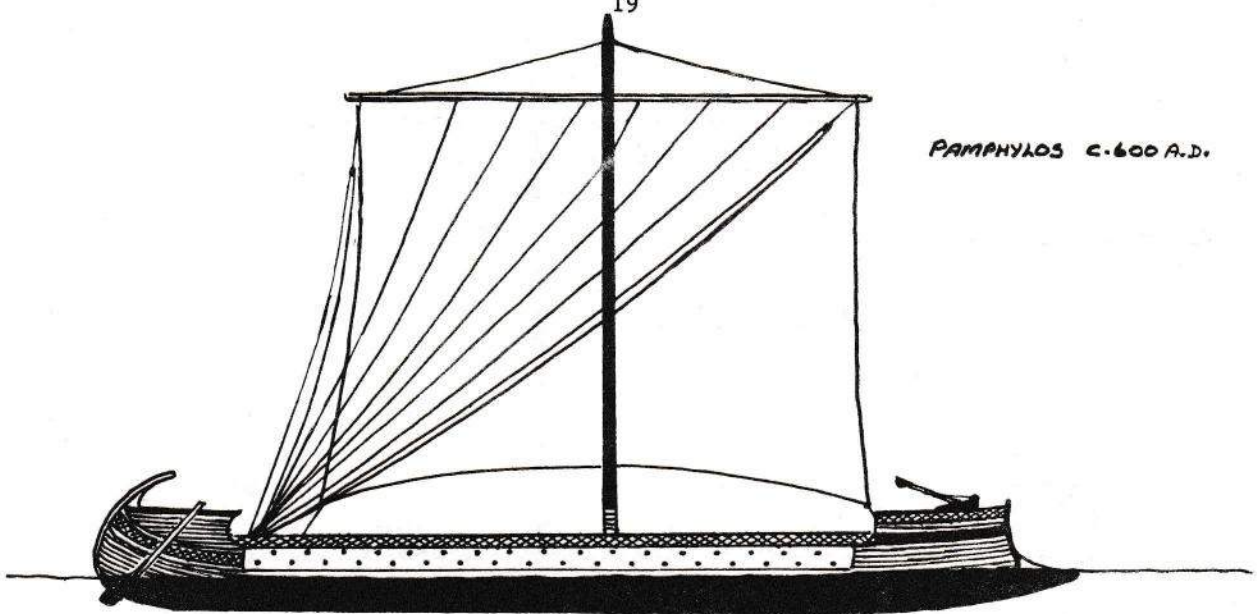
turies until, with a brief return to a shadow of its former power under Constantine, the Imperial Fleet became ineffectual in stopping even the raids of minor barbarian peoples who had taken to the sea. Similarly, the mighty squadrons that patrolled the Danube and Rhine Rivers and held the northern frontier were helpless to prevent the invasions that broke into the Empire with increasing frequency after A.D. 300. Thus the Imperial period is actually one of decline in naval power and naval design.

#26. Trajan's Coast Guard Ship: A.D. 75 - 700

In addition to the mighty biremes of the Imperial Fleet, the Romans had need of smaller, slower vessels for coastal and river patrols. The vessel presented in the Data Tables is a reconstruction of one such vessel depicted on the column of Trajan. Such vessels would have existed in one form or another early in the Imperial period, for they were a logical type to meet the naval requirements of an Empire which lacked powerful enemies on the seas. It is a measure of how far Roman naval power had declined by Trajan's time that the major part of the Roman fleet would have been composed of vessels of this type.

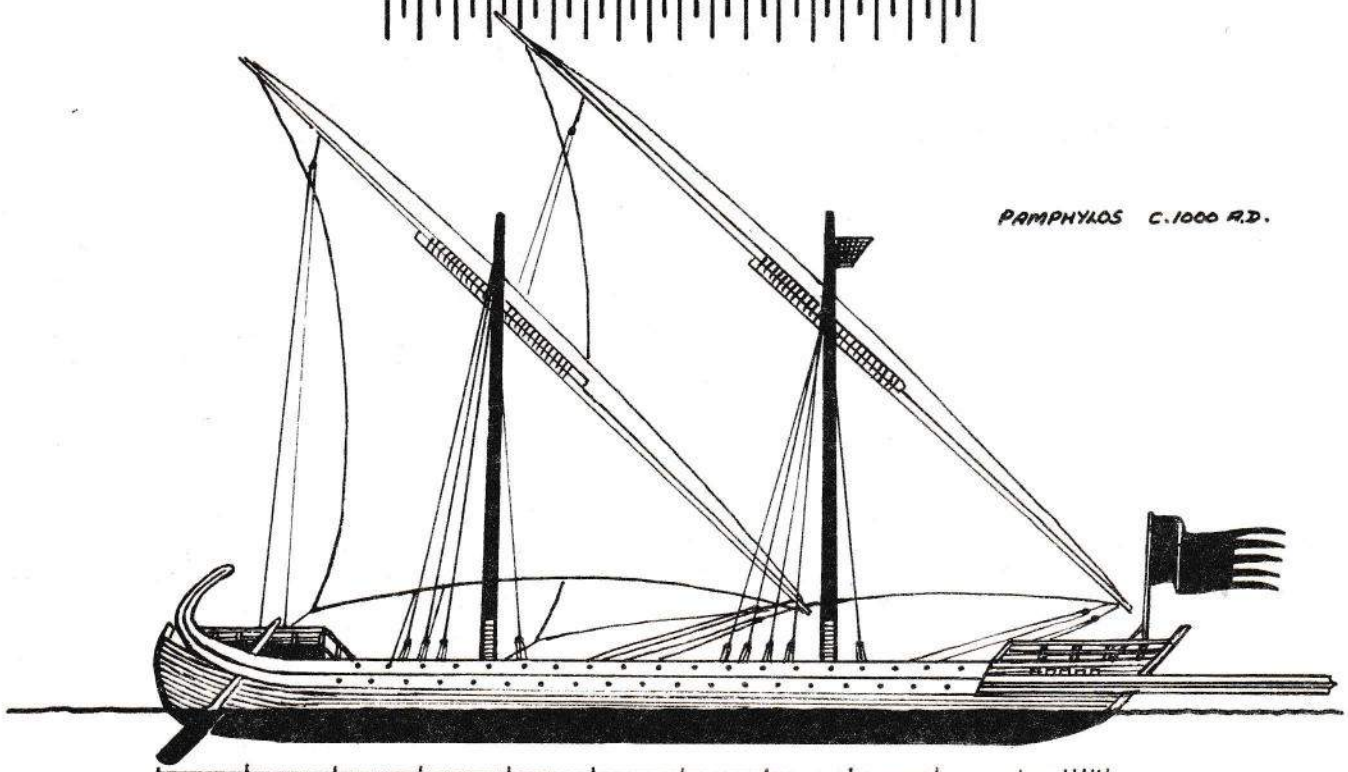
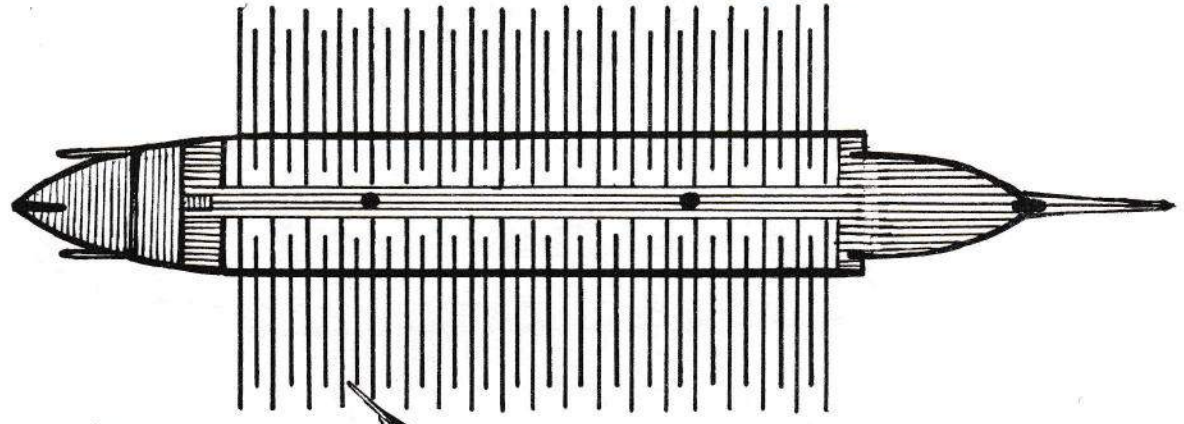
The ships themselves are unique in that the rowing crews were also the fighting men, a reversion to the earliest composition of warship crews. The men rowed into battle after donning their armour and slinging their shields along the gunwhales to provide protection against missiles.

19



PAMPHYLOS C. 600 A.D.

110 100 90 80 70 60 50 40 30 20 10 0
SCALE IN FEET



PAMPHYLOS C. 1000 A.D.

110 100 90 80 70 60 50 40 30 20 10 0

These single-banked ships probably formed the backbone of the Roman fleet from A.D. 100 up to the fall of Rome. Afterwards, they would have seen service in the squadrons of the Eastern Roman Empire until the Byzantine dromon designs replaced them by A.D. 600 - 700.

#27. The Moneres or Galea: A.D. 400 - 1000+

Shortly before the collapse of the Western Roman Empire, a small but fast vessel began to appear which would be the ancestor of the dromons of the Byzantine Empire. The galea, from which the term "galley" derives, probably saw extensive service as a dispatch vessel and light raider for many centuries. As in the case of the coast-guard vessels, it had only one bank of oars. Originally carrying square sails, it was lateen-rigged under the Byzantines.

THE BYZANTINE EMPIRE (A.D. 500 - 1200)

With the fall of the Western Roman Empire, the naval designs of the Byzantines would predominate for more than six centuries. At first, the old Roman designs were used; then the dromon series was adopted. Byzantine designs were so successful that they were copied by the other Christian nations bordering on the Mediterranean. Islamic powers used them too. With the fall of Alexandria to the Arabs, the great shipyards and skilled shipbuilders of that city were quickly turned to building a navy for Islam. By the 13th century, however, the dromons were abandoned in favor of the heavier galleys pioneered by the Italians, and the Byzantines themselves were increasingly unable to build or maintain a strong fleet because of the loss of most of their empire to the Turks.

#28. The Ouisiakos: A.D. 500 - 1200

The ouisiakos was the first true "dromon" (meaning "runner") and was reputed to be very fast under sail and oars. As was the case with most vessels in the Byzantine Navy, the rowers were free men who also fought in boarding actions. The vessel had two banks of oars mounted on an outrigger, and it was highly maneuverable. The ram tended to be a spur placed just above the waterline, which reduced drag and yet was capable of making a nasty hole in the hull of an enemy vessel at water level. It also could break up the outrigger of an enemy, crippling him seriously if the blow was aimed properly.

#29. The Pamphylos: A.D. 600 - 1200

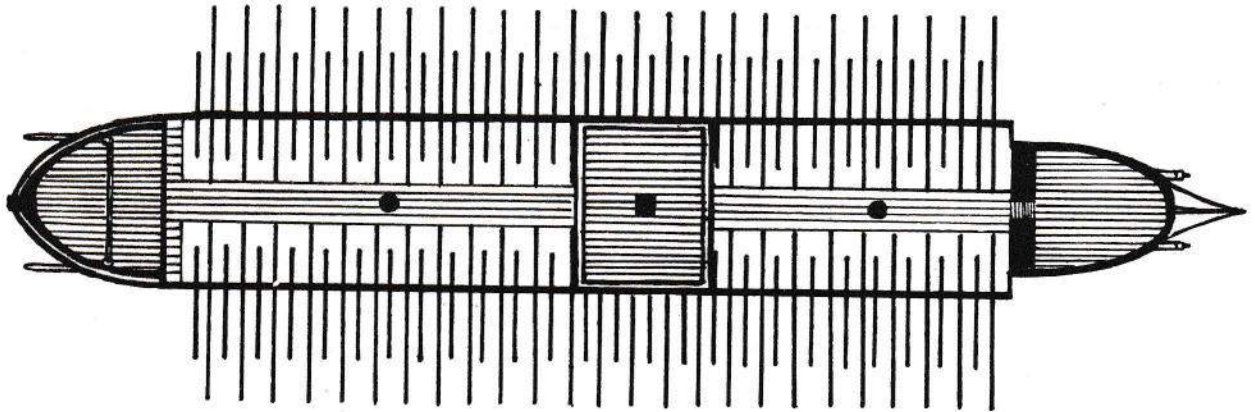
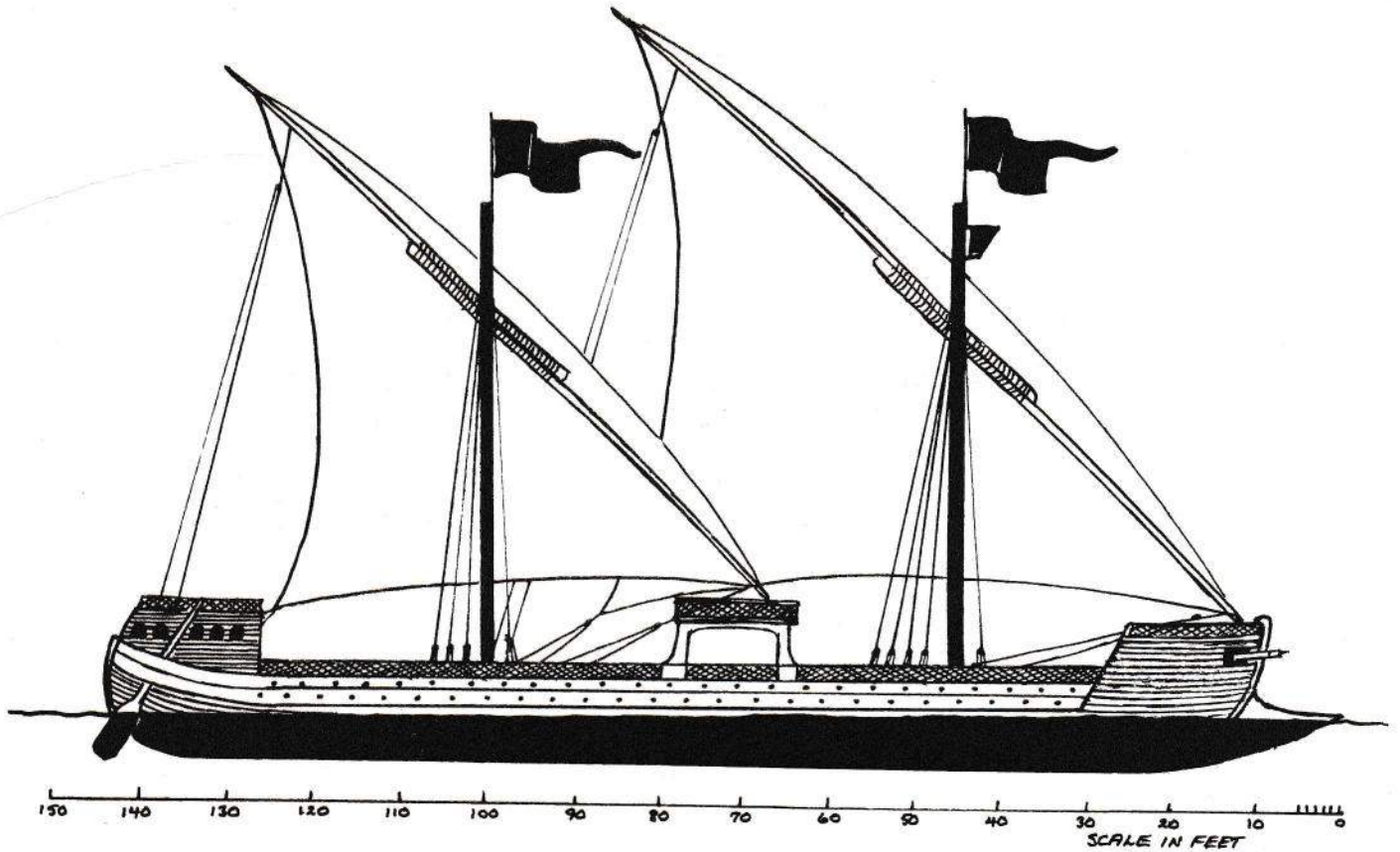
The pamphylos was a logical development of the ouisiakos into a larger, stronger vessel. It also had two banks of oars. The size of the rowing crews varied considerably, with a minimum crew of 108 in peacetime to a maximum of 164 in wartime. When the full war crew was aboard, one man would row the lower bank for slow cruising, and up to three men would row the upper bank at high speeds. Clearly, there were extra rowers which would produce a most efficient system of relief. When a full rowing crew is aboard, extend standard cruising times by 2 hours, and slow cruise times by 3 hours. A 108-man rowing crew could attain speeds up to 7.3 knots for a brief time, while a full crew might reach 7.8 knots. Some phamphylian types appear to have mounted mechanical artillery capable of casting solid or incendiary missiles, the armaments usually being mounted in the bows. The main battle fleets of the Byzantines, Arabs, Moors, Turks, and Christian nations were largely composed of such vessels until A.D. 1200, after which first the Italians and then other nations converted to the galley. Islamic vessels tended to lack adequate protection from archery fire.

#30. The War Dromons: A.D. 600 - 1200

The word "dromon" eventually came to be applied only to the largest vessels in service. Crews often reached 300 men, with 200 acting as rowers. Byzantine vessels often had as many as three fighting towers, one at the bow, one amidships, and one astern. In the bow heavy mechanical artillery was mounted, and elite vessels of the Byzantine Navy also mounted tubes capable of projecting the dread Greek Fire. (Other nations did not learn the method of projecting Greek Fire in a blast of flame, but they did learn how to hurl pots of it at an enemy vessel by using catapults.) Considering its size, the dromon was very fast and quite maneuverable. As in the case of other dromons, the entire crew participated in boarding actions.

Byzantine Military Transports and Merchantmen: A.D. 500 - 1200

The Byzantines had military transports and merchant vessels little different from those of other Mediterranean nations in the Dark Ages. Most were small vessels similar to the ships of Greek and Roman times, only with the addition of the lateen sail which permitted them to sail much closer to the wind. The military transports were especially important to the Byzantines because they never were able to maintain a large standing army. The transports, escorted by the fleet,



WAR DROMON C. 900 A.D.

carried the army, its horses, and its provisions and equipment to the relief of the threatened provinces, which were held by local militias. The great General Belisarius constructed a large fleet of transports for this purpose, including vessels specially fitted to carry the horses of his Cataphracts. The practice was continued until the eclipse of the Byzantines after the start of the Crusades. With the loss of her provinces in Syria and Asia Minor, Byzantine naval power was virtually eliminated for want of trained seamen and the wealth to build and maintain a fleet. By the end of the 13th century, the Eastern Roman Empire, such as it was, had been driven to rely upon mercenary Italian squadrons for protection.

THE ITALIANS: A.D. 1100 - 1500

From the beginning of the Crusades to the destruction of Islamic naval power at Lepanto in 1571, Italian naval designs predominated in the Mediterranean. The great advance in naval architecture was the "galley". During the Dark Ages the Tialians used ships of Byzantine design, but in the late 11th century they had departed from the dromon and were launching vessels with a single bank or oars. The galleys placed three rowers on the same bench at first, each man working his own oar. Later, a "saloccio" arrangement placed several men on the same oar, and the sweep was made much longer. The deck of the galley was usually 2 to 3 feet above the waterline, over which was fixed the talero or massive rowing frame which ran for most of the length of the ship. The talero carried the oars and tholepins, increasing rowing efficiency and power in the same manner as the outriggers of earlier oared warships. It also increased the beam above the waterline by as much as 8 feet, providing a fighting area of considerable size.

The rowers of Christian galleys were protected by a line of square mantlets hung on the guard-rails that ran the length of the telaro. This practice was not imitated by the Muslims, an oversight which exposed Moorish and Turkish rowers to murderous missile fire. A platform was placed between the longitudinal members of the talero (the apostis) and the side of the ship, permitting the soldiers to man the sides without interfering with the rowers. Mechanical artillery, then cannon, would be mounted in the bow. The sides of important vessels were sometimes covered with raw leather hides or felt to protect against Greek Fire and incendiaries, such ships being termed "in barbotte". Finally, a spur ram replaced the submerged prow, the intention becoming to break up the telaro of the enemy and cripple him before boarding.

Galley crews often numbered 250 men or more, for the favorite tactic was the boarding action. Archery, musketry, and artillery were employed in preparation for storming the enemy decks. Ramming was a method of crippling the enemy and killing his rower/fighters while the attacker maneuvered for the best position from which to board. The vessel with the largest fighting crew had the advantage. This was especially true of Christian vessels. The inboard oarsmen had swords and half-pikes, while the others were archers or stone-throwers. The soldiers wore excellent armour and were armed with an assortment of deadly melee weapons and crossbows or muskets.

Islamic galleys tended to be rowed by slaves and captives. Thus both crew efficiency and fighting strength of Moorish and Turkish galleys tended to be inferior to those of Christian nations. Islamic fighting crews tended to be lightly armoured, as well, but they did not lack in numbers of archers. When cannon were mounted in galleys, the Islamic nations again accepted an inferiority in weight of shot, for it was their practice to ship 3 bow guns to the usual 5 of a Christian vessel.

#31. The Galea Sotilla: 13th - 15th Century

Italian galley designs quickly proved popular throughout the Mediterranean and the galea sotilla or "ordinary galley" became the main ship of battle in most fleets. The design is characterized by the one man-one oar concept which predominated until the 14th century, after which three men on a single sweep or the saloccio arrangement was adopted.

#32. The Galea Tarida: 13th - 15th Century

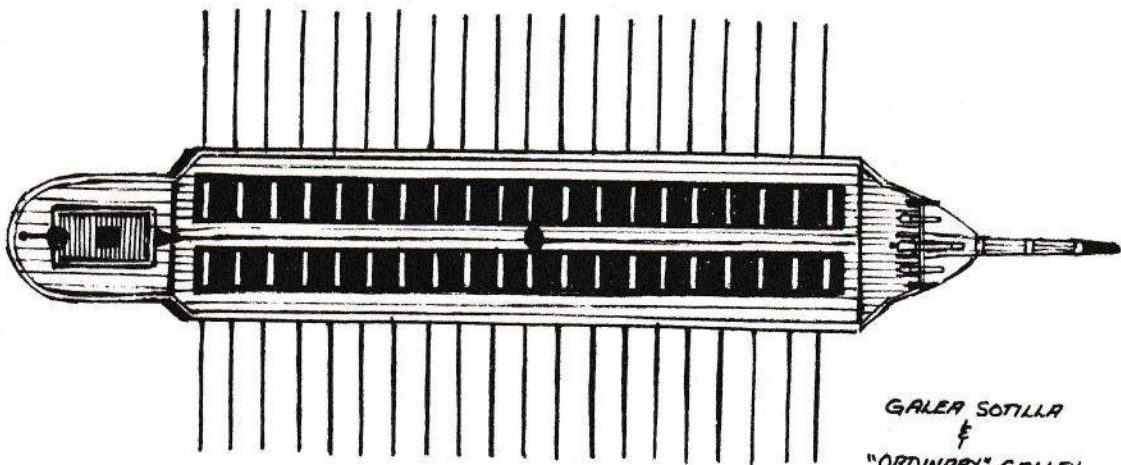
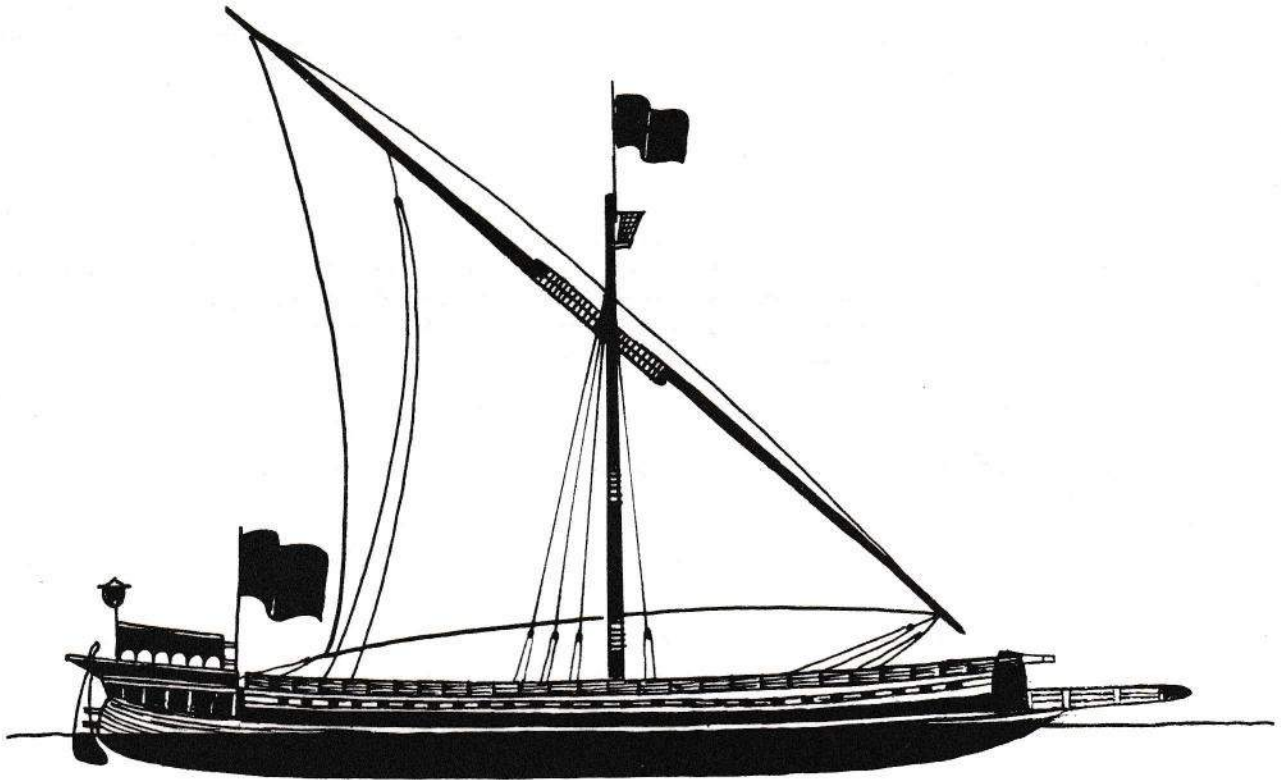
The galea tarida served to carry troops, horses, munitions, provisions, and seige engines. Almost twice as wide as the galea sotilla, it was significantly slower under oars and sail. In battle, the galea tarida was placed in the second line or reserve. Such vessels appear to be unique to the Christian navies, although there may have been a few in Islamic navies as well.

#33. The Sagitta: 13th - 16th Century

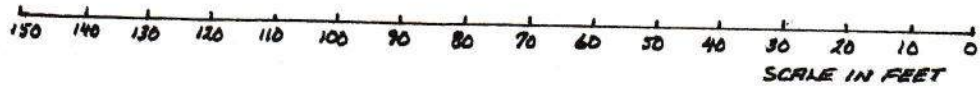
The sagitta was a small galley, an auxiliary rowing vessel possessing greater agility than the ordinary galleys of the fleet. It was used as a dispatch and reconnaissance vessel.

#34. The Vacchette: 13th - 16th Century

The vachette or "little cow" was an auxiliary vessel designed to accompany the large ships. Apparently, a vachette was attached to each ordinary galley and assisted in provisioning and carrying messages between vessels in the fleet. It also accompanied its mother ship into battle, using the larger bulk of the galley as cover from artillery and missile fire. Once battle was joined, it could launch boarding parties against the unengaged sides of the enemy or else pick up friendly troops in the water.



GALEA SOTILLA
&
"ORDINARY" GALLEY



#35. Galee di Mercanzia: 13th - 15th Century

The merchant galleys were built for commerce but were often requisitioned for war as they were designed to protect themselves. Specifications for such vessels were carefully laid down by the governments of Venice, Genoa, and Pisa, for in them the richest cargoes were carried. Italian practice was to form convoys of such vessels under escort of a powerful squadron of ordinary galleys and auxiliaries. Such merchant fleets were often quite safe against piracy, as they could hold their own against all but a battle fleet. The merchant galley was somewhat slow and sluggish under oars, but it made good speed under sail. Thus its position in battle was in the reserve or second line.

#36. "Ordinary" Galley: 15th - 16th Century

The ordinary galleys cruising the Mediterranean during the Renaissance differed from the earlier versions in that they had fewer oars, their being three men to each oar. The ships were larger and heavier as well. Armaments included cannon mounted in the bow of the vessel and large contingents of musketeers.

At the battle of Lepanto in 1571, the Christian galleys typically mounted 5 bow guns: one 36-pdr, two 9-pdr, two 4 1/2-pdr. The heaviest gun, usually weighing around 3 tons, was mounted on the centerline. The 9-pdr guns flanked the 36-pdr, and the 4 1/2-pdr guns were placed outboard of the 9-pdr guns. Turkish galleys mounted only 3 guns in the bow, the 4 1/2-pdr cannon being omitted. Also, Christian galleys mounted three 4 1/2-pdr guns on each broadside, a practice rarely encountered in Turkish vessels. Thus the Christians at Lepanto had a total weight of fire of 18,450 pounds for 205 galleys, plus the 326 pounds of all-around fire from each of their six galleasses. The Turks had about 250 galleys, but because of the smaller number of guns aboard each vessel, their total weight of fire was only 13,500 pounds.

Galleys rarely fired more than twice in battle before close action was joined, although there have been instances of such vessels standing off and engaging in prolonged gun duels. At the battle of Jiddah in 1517, the Muslim galleys remained under the cover of their fortress guns and bombarded the advancing Portuguese at long range. Indeed, the lesson of Jiddah is that the galley could operate with devastating effect where it had access to nearby bases whose shore batteries could be used to augment the firepower of the fleet.

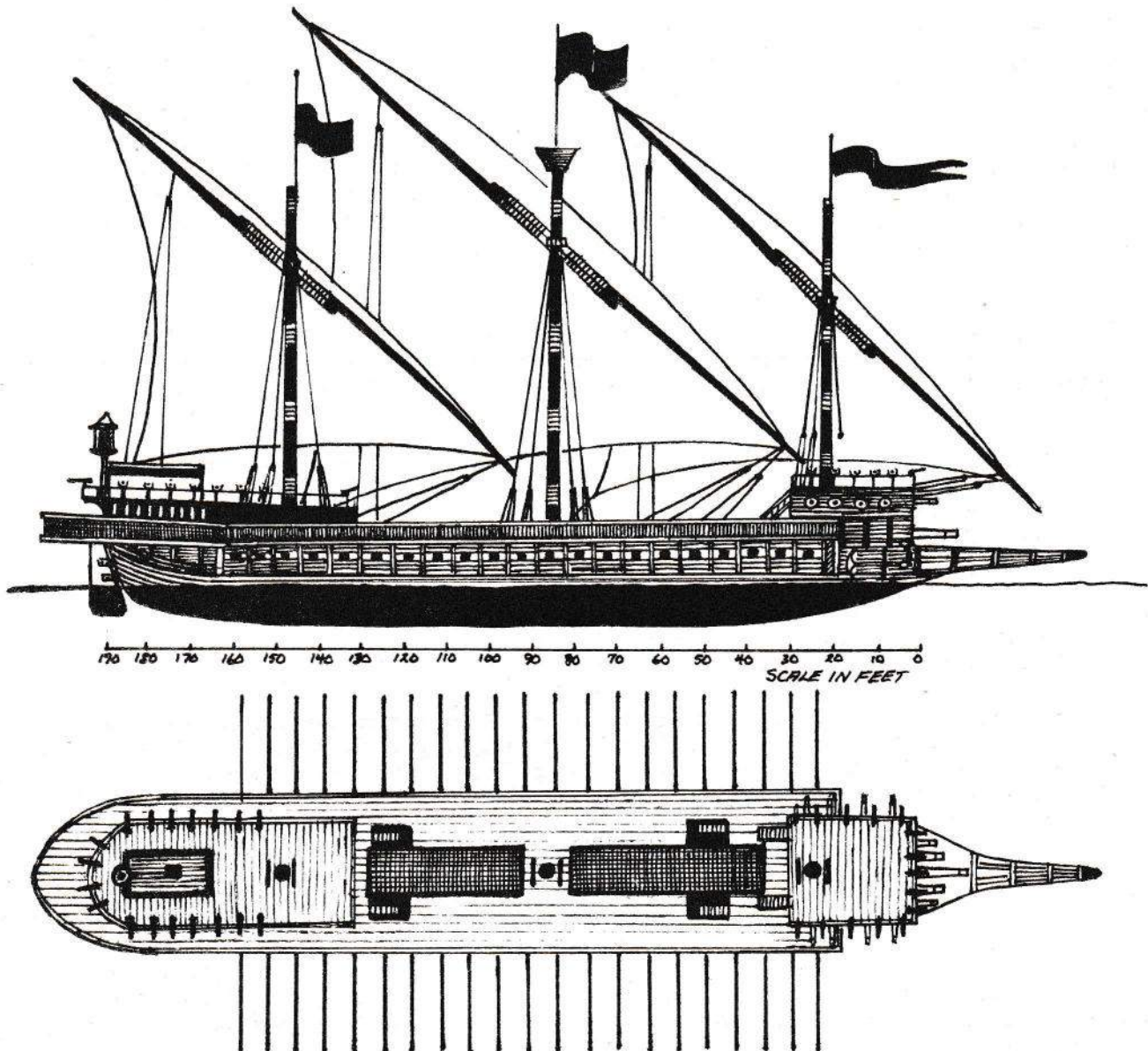
Early naval cannon tended to be no longer than 25 calibres (25 times the diameter of the bore). Stone shot was preferred because of the large holes it made, but the high cost drove all nations to use iron shot. It is a fallacy to believe that iron shot is superior to stone. Economics alone became the reason for abandoning stone. Similarly, economics argued against the continuance of the great galley fleets of the 15th and 16th centuries, and sailed warships were adopted as an economy measure. In the Mediterranean, with its light airs, the galley was the logical ship of war, but far too expensive.

The "Capitanas" and "Patronnes": 16th - 17th Century

Although not presented in the Data Tables, the capitanas (1st flagships) and patronnes (2nd flagships) may be desired by some players. These vessels were larger than ordinary galleys, but possessed much the same appearance and rowing and sailing characteristics. A typical capitana is outlined in Chapman's Naval Architecture. This Maltese capitana was 179.5 feet long, 25 feet in beam, and had a draft of 8.3 feet. A forecastle protected the bow guns and provided additional fighting space above the main deck. The sides were several feet higher than in the case of ordinary galleys. There were 30 oars on a side, with 7 men on the aft oars and 6 on the forward oars, yielding a total rowing crew of 390. About 400 officers, soldiers, and sailors completed the crew. Displacement would have been between 400 and 500 tons, and maximum speed under oars would have been comparable to that of an ordinary galley, about 6.5 knots. In addition to the standard forward battery, additional 9-pdr guns would have been mounted on the broadside as well as a number of 4 1/2-pdr or 2-pdr swivel guns. The patronnes were slightly smaller, with 28 or 29 oars to the side, a rowing crew of 364 to 376, and a fighting/sailing crew of 300 to 350.

#37. The Galleass: 16 - 17th Century

The galleass had a short period of life, compared with the galley, due to the vast costs involved in building and maintaining them. The tactical purpose of the galleass was to deliver a heavy weight of shot against the enemy, but the number and weight of the guns made the vessel sluggish



GALEASS

under the relatively limited power of the oars. To reflect this sluggishness, require a complete turn to accelerate to any speed level above slow cruise. The advantage of the galleass was the height of its sides and the ability to fire all around.

The galleass presented in the Data Tables is based upon the model in the Arsenal in Venice. With 33 guns, 6 would fire astern, 11 ahead, and 9 on each broadside. The heaviest guns (1 x 36-pdr, 2 x 9-pdr, 2 x 4 1/2-pdr or 6-pdr) fired directly forward from under the forecastle. The lighter guns varied from 9-pdrs to 2-pdrs. After Lepanto, galleasses mounted more and heavier guns. The "Royale" of Louis XIV had six 36-pdr guns in the main forward battery, three 24-pdr guns firing on each broadside, and many lighter guns of 9-pdr, 6-pdr, 4 1/2-pdr and 2-pdr weight of shot, giving an all-around weight of fire of 788 pounds!

The effectiveness of the heaviest guns against galleys is readily seen, but even a 4 1/2-pdr had a good chance of penetrating the 3 to 4 inches of planking in most galleys. Since galleasses tended to have much thicker planking, they withstood small shot better and could fulfill their tactical role by barging into the midst of a formation of galleys to endure their fire and shatter them with their superior gun batteries. Also, the talero of the galleass was placed higher off the water than in the galley, and was heavily reinforced, making it far less susceptible to ramming attacks.

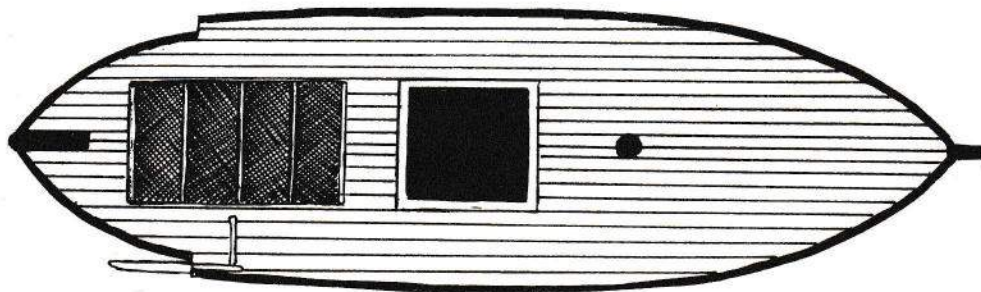
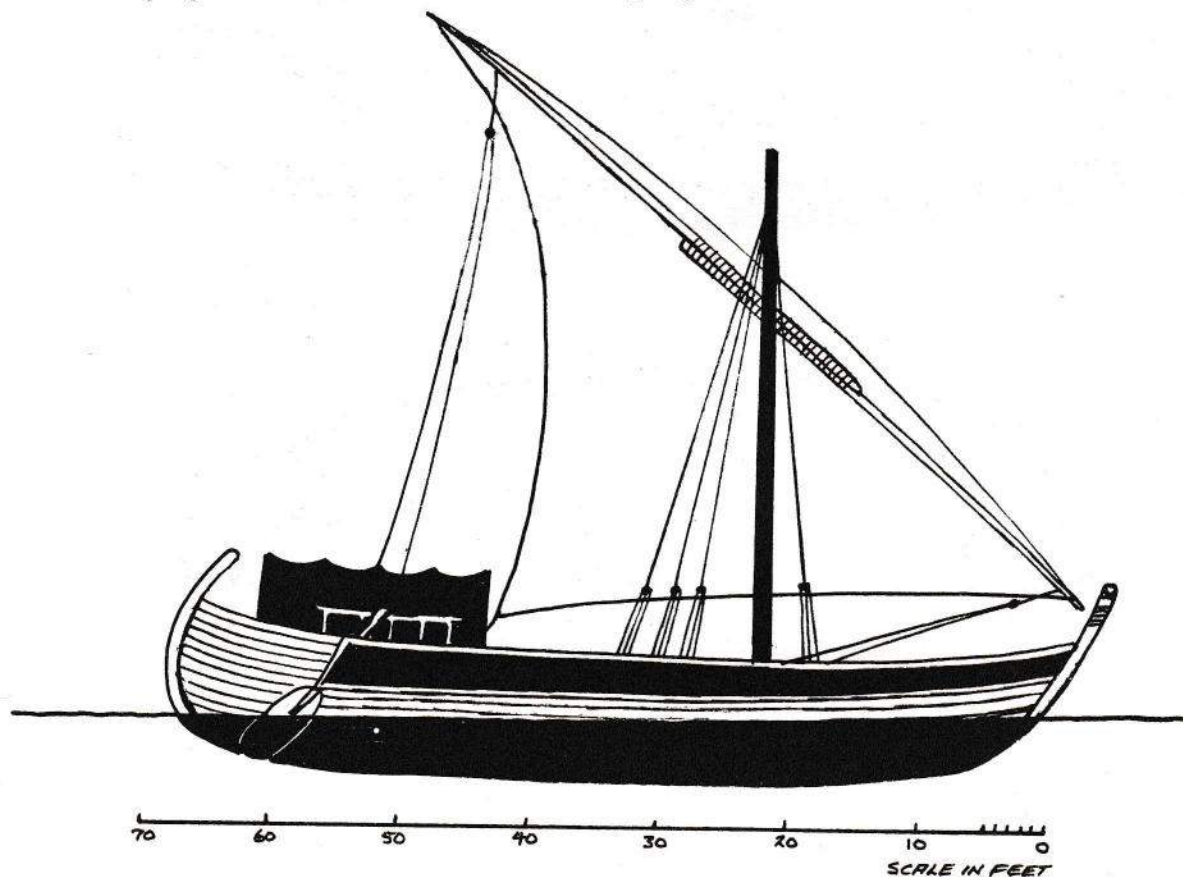
#38. The Usciére: 13th - 16th Century

The usciére were large sailing vessels with ports in their round sterns to permit the loading and unloading of horses and heavy cargo. In addition to their role as military transports, they were also used as floating fortresses by erecting fighting castles on the decks with flying bridges to throw over the sea walls of fortified ports. The ship presented in the Data Tables was constructed by Louis IX in 1268 for his crusade.

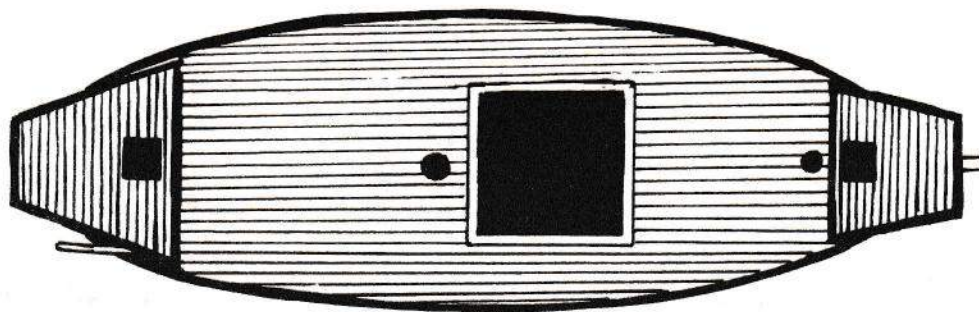
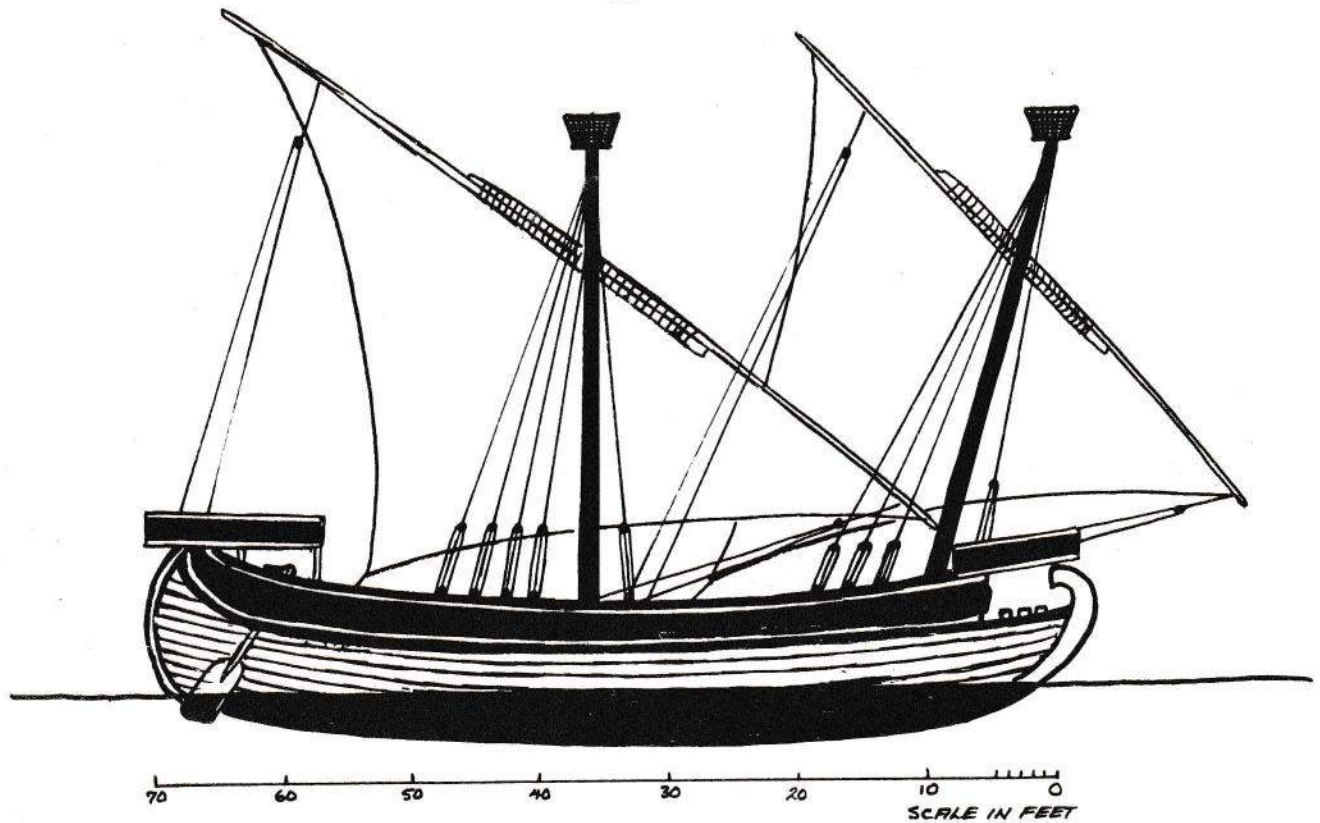
Similar "navi" or "nefs" were constructed for commercial purposes, both in the Mediterranean and the Atlantic, but they rarely were in excess of 1000 to 1500 tons displacement.

#39. Italian Merchantman: 12th - 16th Century

Much smaller merchant vessels were used for the coastal trade, although they were capable of long voyages. These ships were found, with local modifications, throughout the European nations along the Mediterranean. The illustration shows an Italian vessel of the 12th Century. Later vessels had a poop-deck similar to Atlantic shipping.



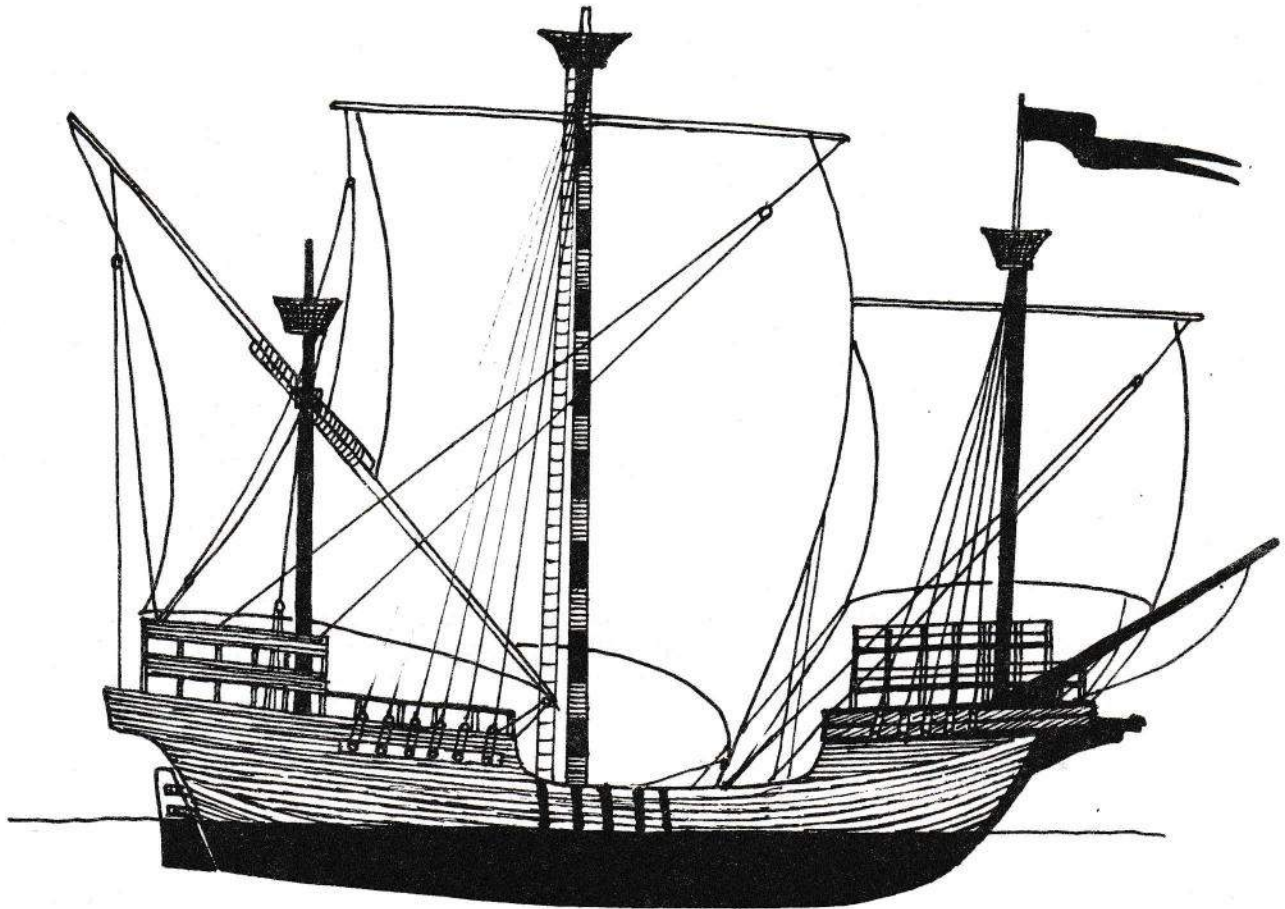
MEDITERRANEAN MERCHANTMAN C. 900 AD.



MEDITERRANEAN MERCHANTMAN C. 1200 A.D.

#40. Venetian Carracks: 15th - 16th Century

The carrack carried an exceptional quantity of sail. It first made its appearance in the 15th century in both the Atlantic and the Mediterranean. The ship presented in the Data Tables is an Italian type which ranged from 200 to 1000 tons displacement. Few of the larger vessels would have been built, due to the cost. With the introduction of guns to naval warfare, the carrack became the logical choice to carry such armaments. There was, after all, little difference between merchantmen and warships at this time, for merchants had to protect themselves from pirates and act as auxiliaries and transports in wartime anyway. Besides, few nations could afford to maintain vessels solely for making war. The carrack was fast, strongly-built, and capable of mounting a gun battery. The guns were small, however, mostly 2-pdr and 4-pdr cannon, with perhaps a few 6-pdr or 9-pdr guns in the largest vessels. Carracks under 400 tons likely carried only a few guns, if any.



CARRACK

2. The Atlantic and Baltic Regions

The Atlantic is a hostile sea. The Baltic is inhospitable too. Such waters are characterized by strong winds, high seas, and long periods of gale and storm. There are few good harbours and anchorages, and many of these tended to be defended by the ships and fortifications of men suspicious of all strangers. Shipping was designed for extended voyages, emphasizing seaworthiness, large cargo space for provisions and commodities in transit, and structural strength. Since all but the smallest vessels find oars to be inefficient and difficult to use in a high sea, the wind became the main source of motive power. (Of course, the earlier vessels on the lines of the Viking ships were excellent sea boats and used oars; but speed was obtained at the expense of cargo space and shelter from the elements.)

The typical vessel of the Atlantic and Baltic was built wider, taller, and much sturdier than its counterparts in the Mediterranean. Virtually all of the larger vessels were decked. Since draft aids a sailing ship to "bite" deep into the sea and prevent drift, and because naval construction was necessarily heavier to provide strength, the ships drew more water than Mediterranean shipping.

With weather and sea dictating so much of a ship's characteristics, warships tended to resemble the merchantmen of the time--tubby, round ships, relatively unresponsive in maneuvering but capable of surviving the elements. Fighting towers--the forecastles and sterncastles--were erected to give archers and crossbowmen positions of advantage when firing at enemy crews. Because relatively few men were needed to work the ship under sail, warship crews tended to be largely composed of fighting men. Also, since ramming is not very effective when under sail and backing away from a rammed ship is impossible without oars, tactics concentrated upon laying alongside the enemy and either raking her decks with archery fire or grappling and boarding. Seaborne artillery tended to be conspicuous by its absence, furthermore, until the appearance of gunpowder. Few vessels mounted ballistae or catapults, close combat being preferred.

THE NORTHERN PEOPLES (A.D. 400 - 1200)

Throughout the Dark Ages the cry, "The Vikings are upon you!" chilled the hearts of even the bravest men and provided impetus to the development of the whole feudal system. When the Viking movement began, it derived its impact on Atlantic Europe less from the numbers of the raiders than from the simple fact that they were the finest warriors in Europe. The Franks and Saxons no longer were the fierce fighters who occupied the Roman Empire, and the soldiers of Byzantium generally preferred to sidestep a battle unless there was a good prospect of victory. A valorous Dane or Norwegian thought his life well spent if he took his enemy with him to Hell.

Initially, the Viking raids were small, but they increased in size as the Northmen became experienced in the activity. In England, first the Saxons gained a foothold and then came to dominate the Britons. The Danes came later, seizing and fortifying the Island of Thanet in the mouth of the Thames, then moving inland to establish the Danelaw. In France, the Vikings ranged up and down the navigable rivers, looting and pillaging almost at will. In both lands, they eventually were granted territory or else seized it and stayed as permanent settlers. Against the Viking attacks no effective reply could be made until the victims also developed shipping, as did King Alfred of England, to pursue them on the sea.

#41. The Viking Warboat: A.D. 400 - 1200

The typical Viking warboat was "clinker-built", about 70 - 80 feet long, and carried 60 - 70 men. Drawing less than 3 feet of water and possessing superb lines, such vessels were capable of speeds between 7.0 and 7.5 knots for short spurts, with two men on each oar. For seaworthiness they had no equal for many centuries. Because the yardarm was capable of turning freely through 360° the vessel was also capable of sailing very close to the wind, making it far less likely to be driven ashore by adverse winds. It was, in all, an excellent seaboat suited to long voyages through hostile waters.

#42. The Viking Longship: A.D. 700 - 1200

The longship is nothing more than a large warboat capable of carrying a larger crew. Its advantage lay in its relatively high sailing speeds and larger rowing crew. To reflect the effect of extra crewmen for relief at the oars, increase slow cruising times by 3 hours and standard cruising times by 2 hours.

#43. "The Great Serpent": A.D. 1000

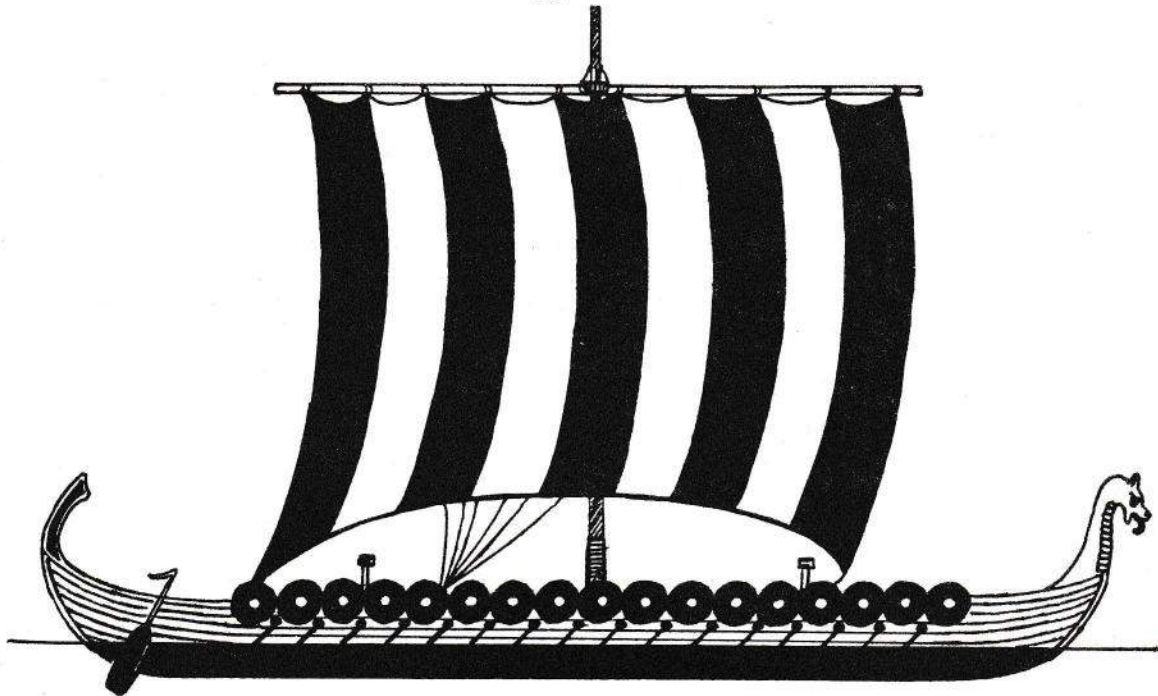
There were apparently a limited number of large "king's ships" built by the Northmen from the tenth century onward. The most celebrated of these was the Long Serpent of King Olaf Tryggevesson. The Saga of King Olaf notes that such vessels had high poops and forecastles, and although the description places 574 men aboard her, even correcting for exaggeration a reasonable crew of 400 emerges. Comparable Mediterranean vessels, the dromons of Byzantium shipped about 300. However, such vessels were few in number.

#44 & #45. Nordic Merchantmen: A.D. 400 - 1200

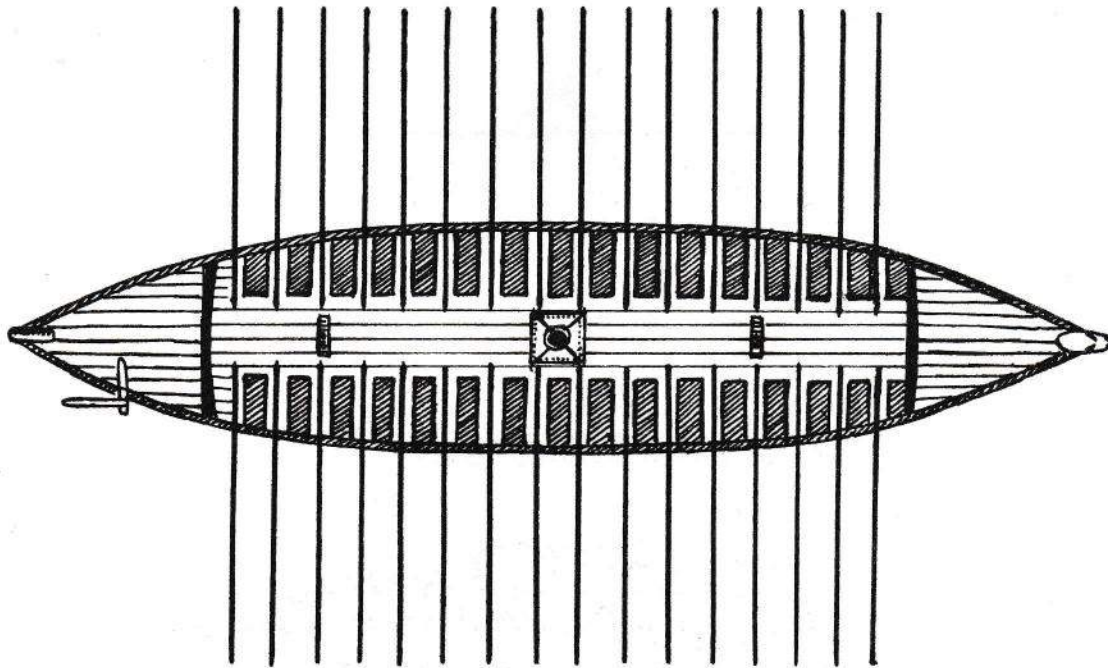
The Northmen were great sailors and great traders, and their vessels ranged far afield. The Atlantic proved to be no insurmountable barrier, and colonies were planted in Iceland, Greenland, and even Vineland in America. Trade was conducted all along the Atlantic coast and into the Mediterranean. Smaller vessels were taken up the great river systems of Russia and North-Eastern Europe as well, all the way to far Miklegard (Byzantium). Most of these vessels were small, probably averaging 55 to 60 feet in length, with a displacement of 25 to 30 tons. However, by 700, vessels up to 90 feet long and 70 tons displacement were being constructed for longer voyages. These ships were apparently the model on which the nations of the Atlantic and Baltic founded their later sailing designs, and the Small Cog (#46) betrays its Nordic lines and marks the transition.

THE ATLANTIC AND BALTIC NATIONS (A.D. 900 - 1450)

Under the assault of the Vikings, the nations of the Atlantic Regions had to develop their own seapower to counter the menace. Alfred the Great built a fairly strong navy and kept England safe for a time. The peoples of the Low Countries and Northern Germany also took to the sea. By the end of the 12th century, the characteristic poop deck began to appear on some vessels. The designers have refrained from distinguishing between too many types, as this would have been playing minor variations on the same tune. The essential differences between English



80 70 60 50 40 30 20 10 0
SCALE IN FEET



VIKING WARBOAT C. 900 A.D.

and Hanseatic cogs are simply too small to consider. Of course, there were many vessels of only a few tons burden, but these can be simulated by scaling down the size of the types given and reducing speeds by 0.5 knots at slow speeds, and 1.0 to 2.0 knots at high speeds to take into account their poorer sailing characteristics.

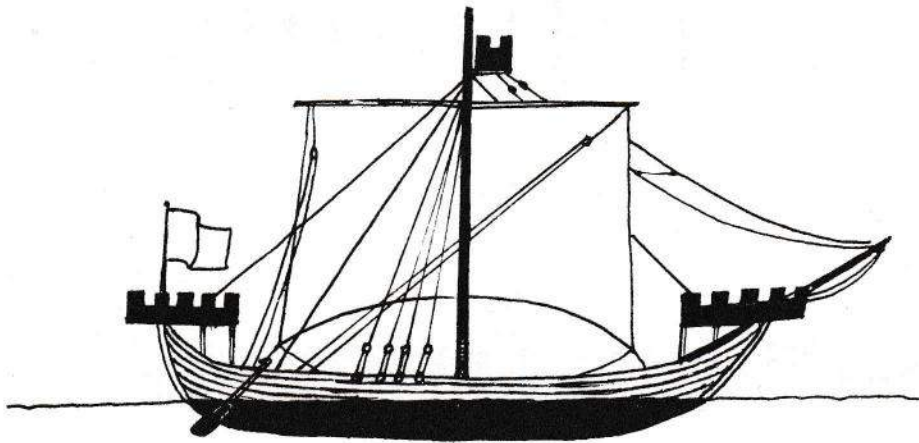
Atlantic vessels were quite capable of sailing in Mediterranean waters, although they suffer a 20% reduction in speed in light breezes because of intrinsic design differences and variations in sail handling, compared to Mediterranean vessels. Atlantic vessels were the product of nations too poor to be able to maintain pure warship types, so they performed the dual roles of

merchantmen and ships of war. In fact, with the incidence of piracy as high as it was, a merchant ship had to be a warship to survive. Tactics emphasized maneuvering for advantage, archery to thin enemy ranks, and finally boarding the enemy for close combat. The very terms "forecastle" and "aftercastle" suggest their function in battle as floating fortresses, and indeed a good number of the ships even had bulwarks cut in the shape of battlements.

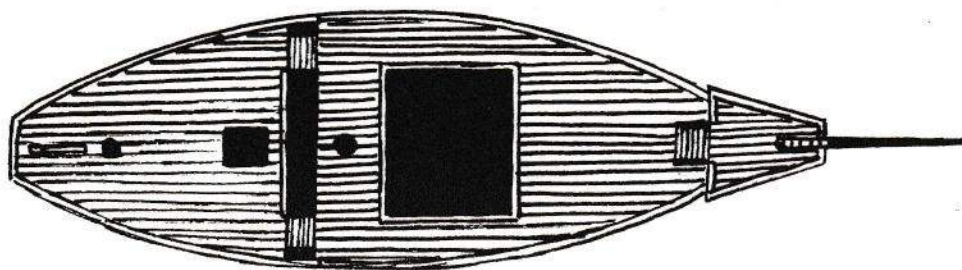
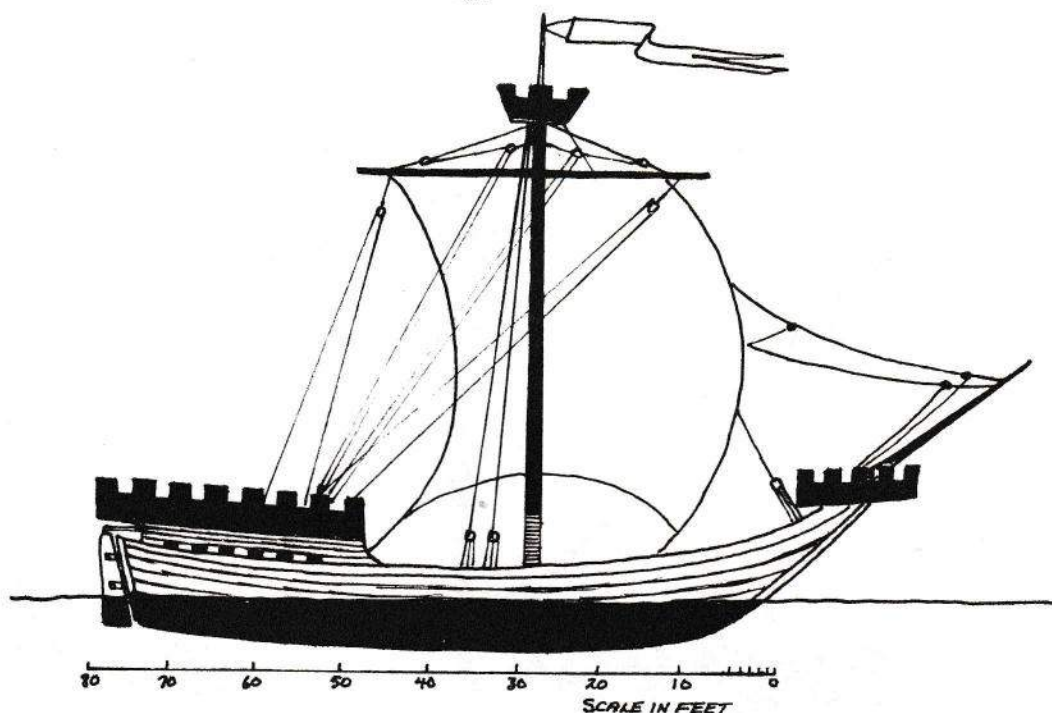
In Mediterranean warfare, cannon were used to "soften up" the enemy for a boarding action, or else to brush aside smaller, annoying opposition. In the Atlantic naval tactics quickly turned to the gun duel as a viable alternative to boarding, and deck actions tended to occur only after a number of broadsides had been exchanged.

#46. Small Cogs: A.D. 900 - 1450

Initially, the cog bore a striking resemblance to Viking vessels, for they were clinker-built and imitated the general lines of the raiders. They differed in their dependence upon wind for motive power and their higher sides. By A.D. 1000, they had become considerably broader in beam than comparable Viking merchantmen, and some might have had as much as 100 tons' displacement. The vessel depicted as a cog of 1300 is based upon the ship in the Seal of Dover. The beginnings of the forecastle and sterncastle can be seen in the castellated platforms at bow and stern. The bowsprit is used to carry the bow lines which keep the sail taut when sailing close to the wind. Larger vessels probably would not need the bowsprit, but a short (65-foot), tubby vessel like the one depicted would require one to give the bow lines room to work. Such vessels also shipped a windlass near the stern to haul on the halyard. Steering is still done with the steering oar, mounted on the starboard (steerboard) side, so maneuverability left something to be desired. Within 50 years, the appearance of such vessels had changed significantly (see the illustration of the Large Cog, c. 1370) and the rudder was often fitted at the stern.



SMALL COG C. 1300 A.D.



LARGE COG C. 1350 AD.

#47. Large Cogs: A.D. 1100 - 1450

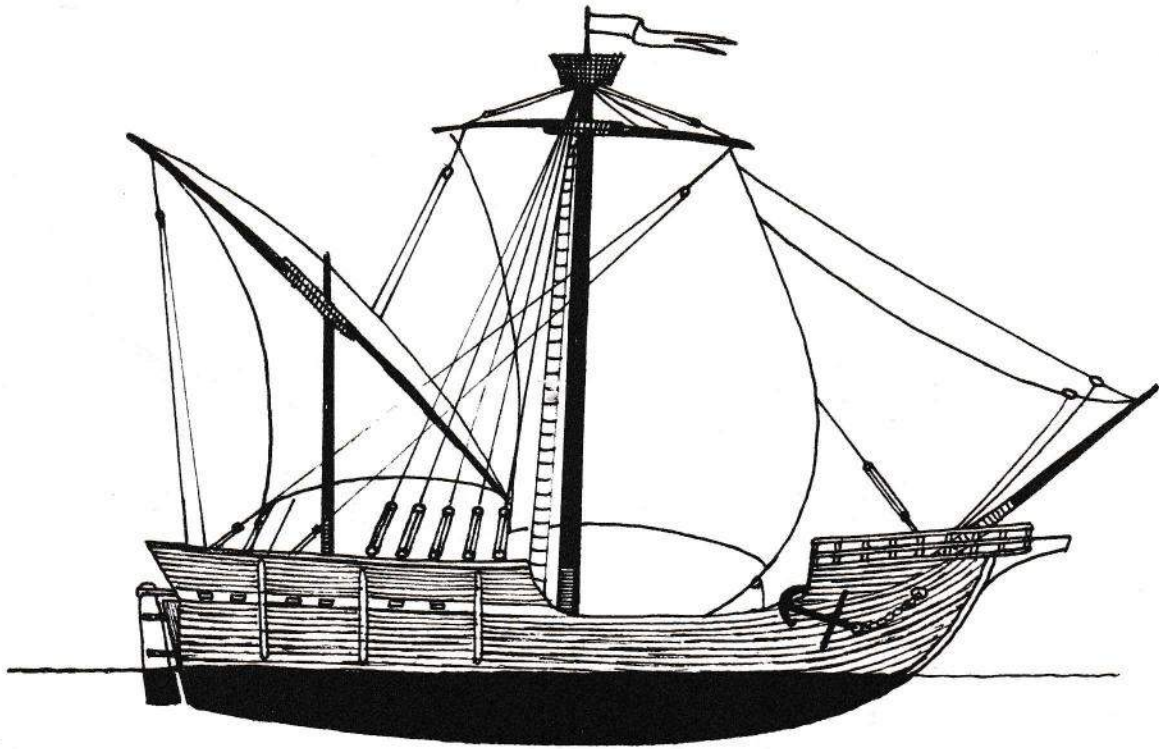
Large cogs were built in limited numbers at first, and they resembled the early small cogs. By 1350, tonnages of up to 500 tons had been reached, and the vessels had the more characteristic "modern" look, with full decks, forecastles and sterncastles, and fairly sophisticated rigging. Like the smaller types, they were exceptionally broad in the beam.

#48. Great Cogs: A.D. 1200 - 1450

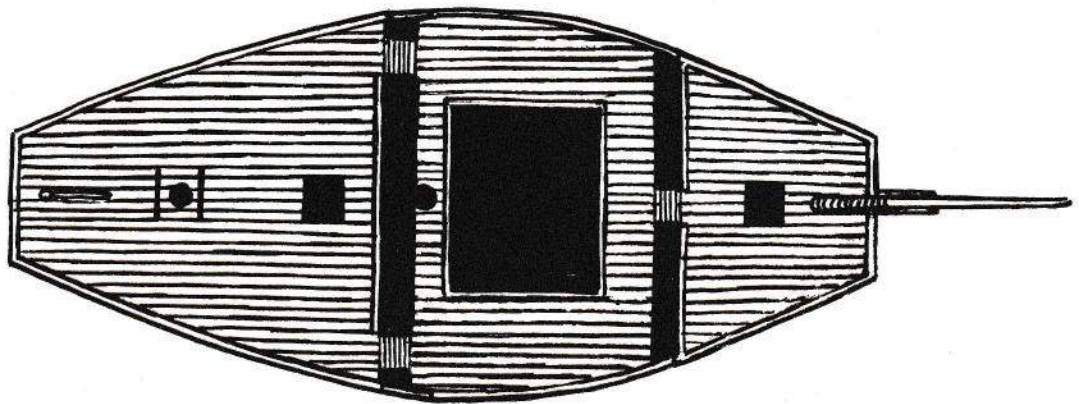
Relatively few great cogs or "nefs" were built because of the expense and also the risk of financial disaster if one should be lost. However, the merchant fleets of most nations contained a number of these vessels, usually 500 - 600 tons in displacement, although cogs of 1000 tons were sometimes built. (See #38. The Uschiere)

#49. The Caravel: A.D. 1250 - 1600

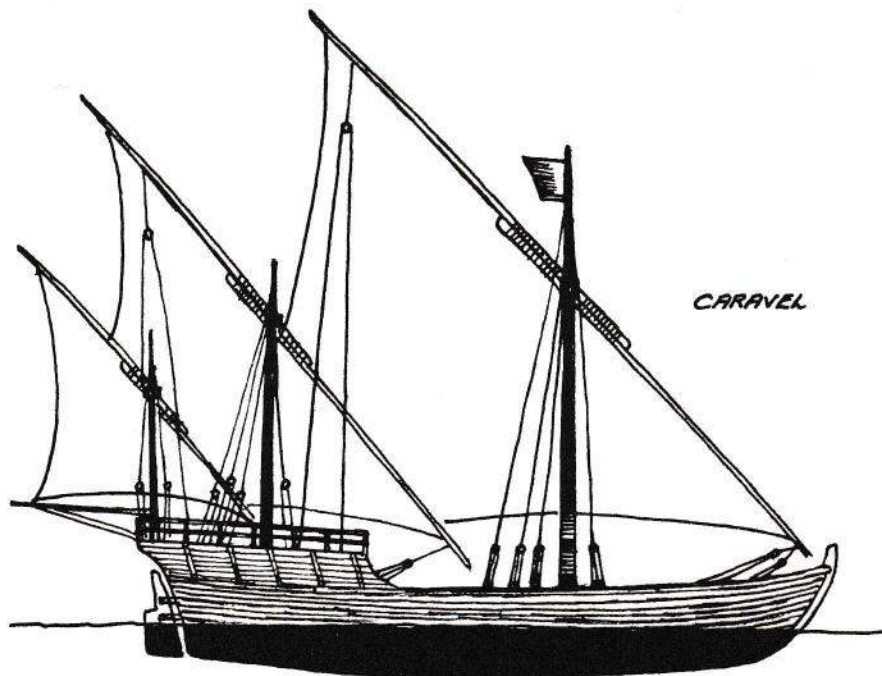
The first mention of "caravela" appears in a 13th century document referring to fishing vessels. Apparently this design proved so successful that it was developed and enlarged so that it became a fair-sized ship averaging 60 to 100 tons in displacement. It enjoyed a brief period of glory in the early period of exploration, but by 1588 it had been relegated to the status of a dispatch boat.



100 90 80 70 60 50 40 30 20 10 0
SCALE IN FEET



GREAT COG C. 1375 AD.



#50. The Carrack: A.D. 1400 - 1550

The carrack was the first "modern" ship in all of its components. All that happened after its appearance was a refinement in equipment, a reduction in the size of sails (and an increase in number) to improve handling, and superior hull designs. It was very fast, despite the fact that most carracks tended to be large vessels with broad beams and deep drafts. By Tudor times, they were fitted with small cannon, often of the breech-loading type, and sometimes a swivel gun was placed in the mizzen top. (See: #40. Venetian Carracks)

THE DATA TABLES

The following data tables give the important physical, fighting, and sailing characteristics of the typical vessels of different nations and time periods from about 1200 B.C. to A.D. 1500. The individual entries may require some explanation:

Type of Vessel	= name of ship
Seakeeping	= environment for which a ship was designed. Most vessels are either Atlantic or Mediterranean ships, but a few are capable of sailing in the waters of either region without penalty and are designated as Atlantic-Mediterranean or Mediterranean-Atlantic types.
Length at Waterline	= ship's length from prow to stern at the waterline. Most ships will be longer at deck level.
Beam at Waterline	= ship's breadth at the waterline. Vessels may be wider on deck as, for instance, in a galley with an outrigger or any vessel in which the curve of the hull is continued outward above the waterline.
Draft	= depth of water drawn by the hull. Clearly, this is an averaged figure, as ships with lighter or heavier load displacements will draw more or less water.
Displacement	= weight of water displaced by the ship's hull, cargo, and crew. This figure is much higher than the actual weight of the hull alone. A Greek trireme, for instance, weighed no more than 67% of its displacement: 43-50% for the hull and up to 17% for masts, sails, anchors, etc. The remainder is for crew and cargo.

- Freeboard = height of main deck or else the gunwales of undecked from the waterline. If a ship is decked, add 2 - 3.5 feet to the figure given. The choice of giving deck height was made to provide wargamers with a figure on which to compute height advantages.
- Lower Oars = height of lowest bank of oars on a galley from the waterline.
- Upper Deck = height of foredecks, afterdecks, fighting castles, etc., from the waterline.
- Structure = relative size of ship compared to others/structural strength calss. The first number is called the "size number", the following letter is the "construction type".
- Deck Type = class of deck, if any.
- Ram Type = type of bow. A bow is the usual cutting edge found on most vessels and is generally ineffective against all but the smallest boats except in unusual circumstances. A ram is a pointed, often armoured beak carried at or below the waterline to pierce the hull of enemy vessels. A spur is a ram carried above the waterline to smash oars and unship the outrigger or apostis, crippling an oared vessel severely. A spur can also cause serious hull damage.
- Crew = standard complement of men carried aboard the typical vessel. The crew sizes should be kept more or less within the limits given, as the figures reflect actual practice. Serious alterations in ship performance occur when the crew numbers are significantly raised.
- Officers = Captain, Navigator, Rowing Officers, and Sailing Masters.
- Soldiers = trained fighting men, usually heavily armed and armoured.
- Seamen = members of the crew assigned to general shiphandling.
- Rowers = number of trained oarsmen aboard the vessel. Depending on the type of ship and the period, these may be fighting men, freemen non-combatants (usually) or slaves.
- Turning Radius = track to be used on the Turn Radius Inlay when altering course/Turn Radius Table to be used when computing responsiveness in a turn at speed.
- Banks of Oars = number of horizontal rowing banks on oared vessels.
- Number of Oars = maximum number of oars that could be employed throughout the ship. To compute the number of oars per bank, divide the maximum by the number of oar-banks. To compute the number of oars on one side of a vessel for a particular bank, divide the total oars for that rowing bank by 2.
- Slow Cruise = average rowing speed for 3 watches (12 hours), given in knots/hour.
- Standard Cruise = average rowing speed for 2 watches (8 hours), given in knots/hour.
- Battle Cruise = average rowing speed for 4 hours, given in knots/hour, with full crew rowing.
- Ramming Speed = standard fast battle speed to lay alongside an enemy nearby to ram or board. Speed is given in knots/hour, but few crews can maintain it for more than 1/2 hour.
- Racing = maximum speed possible, given in knots per hour, with all crew members rowing at maximum speed. After 10 - 20 minutes, depending on the type of crew and ship, all rowers will collapse into total exhaustion.

- Masts = number of masts shipped. Galleys usually have detachable masts in the Ancient Period.
- Max. Sail Area = possible maximum sail carried by the vessel. These estimates are based upon the containing parallelepipedon (L x W at waterline) and the probable maximum sail that would have been carried.
- Light Breeze = speed of ship in knots/hour in mild breezes under sail.
- Good Breeze = speed of ship in knots/hour in steady, fairly strong breezes.
- Good Wind = speed of ship in knots/hour in steady, brisk winds.
- Strong Wind = speed of ship in knots/hour in forceful winds.
- Max. Under Sail = maximum theoretical safe speed of ship in knots/hour. Faster speeds will strain masts, carry gear away, and cause galleys to ship water unless in very calm seas. In the Mediterranean, such ideal sailing conditions are obtained only close inshore with a land breeze (in late evening and early morning hours).
- Provisions = number of days a ship can maintain the crew on full rations of food and water. Five days' provisions plus the weight of a man is an average of 270 pounds: Weight of man, 150 lbs.; clothing, 12 lbs.; arms and armour, 28 lbs.; food, 3 lbs. per day; firewood, 2 lbs. per day; water, 1 gal. per day, weighing 11 lbs. in casks or earthenware. (See Rodgers, Greek and Roman Naval Warfare, p. 44) Using these figures, wargamers can compute provisions required for longer voyages or cargoes to be carried by transports of the supply fleet.
- Cargo = probable cargo in tons that can be carried by merchantmen.
- Time of Service = dates in which the vessel appeared and was extensively used.

THE VESSELS OF THE MEDITERRANEAN REGION

	1	2	3	4	5
Type of Vessel	Egyptian 'Punt' Ship	Egyptian War Galley	Phoenician Bireme	Phoenician Merchantman	Phoenician Merchantman
Seakeeping	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Med. & Atlantic
Length at Waterline:	84'	75'	75'	55'	75'
Beam at Waterline:	17'	14'	10'	12'	16'
Draft:	3.0'	3.0'	3.0'	3.2'	3.6'
Displacement:	60 tons	50 tons	35 tons	40 tons	80 tons
Freeboard:	3'	4' gunwales	3' gunwales	3' gunwales	3' gunwales
Lower Oars:	-	2.0'	2.0'	-	-
Structure:	2/F	2/F	2/E	2/E	3/D
Deck Type:	aphract	aphract, with 4' rear deck	aphract, but 6' ftg. deck	partial deck	partial deck
Ram Type:	none-bow	spur	prow	none-bow	none-bow
Crew:	50	85	80	25 (50)	30 (65)
Officers:	5	4	4	4	4
Soldiers:	25	20	15	(50)	(35)
Seamen:	20	7	5	21	26
Rowers:	-	54	60	-	-
Turning Radius:	3/II	3/II	3/I	3/II	3/II
Banks of Oars:	-	1	2	-	-
Number of Oars:	-	26	60	-	-
Slow Cruise:	-	2.1 knots	2.5 knots	-	-
Standard Cruise:	-	2.9 knots	3.2 knots	-	-
Battle Cruise:	-	3.4 knots	4.0 knots	-	-
Ramming Speed:	-	5.0 knots	5.7 knots	-	-
Racing:	-	5.7 knots	6.5 knots	-	-
Masts:	1	1	1	1	1
Max. Sail Area:	750 sq. ft.	800 sq. ft.	750 sq. ft.	650 sq. ft.	1200 sq. ft.
Light Breeze:	1.8 knots	2.3 knots	2.8 knots	2.0 knots	1.9 knots
Good Breeze:	2.8 knots	3.4 knots	3.8 knots	3.6 knots	3.2 knots
Good Wind:	4.2 knots	4.8 knots	5.3 knots	5.1 knots	5.5 knots
Strong Wind:	5.8 knots	6.5 knots	6.8 knots	6.5 knots	6.9 knots
Max. under Sail:	7.5 knots	8.0 knots	8.5 knots	8.5 knots	9.0 knots
Provisions:	1 month	7 days	10 days	1 month	1-2 months
Cargo:	20 tons	-	-	16 tons	35 tons
Time of Service:	c. 1500 B.C.	c. 1200 B.C.	c. 800 B.C.	c. 1200 B.C.	c. 1200 B.C.

THE VESSELS OF THE MEDITERRANEAN REGION

	6	7	8	9	10
Type of Vessel:	Pentekonter	Dispatch Boat	Hecatonter	Early Bireme	Early Trireme
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Mediterranean
Length at Waterline:	60'	55'	100'	75'	75'
Beam at Waterline:	13'	10'	12'	13'	13'
Draft:	2.75'	2.5'	3.0'	3.1'	3.0'
Displacement:	22 tons	19 tons	60 tons	45 tons	45 tons
Freeboard:	2.75' gunwales	2.5' gunwales	3.0' gunwales	4.0' gunwales	4.5' gunwales
Lower Oars:	1.75 - 2.0'	1.75 - 2.0'	2.0'	2.0'	1.5 - 2.0'
Structure:	1/E	1/E	3/E	2/E	2/D
Deck Type:	aphract	aphract	aphract	aphract	aphract
Ram Type:	bow or prow	bow	prow	prow	prow
Crew:	70 - 75	56	130	126	120
Officers:	3	3	5	5	5
Soldiers:	15 - 20	5	20	20	20
Seamen:	-	-	5	5	5
Rowers:	52	48	100	96	90
Turning Radius:	3/I	2/I	3/II	3/I	3/I
Banks of Oars:	2	2	2	2	3
Number of Oars:	26	24	100	64	96
Slow Cruise:	2.5 knots	2.7 knots	3.0 knots	3.0 knots	3.0 knots
Standard Cruise:	3.7 knots	4.1 knots	3.8 knots	3.8 knots	4.0 knots
Battle Cruise:	4.5 knots	4.6 knots	4.7 knots	4.6 knots	4.8 knots
Ramming Speed:	5.5 knots	5.9 knots	5.8 knots	6.0 knots	6.5 knots
Racing:	6.9 knots	7.5 knots	7.3 knots	7.0 knots	7.2 knots
Masts:	1	1	1	1	1
Max. Sail Area:	500 sq. ft.	650 sq. ft.	1000 sq. ft.	900 sq. ft.	900 sq. ft.
Light Breeze:	2.5 knots	3.8 knots	2.9 knots	3.0 knots	3.0 knots
Good Breeze:	4.3 knots	4.9 knots	4.2 knots	4.0 knots	4.2 knots
Good Wind:	5.9 knots	6.8 knots	5.6 knots	6.0 knots	6.1 knots
Strong Wind:	7.5 knots	8.2 knots	7.0 knots	7.4 knots	7.6 knots
Max under Sail:	9.5 knots	10.0 knots	9.5 knots	9.5 knots	9.5 knots
Provisions:	5 days	8 days	5 days	5 days	5 days
Time of Service	1000 to 400 B.C.	500 B.C. to 200 A.D.	850 to 600 B.C.	700 to 400 B.C.	550 to 450 B.C.

THE VESSELS OF THE MEDITERRANEAN REGION

	11	12	13	14	15
Type of Vessel:	Trireme II	Athenian Trireme III	Athenian Trireme IV	Athenian Trireme V	Syracusan Pentere I
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Mediterranean
Length at Waterline:	110'	105'	120'	130'	100'
Beam at Waterline:	14.5'	14.5'	14.5 - 15.0'	15'	21.5'
Draft:	3.1'	3.1'	3.2'	3.2'	4.0'
Displacement:	80 tons	69 tons	83 tons	112.5 tons	140 tons
Freeboard:	4.5 gunwales	6.0 deck	6.5 deck	6.5 deck	8.0 - 9.0' deck
Lower Oars:	1.5 - 2.0'	1.4 - 2.0'	1.75 - 2.0'	1.75 - 2.0'	3.0 - 3.5'
Structure	3/D	4/D	5/D	6/C	8/C
Deck Type:	aphract	cataphractIII	cataphractIII	cataphractIII	cataphractIII
Ram Type:	prow	prow	prow	prow	prow
Grew:	155 - 170	182	213 - 218	233 - 243	250
Officers:	5	6	8	10	10
Soldiers:	20 - 35	20	25 - 20	25 - 35	75
Seamen:	10	12	12	12	15
Rowers:	120	144	168	186	150
Turning Radius:	3/I	2/I	3/I	3/I	4/II
Banks of Oars:	3	3	3	3	1
Number of Oars	120	144	168	186	30
Slow Cruise:	3.2 knots	3.5 knots	3.5 knots	3.5 knots	2.5 knots
Standard Cruise:	4.0 knots	4.2 knots	4.2 knots	4.2 knots	3.0 knots
Battle Cruise:	4.6 knots	5.3 knots	5.3 knots	5.3 knots	4.0 knots
Ramming Speed:	6.5 knots	7.2 knots	7.4 knots	7.1 knots	5.0 knots
Racing:	7.3 knots	7.8 knots	7.9 knots	7.6 knots	6.4 knots
Masts:	1	1	1 or 2	1 or 2	1
Max. Sail Area:	1400 sq. ft.	1525 sq. ft.	1800 sq. ft.	2200 sq. ft.	2200 sq. ft.
Light Breeze:	2.8 knots	3.0 knots	3.0 knots	3.0 knots	2.6 knots
Good Breeze:	4.3 knots	4.5 knots	4.5 knots	4.5 knots	3.8 knots
Good Wind:	6.3 knots	6.8 knots	7.0 knots	7.5 knots	6.0 knots
Strong Wind:	7.8 knots	8.0 knots	8.5 knots	8.0 knots	7.3 knots
Max under Sail:	10.5 knots	11.0 knots	11.5 knots	12.0 knots	10.0 knots
Provisions:	5 days	5 days	5 days	5 days	8 days
Time of Service:	500 - 150 B.C.	466 - 150 B.C.	440 - 150 B.C.	440 - 150 B.C.	413 - 100 B.C.

THE VESSELS OF THE MEDITERRANEAN REGION

	16	17	18	19	20
Type of Vessel:	Successor Pentere II	Successor Octere	Successor 16-er	Small Merchantman	Large Merchantman
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Mediterranean
Length at Waterline:	150'	150'	180'	60'	80' - 100'
Beam at Waterline:	21.5'	24'	30'	15'	17' - 28'
Draft:	4.5'	4.5'	7.5'	4'	4' - 7'
Displacement:	210 tons	230 tons	640 tons	40 tons	75 - 400 tons
Freeboard:	8 - 9' deck	9 - 10' deck	15' deck	3 - 4' deck	4 - 8' deck
Foredeck:	15'	15'	20'	3 - 4'	4 - 8'
Afterdeck:	15'	15' & 20'	20' & 25'	3 - 4'	6'
Lower Oars:	3.0'	3.0'	3.5'	3 - 4'	4 - 8'
Structure:	10/c	10/c	12/c	2/e	3 - 8/c
Deck Type:	cataphract III	cataphract III	cataphract III	decked over	decked over
Ram Type:	bow	bow	bow	none--bow	none-bow
Crew:	400	550	1340	20	30 - 45
Officers:	10	10	20	3	5 - 8
Soldiers:	125	170	440	-	-
Seamen:	25	50	80	17	-
Rowers:	250	320	800	(16)	25 - 37
Turning Radius:	5/II	5/II	7/II	3/II	4/II
Banks of Oars:	1	2	2	1	1
Number of Oars:	50	80	100	16	20
Slow Cruise:	2.5 knots	2.6 knots	2.5 knots	1.7 knots	--
Standard Cruise:	3.0 knots	3.0 knots	3.3 knots	2.0 knots	--
Battle Cruise:	4.0 knots	4.0 knots	4.8 knots	2.8 knots	--
Ramming Speed:	5.2 knots	5.3 knots	5.3 knots	3.1 knots	--
Racing:	6.9 knots*	7.3 knots*	7.3 knots*	3.5 knots*	--
Masts:	1 or 2	2	3	1	1 or 2
Max. Sail Area:	3200 sq.ft.	3500 sq.ft.	5000 sq.ft.	700 sq.ft.	1300-1800 sq.ft.
Light Breeze:	2.7 knots	2.9 knots	2.5 knots	2.0 knots	1.9 knots
Good Breeze:	3.8 knots	4.0 knots	4.1 knots	3.2 knots	3.0 knots
Good Wind:	6.0 knots	6.3 knots	6.3 knots	4.9 knots	4.9 knots
Strong Wind:	7.5 knots	7.5 knots	7.0 knots	6.0 knots	6.4 knots
Max. under Sail:	10 knots	10 knots	10 knots	8.0 knots	8.5 knots
Provisions:	7-10 days	7-10 days	7-10 days	1-2 months	1-2 months
Cargo:	N/A	N/A	N/A	16-18 tons	30-250 tons
Time of Service:	300 B.C.	300 B.C.	300 B.C.	1000 B.C. on	300 B.C. on

*Maximum of 10 minutes.

THE VESSELS OF THE MEDITERRANEAN REGION

	21	22	23	24	25
Type of Vessel:	Carthaginian Bireme:	Carthaginian Pentere:	Roman Bireme:	Roman Quinquereme:	"Augustan" Bireme:
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Med. & Coastal Atlantic
Length at Waterline:	100'	100'	105'	100'	105'
Beam at Waterline:	14.5'	18'	15.5'	18'	17.5'
Draft:	3.0'	4'	3.0'	4'	3.1'
Displacement:	67 tons	111 tons	75 tons	116.5 tons	81 tons
Freeboard:	7' gunwales	4.5-5' gunwales	7' deck	4.5-5' gunwales	7'
Lower Oars:	2.5'	4'	2.5'	4'	2.5'
Structure:	3/D	5/D	3/C	5/D	5/B
Deck Type:	cataphract II	cataphract II	cataphract III	cataphract II	cataphract III
Fighting Castles:	-	-	-	-	2 x 8' high
Ram Type:	prow	prow	prow	prow	prow
Crew:	160	215	198	250	218
Officers:	7	5	5	5	5
Soldiers:	25	40	60 Marines	75	80 Marines
Seamen:	20	20	25	20	25
Rowers:	108	150	108	150	108
Turning Radius:	3/I	3/II	3/I	3/II	3/I
Banks of Oars:	2	1	2	1	2
Number of Oars:	72	30	72	30	72
Slow Cruise:	3.5 knots	2.5 knots	3.5 knots	2.5 knots	3.5 knots
Standard Cruise:	4.1 knots	3.5 knots	4.1 knots	3.3 knots	4.0 knots
Battle Speed:	5.0 knots	4.3 knots	4.9 knots	4.0 knots	4.8 knots
Ramming Speed:	6.3 knots	5.5 knots	6.1 knots	5.1 knots	6.0 knots
Racing:	7.3 knots	6.8 knots	7.3 knots	6.6 knots	7.3 knots
Masts:	1	1	1	1	1
Max. Sail Area:	1500'	1800'	1700'	1800'	1800'
Light Breeze:	2.8 knots	2.8 knots	3.0 knots	2.7 knots	3.0 knots
Good Breeze:	4.3 knots	4.2 knots	4.5 knots	4.0 knots	4.8 knots
Good Wind:	6.6 knots	6.5 knots	6.6 knots	6.1 knots	7.0 knots
Strong Wind:	7.4 knots	7.5 knots	7.6 knots	7.3 knots	8.0 knots
Max under Sail:	10.5 knots	9.5 knots	10.5 knots	9.0 knots	11.0 knots
Provisions:	5 days	5 days	7 days	7 days	10 days
Time of Service:	350-210 B.C.	450-250 B.C.	210-36 B.C.	350-250 B.C.	36 B.C.-200 A.D.

THE VESSELS OF THE MEDITERRANEAN REGION

	26	27	28	29	30
Type of Vessel:	Trajan's Coast Guard Ship:	Moneres or Galea:	Ousiakos (Dromon):	Pamphylos (Dromon):	Byzantine War Dromon:
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Mediterranean
Length at Waterline:	60'	60'	100'	109'	127'
Beam at Waterline:	12.5'	10'	13'	14'	18'
Draft:	2175'	3.0'	3.0'	3.25'	5'
Displacement:	30 tons	21 tons	60 tons	70-78 tons	175 tons
Freeboard:	4' gunwales	3.5' gunwales	6' gunwales	6.5-7' gunwales	10' gunwales
Lower Oars:	2.5'	2.5'	3.0'	3.0'	3.5'
Structural Strength:	1/C	1/E	2/D	3/D	9/C
Deck Type:	cataphract II	cataphract I	cataphract II	cataphract II	cataphract II
Forecastle:	4'	4'	6'	10'	20'
Midships Castle:	-	-	-	-	20'
Aftercastle:	4'	4'	6'	12'	25'
Ram Type:	proW	proW	proW or spur	proW or spur	proW or spur
Crew:	75	102	164	169-225	300
Officers:	5	6	6	6	10
Soldiers:	25	30	30	35	60
Seamen:	6	6	20	20	30
Rowers:	44	60	108	108-164	200
Turning Radius:	2/I	2/I	3/I	3/I	4/I
Banks of Oars:	2	1	2	2	2
Number of Oars:	44	30	72	72	100
Slow Cruise:	2.7 knots	3.0 knots	3.5 knots	3.5 knots	3.2 knots
Standard Cruise:	3.5 knots	3.8 knots	4.2 knots	4.0 knots	3.8 knots
Battle Cruise:	4.5 knots	5.5 knots	5.2 knots	5.0 knots	4.6 knots
Ramming Speed:	5.2 knots	6.5 knots	6.7 knots	6.6 knots	6.5 knots
Racing:	6.4 knots	7.5 knots	7.3 knots	7.8 knots*	7.5 knots
Masts:	1	1	1	1 or 2	2
Max. Sail Area:	700 sq.ft.	800 sq.ft.	1500 sq.ft.	1800 sq.ft.	2700 sq.ft.
Light Breeze:	2.8 knots	3.8 knots	3.8 knots	3.2 knots	2.6 knots
Good Breeze:	4.5 knots	5.2 knots	6.0 knots	4.8 knots	4.0 knots
Strong Wind:	6.0 knots	7.1 knots	8.5 knots	7.0 knots	6.6 knots
Max. under Sail:	7.1 knots	8.0 knots	9.5 knots	8.0 knots	8.0 knots
Provisions:	10 days	7 days	7 days	7 days	10 days
Time of Service:	88 B.C.-500 A.D.	500 A.D.-1000+	A.D. 500-1000+	A.D. 500-1000+	A.D. 600-1000+

*7.3 knots with 108 rowers.

THE VESSELS OF THE MEDITERRANEAN REGION

	31	32	33	34	35
Type of Vessel:	Italian Galea Sottilla	Italian Galea Tarida	Italian Galea Sagitta	Italian Vacchette	Italian Galea di Mercanzia
Seakeeping:	Mediterranean	Mediterranean	Mediterranean	Mediterranean	Mediterranean
Length at Waterline:	128'	128'	80'	25-60'	170'
Beam at Waterline:	17'	35-40'	14'	6-12'	25-30'
Draft:	4.0-4.5'	5.5-6.0'	3.25'	2.25-3.0'	4.5-5.5'
Displacement:	130-145 tons	650-800 tons	55-60 tons	8-25 tons	700-800 tons
Freeboard:	5' deck	6' deck	5' deck	3.5' gunwales	6' deck
Oars:	4'	4'	3.5'	2'	4'
Structure:	8/C	12/B	2/D	1/F	12/C
Deck Type:	cataphract II	cataphract II	cataphract II	aphract	cataphract
Forecastle:	none	none	none	none	10-15'
Aftercastle/Poop	10'	10'	5'	none	10-15'
Ram Type:	spur or prow	spur or prow	spur	none	spur in war
Crew:	225-285	255	106-116	24-50	166
Officers:	15	15	6	3-5	16
Soldiers:	60-120	60	20-30	5-15	30
Seamen:	30	30	20	8-10	40
Rowers:	120	150	60	8-20	80
Turning Radius:	4/II	7/II	3/I	2/I	7/II
Banks of Oars:	1	1	1	1	1
Number of Oars:	120	150	60	8-20	80
Slow Cruise:	2.5 knots	1.6 knots	3.2 knots	3.0 knots	1.2 knots
Standard Cruise:	3.2 knots	2.5 knots	3.8 knots	3.9 knots	2.0 knots
Battle Cruise:	4.3 knots	3.3 knots	4.5 knots	4.7 knots	2.8 knots
Ramming Speed:	5.7 knots	4.0 knots	5.9 knots	5.8 knots	3.6 knots
Racing:	7.0 knots	4.5 knots	6.5 knots	6.4 knots	4.0 knots
Masts:	1:lateen rigged 2:lateen rigged	2:lateen rigged 1:lateen rigged	1:lateen rigged 1:lateen rigged	1:lateen rigged 2:lateen rigged	1:lateen rigged 2:lateen rigged
Max. Sail Area:	2500 sq.ft.	5000 sq.ft.	1300 sq.ft.	275-750 sq.ft.	6000-6800 sq.ft.
Light Breeze:	2.6 knots	1.5 knots	3.5 knots	3.3 knots	1.8 knots
Good Breeze:	4.3 knots	3.0 knots	4.6 knots	5.0 knots	3.5 knots
Good Wind:	7.0 knots	5.0 knots	7.5 knots	6.5 knots	6.5 knots
Strong Wind:	8.0 knots	7.0 knots	8.5 knots	8.0 knots	8.5 knots
Max. Under Sail:	11.0 knots	9.0 knots	11.5 knots	9.5 knots	11.0 knots
Provisions:	10 days	10 days	7 days	5 days	30 days
Cargo:	50 tons or 100 soldiers	350-450 tons or 200 soldiers & 60-75 horses			350-500 tons or 250 soldiers
Time of Service:	13-15 A.D.,	although all vessels of these types appeared in the 16th century.			

THE VESSELS OF THE MEDITERRANEAN REGION

	36	37	38	39	40
Type of Vessel:	Mediterranean "Ordinary" Galley	Mediterranean Gallass	Italian Usciare	Mediæval Merchantman	Venetian Carrack
Seakeeping:	Med/Atlantic	Med/Atlantic	Med/Atlantic	Mediterranean	Med/Atlantic
Length at Waterline:	131'	165'-190'	125'	60'	60'-115'
Beam at Waterline:	18'	28'-33'	41'	18'	18'-39'
Draft:	4.5'	10.4'	18'	10'	10'
Displacement:	170 tons	700 tons	2000-2100 tons	200-250 tons	200-1000 tons
Freeboard:	5' deck	10' deck	8' deck	4' deck	6' deck
Oars:	4'	4.5'-5.0'	-	-	-
Structure:	9/B	15/A	12/A	9/C	10-12/C
Deck Type:	cataphract II	cataphract III	fully decked	fully decked	fully decked
Forecastle:	none	15'	15' & 20'	none	15'-18'
Aftercastle/Pop	10'	13' & 20'	15' & 20'	8' - 10'	10' & 15' - 15' & 18'
Ram Type:	spur	spur	none--bow	none--bow	none--bow
Crew:	265 (295)	698	120 - 140	25	25 - 85
Officers:	15	25	10	5	5 - 10
Soldiers:	60 (30 gunners)	220 + 50 gunners	20 - 40	-	0 - 25
Seamen:	30	50	90	20	20 - 50
Rowers:	150	343	-	-	-
Turning Radius:	4/I	5/II	7/II	4/II	4/II
Banks of Oars:	1	1	-	-	-
Number of Oars:	50	49	-	-	-
Slow Cruise:	2.6 knots	2.4 knots	-	-	-
Standard Cruise:	3.3 knots	2.9 knots	-	-	-
Battle Cruise:	4.3 knots	3.5 knots	-	-	-
Ramming Speed:	5.9 knots	5.0 knots	-	-	-
Racing:	6.9 knots	6.5 knots	-	-	-
Masts:	2:lateen rigged	3:lateen rigged	2 - 3	1	2 - 4
Max. Sail Area:	3000 sq.ft.	8000 sq.ft.	5000-6500 sq.ft.	1000-1100 sq.ft.	1500-6000 sq.ft.
Light Breeze:	2.9 knots	1.5 knots	1.4 knots	1.5 knots	2.1 knots
Good Breeze:	4.8 knots	3.6 knots	3.1 knots	3.0 knots	3.9 knots
Good Wind:	7.2 knots	6.0 knots	5.0 knots	4.9 knots	6.4 knots
Strong Wind:	9.0 knots	8.0 knots	6.8 knots	6.0 knots	9.0 knots
Max. under Sail:	12.0 knots	11.5 knots	10.0 knots	8.5 knots	12.0 knots
Provisions:	10 - 20 days	10 - 20 days	30 days	30 days	30 days
Cargo/Armaments:	5 bow guns (1x36 pdrs, 2x9 pdr, 2x4 1/2 pdr)	5 bow guns + 25-28 lighter guns (2 1/2&6pdr)	1250 - 1300 tons or 100-150 horses & 300 soldiers	100 - 150 tons	100 - 550 tons
Time of Service:	15-16 century	15-16 century	13-15 century	13-16 century	15-16 century

THE VESSELS OF THE ATLANTIC REGION

41

42

43

44

45

Type of Vessel:	Viking Warboat	Viking Longship	"The Great Serpent"	Small Nordic Merchantmen	Large Nordic Merchantmen
Seakeeping:	Atlantic/Med.	Atlantic/Med.	Atlantic/Med.	Atlantic/Med.	Atlantic/Med.
Length at Waterline:	72.5'	100'	155'	55'	90'
Beam at Waterline:	15/75'	16-17'	25'	15'	18'
Draft:	2.7'	2.8'	5.0'	3.0'	3.5'
Displacement:	30 tons	50 tons	225 tons	25 tons	71 tons
Freeboard:	3.0' gunwales	3.5' gunwales	4.5-5' gunwales	3.0' gunwales	3.5' gunwales
Oar Level:	1.5-2'	2.0'	3.0'	1.5-2.0'	2.0'
Structure:	1/B	2/B	11/B	1/C	3/B
Deck Type:	bilges decked	bilges decked	hold decked	bilges decked	hold decked
Ram Type:	bow	bow	bow	bow	bow
Crew:	70	106	400	25	40
Officers:	6	6	10	4	6
Seamen:	64	100	50	5	10
Rowers:	(64)	(100)	340	16	24
Turning Radius:	2/I	3/I	3/II	2/I	2/II
Banks of Oars:	1	1	1	1	1
Number of Oars:	32	50	68	16	24
Slow Cruise:	3.5 knots	3.5 knots	3.2 knots	1.0 knots	1.0 knots
Standard Cruise:	4.2 knots	4.2 knots	4.0 knots	1.3 knots	1.3 knots
Battle Cruise:	5.5 knots	5.5 knots	4.8 knots	1.9 knots	1.7 knots
Emergency Speed:	6.9 knots	6.8 knots	5.4 knots	2.6 knots	2.3 knots
Racing:	7.5 knots	7.8 knots	6.5 knots	3.0 knots	2.8 knots
Masts:	1	1	2	1	1
Max. Sail Area:	850-950 sq.ft.	1500 sq.ft.	3500 sq.ft.	700 sq.ft.	1400 sq.ft.
Light Breeze:	3.8 knots	3.8 knots	3.5 knots	3.2 knots	3.1 knots
Good Breeze:	4.8 knots	4.8 knots	4.5 knots	4.0 knots	3.9 knots
Good Wind:	7.5 knots	7.5 knots	7.3 knots	6.3 knots	6.3 knots
Strong Wind:	8.5 knots	8.9 knots	8.5 knots	7.0 knots	7.2 knots
Max. under Sail:	10.5 - 11 knots	10.5 - 11 knots	10 knots	8.5 knots	8.5 knots
Provisions:	10 days	10 days	10 days	10 - 30 days	10 - 90 days
Cargo:	-	-	-	12 tons	35 - 40 tons
Time of Service:	A.D.400-1200	A.D.700-1200	A.D.1000	A.D.400-1200	A.D.700-1200

THE VESSELS OF THE ATLANTIC REGION

	46	47	48	49	50
Type of Vessel:	Small Cog	Large Cog	Great Cog	Caravel	Carrack
Seakeeping:	Atlantic/Mec.	Atlantic/Med.	Atlantic/Med.	Atlantic/Med.	Atlantic/Med
Length at Waterline:	45' - 75'	80' - 100'	100' - 125'	60' - 75'	80' - 100'
Beam at Waterline:	18' - 25'	25' - 30'	35' - 40'	20' - 25'	20' - 33'
Draft:	5-0-5.5'	6 - 8' deck	10 - 12'	4 - 5'	6 - 10'
Displacement:	30 - 150 tons	200 - 450 tons	500 - 1500 tons	60 - 100 tons	300 - 1000 tons
Freeboard:	4 - 5' gunwales	5 - 7' deck	6 - 8' deck	4' deck	7' deck
Structure:	1-8/C	10-12/B	12/A	3-5/C	11-12/A
Deck Type:	decked	fully decked	fully decked	fully decked	fully decked
Forecastle:	8-19'	12-15'	12-15'	none	12&18'
Aftercastle/POOP:	8-10'	15'	12-15'	8-10'	12&18'
Ram Type:	none-bow	none-bow	none-bow	none-bow	none-bow
Crew:	10-35	40-80	80-130	15-30	65-135
Officers:	2-5	5	5-10	3-5	5-10
Soldiers:	0	0	0	0	0
Seamen:	8-30	35-75	75-125	12-25	60-125
Turning Radius:	3/II	4/II	5/II	3/II	4/II
Masts:	1	1	1 or 2	2 or 3	3
Max. Sail Area:	1100-1700 sq.ft.	1800-2500 sq.ft.	2500-5000 sq.ft.	1800-2000 sq.ft.	2000-4000 sq.ft.
Light Breeze:	2.0 knots	1.8 knots	1.5 knots	3.5 knots	2.5 knots
Good Breeze:	3.9 knots	3.6 knots	3.0 knots	5.0 knots	4.5 knots
Good Wind:	5.5 knots	5.0 knots	5.0 knots	7.5 knots	7.5 knots
Strong Wind:	7.0 knots	7.0 knots	7.0 knots	9.5 knots	9.0 knots
Max. under Sail:	8.5 knots	8.5 knots	8.5 knots	12.5 knots	12.0 knots
Provisions:	1-3 months	1-3 months	1-3 months	1-3 months	1-3 months
Cargo:	30-70 tons	100-300 tons	225-1000 tons	35-50 tons	150-600 tons
War Crew (Soldiers):	20-35	40-60	75-100	20-35	75-150
Military Transport (with 1 month's provisions)	50-75	100-150	200-500	50	150-300
Time of Service:	Horses: 1 horse = 5 men; can be transported on large vessels fitted for the purpose. 10-15 century	12-15 century	13-15 century	13-16 century	15-16 century

GAME EQUIPMENT

The following equipment will be needed to simulate naval engagements:

Measuring Instruments: Several 6" and 12" rulers are needed, preferably with a scale marked in 1/10's of an inch. A longer tape measure will also prove useful.

Dice: Several sets of percentage dice, 1 - 20 dice, and six-sided dice are needed. These may be purchased from most war game suppliers.

Turning Track Overlay: Provided with the rules.

Ship Counters: Provided with the rules. Players who are able to acquire 1:2000 or 1:3000 scale models in lead can, of course, substitute them for the counters.

Deck Plans: Provided with the rules. Players are granted permission to xerox as many copies for their own personal use as are needed. Some vessels are not included in the 1" = 6' deck plans, but players may draw them on large sheets of paper, using the diagrams and the ship descriptions as guides.

Military Miniatures: Players desiring man-to-man melees will require lead miniatures or their equivalent to represent the fighting crews and other combatants. Where possible, these should correspond to the troop types being depicted.

Maps: To plot ship positions in the Voyage Mode, maps will be needed. These may be maps purchased in a store or hand drawn ones drafted by the players themselves. To preserve the maps, a thin sheet of plastic should be used as an overlay, and all courses and positions could be marked with a washable marker pen or a grease pencil.

Note Pad and Pencil: Some records will have to be kept on ship status and crew condition. A sample record sheet is included in the rules and players are granted permission to xerox as many copies for their own personal use as are needed. Orders of some types will also have to be written.

Pocket Computer: While not essential, this inexpensive aid is most useful in working out any calculations that might arise, and players are strongly urged to make use of one to speed up playing times.

MOVEMENT & TIME SCALES

Three different scales of movement and time are used, depending upon the mode the vessels are in:

Voyage Mode: Distances covered in voyages are measured in miles, and ship positions may be plotted hourly or every watch (4 hours). Players are advised to use the "Speed of Passage" table in the rules to make rapid conversions of knots into miles covered in one hour or four hours.

Battle Mode: As soon as the enemy is sighted, all vessels proceed to Battle Mode. All distances are now measured in feet, with a scale of 1" = 200' for ship and fleet maneuver and for all missile fire between vessels. Players are advised to use the "Battle Speed Conversion" and "Distance Travelled on Turning Tracks" tables to facilitate quick ship handling and scale conversions from feet to inches. The time scale is in 5-minute intervals.

Melee Mode: All deck actions are fought in 5-minute intervals. If the "fast" combat system included in this volume is used, deck battles are fought abstractly on paper. If the "melee" combat system in this volume is used, the 1" = 6' deck plans are laid out and the ships are manned with military miniatures. Players may also choose to use the detailed individual combat

systems in Chivalry & Socery to simulate a more drawn out deck action between individual ships locked in an important duel involving player characters.

Movements of vessels and men aboard deck are covered in other sections.

THE BATTLE WITH THE SEA

A crew is always welcome to try to sail any sea with any vessel they choose. However, they must take their chances. Conditions are not always to the advantage of those who sail the seas. To find the conditions of weather and sea, consult the following tables.

General Weather and Visibility

The weather in the Atlantic differs considerably from that of the Mediterranean. In both regions the conditions can change suddenly and dramatically. Check weather conditions every watch (4 hours) by rolling percentage dice:

<u>The Atlantic Region</u>			<u>The Mediterranean Region</u>		
<u>Die</u>	<u>Weather Conditions</u>	<u>Visibility</u>	<u>Roll</u>	<u>Weather Conditions</u>	<u>Visibility</u>
1-5	Dense Fogbank	20-60 feet	1-5	Fog	100-300 feet
6-10	Fog	100-300 feet	6-9	Mist	300-1000 feet
11-14	Mist	300-1000 feet	10-13	Heavy Rain	1 mile
15-19	Heavy Rain	1/2 miles	14-19	Light Rain	1-3 miles
20-29	Light Rain	1-3 miles	20-29	Drizzle	2-4 miles
20-39	Drizzle	2-4 miles	30-45	Overcast	3-6 miles
40-60	Overcast	3-6 miles	46-70	Fairly Clear	5-10 miles
61-85	Fairly Clear	5-10 miles	71-00	Clear	8-14 miles
86-00	Clear	8-15 miles			
Morning	: -5% on die roll		Morning	: no modification	
Afternoon:	+7% on die roll		Afternoon:	+10% on die roll	
Evening	: -5% on die roll		Evening	: -5% on die roll	
Spring	: +3% on die roll		Spring	: +5% on die roll	
Summer	: +5% on die roll		Summer	: +8% on die roll (no Heavy Rain)	
Fall	: -3% on die roll		Fall	: no modification	
Winter	: -7% on die roll		Winter	: -5% on die roll	

Winds:

The wind is always a crucial factor on the high seas. Close inshore it can spell the difference between a successful voyage and disastrous shipwreck. As in the case of the general weather, wind directions and velocities can change quickly and capriciously. Check conditions of the wind every watch (4 hours) by rolling 2 6-sided dice:

<u>The Atlantic Region</u>		<u>The Mediterranean Region</u>	
<u>Die</u>	<u>Wind Direction</u>	<u>Die</u>	<u>Wind Direction</u>
2-3	South	2-3	North-west
4	South-east	4	West
5	East	5	South-west
6	North-east	6-7	South
7	North	8	South-east
8-9	North-west	9	East
10	West	10	North-east
11-12	South-west	11-12	North

In the most favorable months of sailing (the summer), winds tend to be less capricious than

at other times. Before checking for a change in wind direction, roll percentage dice:

1-15	=	Wind shifts 1 point clockwise
16-30	=	Wind shifts 1 point anticlockwise
31-40	=	Wind shifts 2 points clockwise
41-50	=	Wind shifts 2 points anticlockwise
51-65	=	Wind shifts on Wind Table
66-00	=	Wind remains constant

Wind speeds are no less crucial than wind direction. Use the following table to determine the wind speed by rolling percentage dice every watch (4 hours):

The Atlantic Region

Die	Roll	Wind Speed
	1-14	Calm
	15-25	Light Breeze
	26-55	Good Breeze
	56-75	Good Wind
	76-90	Strong Wind
	91-95	Max. Sailing Conditions
	96-00	Gale*

Spring: +7% on die roll
 Summer: no modification
 Fall : +10%
 Winter: +15% on die roll

Fog or Mist: -20% on die roll
 Heavy Rain : +25% on die roll

The Mediterranean Region

Die	Roll	Wind Speed
	1-24	Calm
	25-40	Light Breeze
	41-65	Good Breeze
	66-80	Good Wind
	88-93	Strong Wind
	94-96	Max. Sailing Conditions**
	97-00	Gale***

Spring: +7% on die roll
 Summer: no modification
 Fall : no modification
 Winter: +10% on die roll

Fog or mist: -15% on die roll
 Heavy Rain : +15% on die roll

*In the Atlantic, Gale conditions signify a full-blown storm at sea with high winds and waves. Gale conditions will persist 4-24 hours, and ships at sea will attempt to make a safe land-fall to ride out the storm in a sheltered harbour or bay.

**In the Mediterranean, maximum sailing conditions are encountered only in the morning, generally close inshore, with a strong and steady wind blowing from the land. Seas are glassy calm, with no appreciable wave action.

***In the Mediterranean, Gale conditions signify wave action sufficient to endanger oared warships, which must take refuge immediately. Sailing vessels have the option of riding out the storm at sea. In the Mediterranean wind speeds during gales increase sailing speeds by 20%, with +10% of average or poorer crews making mistakes with the sails. In the Atlantic, wind speeds increase sailing speeds by 30%, with +10% chance of any crew making mistakes with the sails. Sailing speeds are rated at maximum possible.

WAVE ACTION & SHIPPING WATER

When the seas are running high, there is a good chance that a vessel will ship water. The tables below give the probability of a vessel taking seas aboard during a 4-hour period in "good" weather and every hour during gales. When the seas are "unfavorable", risk of shipping water occurs.

The flotation of a vessel is given in points equal to its structural strength (SSTR). The amount of seas shipped is also given in points, determined by dice rolls. When a vessel loses all of its flotation, it will sink in 1/2 to 3 hours, with no chance of pumping it out. For each 10% of flotation lost, a ship will be slowed in speed by 10%.

A vessel may be bailed or pumped out at the rate of 1 point of flotation for each 3 men manning the pumps per hour. Men cannot bail or pump more than two hours steadily, and so must

be relieved regularly.

The Mediterranean: Unfavorable seas on 1-30%

<u>Wind Speed</u>	<u>Atlantic Vessel</u>	<u>Mediterranean Galley</u>	<u>Mediterranean Merchantman</u>	<u>Viking Vessel</u>
Good Breeze	nil	1 x die	nil	nil
Good Wind	nil	2 x dice	nil	nil
Strong Wind	nil	3 x dice	1 x die	nil
Max. Sailing	nil	nil	nil	nil
Gale	3 x dice	6 x dice	4 x dice	2 x dice

The Atlantic: Unfavorable seas on 1-45%

<u>Wind Speed</u>	<u>Atlantic Vessel</u>	<u>Mediterranean Galley</u>	<u>Mediterranean Merchantman</u>	<u>Viking Vessel</u>
Light Breeze	nil	1 x die	nil	nil
Good Breeze	nil	2 x dice	nil	nil
Good Wind	nil	3 x dice	1 x die	nil
Strong Wind	1 x die	5 x dice	3 x dice	1 x die
Max. Sailing	2 x dice	6 x dice	4 x dice	2 x dice
Gale	4 x dice	8 x dice	6 x dice	3 x dice

SPEEDS UNDER SAIL & DRIFTING

The wind always affects the sailing characteristics of vessel, whether it is under sail or oars, and especially when it is drifting without motive power. The hull of the vessel itself acts as a sail.

If the wind is coming from a direction up to 45° from the stern, no appreciable drift will be experienced. Square-rigged ships increase all speeds under sail by 10%.

If the wind is coming from 45° astern to 45° from the bows, the vessel will drift in the direction the wind is blowing at a rate of 10% of its forward speed. Lateen-rigged ships sail best with winds coming from the beam, so increase sailing speeds by 10%.

If the wind is coming from a direction up to 45° from the bows, the ship's speed will be slowed 10% if under oars, while vessels under sail will be driven back at 30% of their potential forward speed in the existing wind. Viking vessels can sail close to the wind at 50% of their potential forward speed under sail.

Small vessels not under sail or oars will drift at 10% of their potential sailing speeds, while large vessels drift at 15% because of the larger surface areas of their hulls. Drifting does not occur in calms or light breezes at any time.

Atlantic vessels in the Mediterranean will drift at 5% of their potential sailing speed in breezes because of their weight and draft.

The sailing speeds for each type of vessel are given in the Data Tables. Speeds under sail are determined by the force of the wind and the proficiency of the sailors.

All merchant vessels laden with more than 25% of their cargo capacity are slowed by 25% when under sail or oars. Warships with additional crewmen or passengers (above limits given in Data Tables) are slowed by 1% for each 1% of additional crew carried. Atlantic cogs may ship a double crew without penalty when used in their warship configuration.

SPEEDS UNDER OARS

The speed of oared vessels depends upon the design of the ships and the quality of the rowing crews. The essential factor is the endurance of the crews. (See "Rowing Crews")

Speeds of oared vessels are given in the Data Tables. The speeds are subject to some modification by the class of the rowing crew and the type of maneuvers undertaken.

Slow Cruise: About 1/3 of the rowing crew mans the lowest bank of oars, permitting frequent relief. Speeds are slow but little energy is expended by the crew.

Standard Cruise: About 1/2 of the rowing crew mans the oars. Again, relief is possible. Speeds are relatively faster than slow cruise, yet there is economical expenditure of energy.

Battle Cruise: All rowers man the oars, with no relief possible. Speeds are high and the crew rapidly expends its energy.

Emergency Speed: The beat is increased to a rate close to the rower's limit. Emergency/ramming speed should be ordered only when making a final ramming attack or attempting to evade an enemy vessel.

Racing Speed: The rowers pull at the fastest beat possible. Huge amounts of energy are expended to force the ship to her highest speed.

Backing: Although not given in the Data Tables, all oared vessels can row astern at a rate of up to 1 knot (Viking vessels can proceed at 60% of forward speed because of the design of the hull). Backing is used, for the most part, to pull free of a rammed vessel.

The capability of oared vessels to accelerate or decelerate is as important as the speeds themselves:

<u>Speed of Vessel</u>	<u>Accelerating</u>	<u>Decelerating by Water Resistance</u>	<u>Decelerating by Dragging the Oars</u>
Backing	.3 turn	.3 turn	.1 turn
Dead in the Water	.5 turn	.3 turn	.1 turn
Slow Cruise	.4 turn	.3 turn	.1 turn
Standard Cruise	.5 turn	.3 turn	.1 turn
Battle Cruise	.5 turn	.3 turn	.1 turn
Emergency Speed	.5 turn	.2 turn	.1 turn
Racing Speed	.5 turn	.1 turn	.1 turn

The time intervals between each of the speeds represent 5-minute melee turns. For example, if a vessel was lying dead in the water, after 1 turn it could reach Standard Cruise (.5 turn to Slow + .4 turn to Standard). In the following turn it could increase speed to Emergency (.5 turn to Battle Cruise + .5 to Emergency). When computing the speed of the vessel when accelerating in a turn, simply assume the highest speed that will be attained. While not mathematically correct, it simplifies the paperwork.

Deceleration by water resistance simply means that the rowers raise oars and let their vessel slow down of its own accord. Dragging oars increases the resistance and greatly reduces the speed of the vessel. When decelerating, add the highest and lowest speeds, divide by 2, and multiply the result by the number of tenths of a turn spent decelerating. The result will give the average speed in knots. Consult the Battle Scale Speed Table; the speed in knots will indicate the distance and scale distance covered when decelerating.

Vessels under sail may shorten sail (equal to "water resistance") or turn into the wind (equal to "dragging oars"). Acceleration takes twice as long as for oared vessels.

Speed of Passage Conversion Table

<u>Knots/</u> <u>Hour</u>	<u>M.P.H.</u>	<u>Miles in</u> <u>4 Hours</u>	<u>Knots/</u> <u>Hour</u>	<u>M.P.H.</u>	<u>Miles in</u> <u>4 Hours</u>	<u>Knots/</u> <u>Hour</u>	<u>M.P.H.</u>	<u>Miles in</u> <u>4 Hours</u>
0.1	0.12	0.5	5.1	5.87	23.5	10.1	11.63	46.5
0.2	0.23	0.9	5.2	5.98	23.95	10.2	11.75	47.0
0.3	0.35	1.4	5.3	6.10	24.4	10.3	11.86	47.4
0.4	0.46	1.8	5.4	6.22	24.9	10.4	11.97	47.9
0.5	0.58	2.3	5.5	6.33	25.3	10.5	12.09	48.4
0.6	0.69	2.7	5.6	6.45	25.8	10.6	12.21	48.8
0.7	0.80	3.2	5.7	6.56	26.3	10.7	12.32	49.3
0.8	0.92	3.7	5.8	6.68	26.7	10.8	12.44	49.7
0.9	1.04	4.2	5.9	6.79	27.2	10.9	12.55	50.2
1.0	1.15	4.5	6.0	6.91	27.6	11.0	12.67	50.7
1.1	1.27	5.0	6.1	7.02	28.1	11.1	12.78	51.1
1.2	1.38	5.5	6.2	7.14	28.6	11.2	12.90	51.6
1.3	1.50	6.0	6.3	7.25	29.0	11.3	13.01	52.0
1.4	1.62	6.5	6.4	7.37	29.5	11.4	13.13	52.5
1.5	1.73	6.9	6.5	7.48	29.9	11.5	13.24	53.0
1.6	1.84	7.4	6.6	7.60	30.4	11.6	13.36	53.4
1.7	1.96	7.9	6.7	7.72	30.9	11.7	13.47	53.9
1.8	2.07	8.3	6.8	7.83	31.3	11.8	13.58	54.4
1.9	2.18	8.8	6.9	7.95	31.8	11.9	13.70	54.8
2.0	2.30	9.2	7.0	8.06	32.2	12.0	13.82	55.3
2.1	2.42	9.7	7.1	8.18	32.7	12.1	13.93	55.7
2.2	2.53	10.1	7.2	8.29	33.2	12.2	14.05	56.2
2.3	2.65	10.6	7.3	8.41	33.6	12.3	14.16	56.7
2.4	2.77	11.1	7.4	8.52	34.1	12.4	14.28	57.1
2.5	2.88	11.5	7.5	8.64	34.5	12.5	14.39	57.6
2.6	2.99	12.0	7.6	8.75	35.0	12.6	14.51	58.0
2.7	3.11	12.4	7.7	8.87	35.5	12.7	14.62	58.5
2.8	3.22	12.9	7.8	8.98	35.9	12.8	14.74	59.0
2.9	3.34	13.4	7.9	9.10	36.3	12.9	14.85	59.4
3.0	3.45	13.8	8.0	9.21	36.8	13.0	14.97	59.9
3.1	3.57	14.3	8.1	9.32	37.8	13.1	15.08	60.3
3.2	3.68	14.7	8.2	9.44	37.8	13.2	15.20	60.8
3.3	3.80	15.2	8.3	9.56	38.2	13.3	15.32	61.3
3.4	3.91	15.7	8.4	9.67	38.6	13.4	15.43	61.7
3.5	4.03	16.1	8.5	9.79	39.2	13.5	15.55	62.2
3.6	4.15	16.6	8.6	9.90	39.6	13.6	15.66	62.6
3.7	4.26	17.0	8.7	10.02	40.1	13.7	15.77	63.1
3.8	4.38	17.5	8.8	10.13	40.5	13.8	15.89	63.6
3.9	4.49	18.0	8.9	10.25	41.0	13.9	16.01	64.0
4.0	4.61	18.4	9.0	10.36	41.5	14.0	16.12	64.5
4.1	4.72	18.9	9.1	10.48	41.9	14.1	16.23	64.9
4.2	4.84	19.4	9.2	10.59	42.4	14.2	16.35	65.4
4.3	4.95	19.8	9.3	10.71	42.8	14.3	16.47	65.9
4.4	5.07	20.3	9.4	10.82	43.3	14.4	16.58	66.3
4.5	5.18	20.7	9.5	10.94	43.8	14.5	16.70	66.8
4.6	5.30	21.2	9.6	11.05	44.2	14.6	16.81	67.2
4.7	5.41	20.6	9.7	11.17	44.7	14.7	16.93	67.7
4.8	5.53	22.1	9.8	11.28	45.2	14.8	17.04	68.2
4.9	5.64	22.6	9.9	11.40	45.6	14.9	17.16	68.6
5.0	5.75	23.0	10.0	11.52	46.1	15.0	17.27	69.1

Battle Scale Speed Conversion Table

To permit players a rapid method of converting knots to feet when conducting a naval engagement, the following speed conversion tables are provided. The designers realize that there is nothing more frustrating than having to use pad and paper (or pocket computer) to excess in the middle of a hot and furious action. For the sake of rounded numbers, the nautical mile was taken as 6000 feet (not 6080).

<u>Speed</u>	<u>Melee Speed</u>	<u>Scale</u>	<u>Speed</u>	<u>Melee Speed</u>	<u>Scale</u>
0.1 knot	50 feet	0.25"	5.1 knots	2550 feet	12.75"
0.2 knot	100 feet	0.5"	5.2 knots	2600 feet	13.0"
0.3 knot	150 feet	0.75"	5.3 knots	2650 feet	13.25"
0.4 knot	200 feet	1.0"	5.4 knots	2700 feet	13.5"
0.5 knot	250 feet	1.25"	5.5 knots	2750 feet	13.75"
0.6 knot	300 feet	1.5"	5.6 knots	2800 feet	14.0"
0.7 knot	350 feet	1.75"	5.7 knots	2850 feet	14.25"
0.8 knot	400 feet	2.0"	5.8 knots	2900 feet	14.5"
0.9 knot	450 feet	2.25"	5.9 knots	2950 feet	14.75"
1.0 knot	500 feet	2.5"	6.0 knots	3000 feet	15.0"
1.1 knots	550 feet	2.75"	6.1 knots	3050 feet	15.25"
1.2 knots	600 feet	3.0"	6.2 knots	3100 feet	15.5"
1.3 knots	650 feet	3.25"	6.3 knots	3150 feet	15.75"
1.4 knots	700 feet	3.5"	6.4 knots	3200 feet	16.0"
1.5 knots	750 feet	3.75"	6.5 knots	3250 feet	16.25"
1.6 knots	800 feet	4.0"	6.6 knots	3300 feet	16.5"
1.7 knots	850 feet	4.25"	6.7 knots	3350 feet	16.75"
1.8 knots	900 feet	4.5"	6.8 knots	3400 feet	17.0"
1.9 knots	950 feet	4.75"	6.9 knots	3450 feet	17.25"
2.0 knots	1000 feet	5.0"	7.0 knots	3500 feet	17.5"
2.1 knots	1050 feet	5.25"	7.1 knots	3550 feet	17.75"
2.2 knots	1100 feet	5.5"	7.2 knots	3600 feet	18.0"
2.3 knots	1150 feet	5.75"	7.3 knots	3650 feet	18.25"
2.4 knots	1200 feet	6.0"	7.4 knots	3700 feet	18.5"
2.5 knots	1250 feet	6.25"	7.5 knots	3750 feet	18.75"
2.6 knots	1300 feet	6.5"	7.6 knots	3800 feet	19.0"
2.7 knots	1350 feet	6.75"	7.7 knots	3850 feet	19.25"
2.8 knots	1400 feet	7.0"	7.8 knots	3900 feet	19.5"
2.9 knots	1450 feet	7.25"	7.9 knots	3950 feet	19.75"
3.0 knots	1500 feet	7.5"	8.0 knots	4000 feet	20.0"
3.1 knots	1550 feet	7.75"	8.1 knots	4050 feet	20.25"
3.2 knots	1600 feet	8.0"	8.2 knots	4100 feet	20.5"
3.3 knots	1650 feet	8.25"	8.3 knots	4150 feet	20.75"
3.4 knots	1700 feet	8.5"	8.4 knots	4200 feet	21.0"
3.5 knots	1750 feet	8.75"	8.5 knots	4250 feet	21.25"
3.6 knots	1800 feet	9.0"	8.6 knots	4300 feet	21.5"
3.7 knots	1850 feet	9.25"	8.7 knots	4350 feet	21.75"
3.8 knots	1900 feet	9.5"	8.8 knots	4400 feet	22.0"
3.9 knots	1950 feet	9.75"	8.9 knots	4450 feet	22.25"
4.0 knots	2000 feet	10.0"	9.0 knots	4500 feet	22.5"
4.1 knots	2050 feet	10.25"	9.1 knots	4550 feet	22.75"
4.2 knots	2100 feet	10.5"	9.2 knots	4600 feet	23.0"
4.3 knots	2150 feet	10.75"	9.3 knots	4650 feet	23.25"
4.4 knots	2200 feet	11.0"	9.4 knots	4700 feet	23.5"
4.5 knots	2250 feet	11.25"	9.5 knots	4750 feet	23.75"
4.6 knots	2300 feet	11.5"	9.6 knots	4800 feet	24.0"
4.7 knots	2350 feet	11.75"	9.7 knots	4850 feet	24.25"
4.8 knots	2400 feet	12.0"	9.8 knots	4900 feet	24.5"
4.9 knots	2450 feet	12.25"	9.9 knots	4950 feet	24.75"
5.0 knots	2500 feet	12.5"	10.0 knots	5000 feet	25.0"

MANEUVERING

Turning requires that a vessel be moving through the water. Oared vessels can turn while relatively "stationary" by rowing on the side opposite to the direction of the turn, but this will cause some forward movement. All vessels under sail cannot turn if they are dead in the water.

Turning Radius

Each type of vessel is assigned a standard turning radius in the Data Tables. For example, a Viking Warboat has a turning radius of 2/I. The first number means that turning track #2 is used on the Turning Track Overlay, subject to modification by the speed of the vessel. The second number means that Turning Radius Table I is used to modify the standard turning radius according to the vessel's speed. The minimum turning radius is turning track #1.

Table I: Turning Radius

Speed of Vessel	<u>Turning Mode Employed by the Vessel</u>			
		Raise	Drag	Reverse
	1. Rudder	2. Oars	3. Oars	4. Oars
Dead Slow	R + 1	R	R - 1	R - 2
Cruising/Breezes	R + 2	R + 1	R	R - 1
Battle Cruise/Good Wind	R + 3	R + 1	R	R - 1
Emergency Speed/Strong Wind	R + 4	R + 3	R + 2	R + 1
Racing Speed/Max. Sailing	R + 5	R + 4	R + 3	R + 2

When the data tables list a "II" under turning radius, use the following table:

Table II: Turning Radius

Speed of Vessel	<u>Turning Mode Employed by the Vessel</u>			
		Raise	Drag	Reverse
	1. Rudder	2. Oars	3. Oars	4. Oars
Dead Slow	R + 1	R	R - 1	R - 2
Cruising/Breezes	R + 3	R + 1	R + 1	R
Battle Cruise/Good Wind	R + 5	R + 3	R + 2	R + 1
Emergency Speed/Strong Wind	R + 6	R + 5	R + 4	R + 3
Racing Speed/Max. Sailing	R + 8	R + 6	R + 5	R + 4

"R" = Basic turning radius of the vessel as stated in the Data Tables.

Using the Viking Warboat as an example, the standard turn on the rudder alone at cruising speed or in light to good breezes is R + 2. This means that the turn is widened outward 2 tracks on the Turning Track overlay. Since the basic turn is on track #2, the turn at cruising speed is 2 + 2 = track #4. However, if the crew was rowing and reversed oars (Turning Mode #4), the turn is R - 1 or 2 - 1 = turning track #1.

THE TURNING TRACK OVERLAY

The Turning Track Overlay is the sheet of clear plastic imprinted with the various turning circles. The Overlay is drawn to the scale of 1" : 200'. Turning tracks are counted from the center of the overlay.

To use the Overlay, hold it above the vessel that is turning and look directly down through the Overlay to the playing surface below. The course of the ship as it makes its turn can be clearly seen through the plastic. Reach under the Overlay and move the ship to its new position and course. The following table for Distances Travelled on Turning Tracks can be used for easy computation, as the Overlay is divided into 15° segments.

DISTANCES TRAVELLED ON TURNING TRACKS

Turn	Turn Radius	15°	30°	45°	90°	180°	270°	360°
#1	100'	25' / 0.1"	50' / 0.25"	80' / 0.4"	160' / 0.8"	310' / 1.5"	420' / 2.1"	630' / 3.1"
#2	150'	40' / 0.2"	80' / 0.4"	120' / 0.6"	240' / 1.2"	470' / 2.3"	700' / 3.5"	940' / 4.7"
#3	200'	50' / 0.25"	110' / 0.5"	160' / 0.8"	320' / 1.6"	630' / 3.1"	950' / 4.75"	1260' / 6.3"
#4	250'	65' / 0.3"	130' / 0.6"	200' / 1.0"	390' / 1.9"	790' / 3.9"	1190' / 5.9"	1570' / 7.8"
#5	300'	80' / 0.4"	160' / 0.8"	240' / 1.2"	470' / 2.3"	940' / 4.7"	1410' / 7.0"	1880' / 9.4"
#6	350'	90' / 0.4"	180' / 0.9"	270' / 1.3"	550' / 2.75"	1100' / 5.5"	1660' / 8.3"	2200' / 11.0"
#7	400'	105' / 0.5"	210' / 1.1"	320' / 1.6"	630' / 3.1"	1260' / 6.3"	1890' / 9.4"	2510' / 12.5"
#8	450'	120' / 0.6"	240' / 1.2"	360' / 1.8"	720' / 3.6"	1450' / 7.25"	2170' / 10.8"	2890' / 14.4"
#9	500'	130' / 0.6"	260' / 1.3"	390' / 1.9"	790' / 3.9"	1570' / 7.8"	2360' / 11.8"	3140' / 15.7"
#10	550'	145' / 0.75"	290' / 1.4"	430' / 2.1"	860' / 4.3"	1730' / 8.6"	2590' / 12.9"	3460' / 17.3"
#11	600'	160' / 0.8"	320' / 1.6"	470' / 2.3"	940' / 4.7"	1890' / 9.4"	2830' / 14.1"	3770' / 18.8"
#12	650'	175' / 0.9"	350' / 1.7"	510' / 2.5"	1020' / 5.1"	2040' / 10.2"	3060' / 15.3"	4080' / 20.4"
#13	700'	185' / 0.9"	370' / 1.8"	550' / 2.75"	1100' / 5.5"	2200' / 11.0"	3300' / 16.5"	4400' / 22.0"
#14	750'	200' / 1.0"	390' / 1.9"	590' / 2.9"	1180' / 5.9"	2360' / 11.8"	3540' / 17.7"	4710' / 23.5"
#15	800'	210' / 1.1"	420' / 2.1"	630' / 3.1"	1260' / 6.3"	2520' / 12.6"	3780' / 18.9"	5030' / 25.1"
#16	900'	235' / 1.2"	470' / 2.3"	710' / 3.5"	1420' / 7.1"	2830' / 14.1"	4250' / 21.1"	5660' / 28.3"
#17	1000'	160' / 1.3"	520' / 2.6"	790' / 3.9"	1570' / 7.8"	1570' / 7.8"	4710' / 23.5"	6290' / 31.45"
#18	1100'	290' / 1.4"	580' / 2.9"	860' / 4.3"	1730' / 8.6"	3450' / 17.2"	5180' / 25.9"	6910' / 34.5"

The distances a ship would travel along the various turning tracks are given above, first in feet and then in inches to facilitate scale measurement when moving.

When turning a ship, consult the distance table to find the scale distance it would move. Some approximation may be necessary. If the vessel had already been moving for a time in a straight line before it began its turn, subtract the scale distance already travelled from the maximum distance the ship will move at its present speed. The result is the distance it could move through the turn. If the vessel is moving out of a turn to resume a straight course, it may travel a distance equal to that remaining after the turn was completed.

TURNING MODES

There are four methods of turning a vessel. The agility of a ship is determined by its speed, overall design, and the mode of turning chosen.

Rudder: All vessels can turn by using a rudder or steering oar. The ship must be under way to turn at all. Sailing ships lose 25% of their speed in the turn if they come about more than 90°.

Raising Oars: Vessels under oars can raise oars on the side of the ship in the direction of the turn, while the oars on the opposite side continue rowing. A decrease of 5% in speed results for each 90° or part thereof turned.

Dragging Oars: Vessels under oars can drag the oars on the side in the direction of the turn, while the side opposite the turn continues rowing. A decrease in speed of 5% results for each 90° of part thereof turned.

Reversing Oars: Vessels under oars can perform this maneuver if crewed by elite rowers or better. The rowers on the side of the turn step over their oars and reverse the stroke, while the rowers opposite continue their forward stroke. Such a maneuver causes a decrease in speed of 5% for each 90° or part thereof turned.

Turns involving dragging or reversing oars at emergency or racing speeds may cause "stress" damage to the hull. (See "Stress Damage" below.)

Turning with the Rudder Alone

When a vessel is maneuvering with the rudder alone, any turn made on the track indicated by computing the turn radius on the appropriate Turn Radius Table will be made safely and without incident. Wider turns are also safe. However, great stresses are placed upon a rudder and, if sharper turns are desired, risks are incurred which may result in the rudder breaking or even the capsizing of a vessel under said. When making sharp turns, use the following table:

<u>Reduction of Turning Radius</u>	<u>% Chance of Rudder Breaking</u>	<u>% Chance of Capsizing*</u>
1 track narrower	10% per 45° of turn	10% per 45° of turn
2 tracks narrower	20% per 45° of turn	20% per 45° of turn
3 tracks narrower	35% per 45° of turn	30% per 45° of turn
4 tracks narrower	50% per 45° of turn	40% per 45° of turn

*Only vessels under sail have a chance of capsizing when making a sharp turn. Risks of capsizing are decreased by 5% per track for vessels wide in beam (cumulative, so that the risk in a turn 4 tracks narrower is 40% - 4 x 5% = 20% for a wide sailing vessel like a cog). The risk of capsizing is raised 10% in good or strong winds and 20% in gales. Vessels under oars will not capsize but may ship water instead. (Roll 1 - 6 x 6-sided dice for flotation loss.)

BROKEN RUDDER

If a ship's rudder is broken by violent maneuvering or by battle damage, the vessel must stop dead in the water for 10-60 minutes while repairs are made. Of course, a ship might continue without a rudder, but it will generally be out of control and its movements unpredictable.

<u>Speed</u>	<u>Oared Vessels: % Chance of Shift</u>	<u>Sailed Vessels: % Chance of Shift</u>
0 - 2 knots	5% Shift 45° port or starboard	15% Shift 45° port or starboard
2 - 3 knots	10% Shift 45° port or starboard	25% Shift 45° port or starboard
3 - 4 knots	20% Shift 45° port or starboard	40% Shift 45° port or starboard
4 - 5 knots	35% Shift 45° port or starboard	55% Shift 45° port or starboard
5 - 6 knots	50% Shift 45° port or starboard	75% Shift 90° port or starboard
6 - 7 knots	75% Shift 45° port or starboard	90% Shift 90° port or starboard
7 - 10 knots	90% Shift 45° port or starboard	100% Shift 90° port or starboard

The direction the vessel will move is determined at the beginning of the movement phase. If a shift occurs, the vessel's course is altered accordingly and the ship is moved along the new line for the distance that would be covered at the ordered speed. In the case of a vessel under sail, the wind direction will determine the speed on a given course.

If a vessel under sail is "caught in irons" (with its bows head on into the wind), it will be driven back at 30% of the speed it would normally cover when sailing with the wind directly astern. Since most vessels are designed to point their bows into the wind when not under control, all vessels under sail or else unmasted and without power will tend to hold this attitude 75% of the time.

STRUCTURAL STRENGTH (SSTR)

The structural ratings of all vessels are given in the Data Tables immediately after the size number in the Structure entry. For example, an entry of 6/C means that the ship is at size 6 and structural strength "C".

The structural strength (SSTR) of a vessel represents the amount of damage a ship may absorb from artillery fire, ramming attacks, or maneuvering stresses before it sinks. To determine the SSTR, add the size number and the structural type factor (see Data Tables); then multiply the result by the length factor:

$$\text{SSTR} = \text{size} + \text{structural type} \times \text{length factor}$$

Size Number: As given in the Data Tables.

Structure: Given in the Data Tables. The numerical values of the structural types are as follows:

A = 10	C = 6	E = 2
B = 8	D = 4	F = 1

Length: The length factors are as follows:

10 - 30' = x1	100 - 120' = x10
31 - 50' = x3	121 - 130' = x12
51 - 75' = x5	131 - 140' = x15
76 - 100' = x7	141' + = x15 + 1 per 10' additional

Example: An Athenian Trireme IV has a size number of 5, structural type "D" (=4), and a length of 120' (=x10). Its SSTR is $5 + 4 \times 10 = 90$ points.

Construction quality bonuses will increase or decrease the SSTR of a vessel:

Elite Materials and Design	: 150% SSTR	Large Cog	: +25% SSTR
Superior Materials and Design:	125% SSTR	Great Cog	: +40% SSTR
Average Materials and Design	: 100% SSTR	Uschere	: +40% SSTR
Reserve Quality	: 90 % SSTR	Gales Tarida:	+20% SSTR
Poor Quality	: 80 % SSTR	Galeass	: +35% SSTR
Garbage	: 70 % SSTR		

STRUCTURAL DAMAGE

Whenever a vessel is rammed or struck in the hull by artillery shot or incendiaries, structural damage will result. Depending upon the amount of damage (cumulative) that the hull sustains, repairs may be made either at sea or ashore on a beach or in port.

<u>% Damage</u>	<u>Status of the Vessel and Possible Repairs</u>
01 - 10%	Limited damage which may be repaired at sea. Each crewman detailed to repair work may restore 1 SSTR point per hour.*

<u>% Damage</u>	<u>Status of the Vessel and Possible Repairs (cont.)</u>
11 - 30%	Moderate damage which may be repaired at sea. Each crewman detailed to repair work may restore 1 SSTR point every two hours.*
31 - 50%	Extensive damage which may be repaired at sea, provided the ship "heaves to". Repairs are done at the rate of 1 SSTR point every 3 hours per crewman assigned.*
51 - 99%	Massive damage which requires work on the beach or in the shipyards.

*Crewmen repairing the ship must be seamen. Others work at 1/3 the speed of seamen.

If structural damage occurs as a result of being struck by a submerged prow or by 24-pdr or 36-pdr shot, there is a likelihood that flotation will be lost because the vessel will ship water through the holes. For each 5% damage done to the hull, roll a 6-sided die. This represents the amount of flotation lost the moment the hole is made. Each hour thereafter, roll the appropriate number of dice again for total damage. The number of points of flotation lost may be counteracted by detailing 3 men to bailing or manning the pumps, with each 3 men reducing flotation loss by 1 point per hour. Flotation points are equal to the SSTR of the vessel.

STRESS DAMAGE

Few oared vessels were constructed stoutly enough to be immune to structural damage when performing violent maneuvers at high speeds. The light hulls of such vessels precluded any chance of building strong frames.

All vessels are rated at structural strengths ranging from "A" to "F". Type "A" and "B" vessels are structurally sound and do not suffer stress damage. All others may sustain damage from the stresses of turning at emergency or racing speeds while dragging or reversing oars:

"C" type vessels:	roll 1 x 6-sided die = structural damage
"D" type vessels:	roll 2 x 6-sided dice = structural damage
"E" type vessels:	roll 3 x 6-sided dice = structural damage
"F" type vessels:	roll 4 x 6-sided dice = structural damage

RUNNING AGROUND

There is always a chance that a vessel will run aground when sailing in closed waters. If it happens that a ship does run aground, it will suffer damage to the hull.

If the ground is sandy, roll 2 x 6-sided dice for structural damage. Vessels under sail will have the masts torn out if proceeding at more than 5 knots.

If the ground is rocky, treat the damage as if the vessel had been rammed in a bow attack by another ship of the same size with an armoured prow. Minimum damage is always 3 x 6-sided dice.

SAILING & ROWING CREWS

Wargames should simulate the performance of men. Both sides in any given battle in naval history used vessels that were basically similar. It was the difference in crew performances which ultimately decided the battles.

Crews are divided into "sailing crews" and "rowing crews". Except for the Vikings and the Heroic Greeks, few nations developed ship's crews who were expert at both seamanship and rowing at the same time. Each of these groups is divided into seven classes to mark their training, conditioning, and efficiency:

Raw Crews: Landsmen who have been at sea for less than 3 months.

Green Crews: Sailors or rowers who have been at sea for 3 to 6 months. They know the rudiments of their shipboard tasks and are progressing to the finer points.

Reservists: Sailors or rowers who have had about a year's training and sea-duty. These militia crews are called up in wartime to increase the size of the fleet.

Regular Crews: Sailors or rowers who have served with the fleet for more than 6 months and who have mastered the basics in seamanship or working. There are always veterans in such crews who steady and teach the rest. This class is the typical crew found aboard most warships and merchantmen.

Elite Crews: Hand-picked regulars who exhibit superior training and skill.

Veteran Crews: Regulars "seasoned" by several years of service and who have been in a war or a number of naval engagements. Crack merchantmen also carry such crews.

Veteran Elite Crews: The best of the naval forces, these crews are superbly trained, motivated, and conditioned. Most have had extensive naval service. Squadron and fleet flagships will tend to have such crews at all times.

Naval crews will run the full range of classification from raw to veteran-elite seamen and rowers. Merchant ships have raw, green or regular crews. A first-class merchantman always ships veteran or elite crews.

Slaves may be employed as rowers, but few attain a status above regulars.

SAILING CREWS

The sailing crews are those mariners charged with working the ship itself; making and taking in sail, navigation, anchoring, beaching, etc. The following table presents a summary of their skills and abilities in any given class:

<u>Crew Class</u>	<u>Making Sail</u>	<u>Sail Handling</u>	<u>Speed Modifier</u>	<u>Turning Modifier</u>
Raw	25 min.	35% error	-20%	+3
Green	20 min.	25% error	-10%	+2
Reservist	10 min.	20% error	-	+1
Regular	10 min.	15% error	-	-
Elite	10 min.	10% error	+10%	-
Veteran	5 min.	7% error	+20%	-1
Veteran Elite	5 min.	5% error	+30%	-1

Making Sail: The time a crew requires to raise anchor and set sail, to ship or unship the mast (in galleys and Viking ships), or to change sails (winds require different sail than breezes).

Sail Handling: The skill with which the sailors man the braces and shift sail when coming about or sailing in high winds. There is a chance of error. A check is made each time a change in course is ordered or once per hour when a ship is sailing in strong winds, under maximum sailing conditions, or in gales. Roll percentage dice:

- 0 - 25 No error.
- 26 - 50 Reduce speed by 25% in the turn the error occurred.
- 51 - 85 Lines and gear are carried away. Reduce speed by 1--100% for 10 - 60 minutes while repairs are made. If turning, a vessel under sail has a chance of capsizing. (See "Turning with the Rudder", above).
- 86+ Dismasted! The ship is crippled for 1 to 6 hours while repairs are made. Speed is reduced by 25% when using a jerry-rigged mast until landfall is made and proper repairs can be carried out.

Elite, Veteran, and Veteran-Elite crews subtract -10 from the dice result.

Speed Modifier: A percentage modifier indicating the bonus or penalty obtained by good and

poor crews, respectively, when under sail. A (+) bonus represents the percentage of additional speed to be added in a given wind. A (-) penalty represents the percentage of speed to be subtracted in a given wind.

Turning Modifier: Under sail or oars, superior crews are able to make narrower turns safely, without risk of stress damage to the hull, shipping water, or capsizing. The (+) bonus is the number of turning tracks which may be subtracted from the turning radius of the vessel at a given speed.

ROWING CREWS

Rowing crews exhibit a wide range of endurance and efficiency. The following table summarizes their skills and abilities:

Skill/Performance	Class of Crew:						Veteran
	Raw	Green	Reservist	Regular	Elite	Veteran	Elite
Endurance Points	15	18	20	24	27	30	35
Slow Cruise	1/hr.	1/hr.	1/hr.	1/hr.	1/hr.	1/hr.	1/hr.
Slow Cr. Limit	8 hrs.	9 hrs.	10 hrs.	11 hrs.	12 hrs.	14 hrs.	16 hrs.
Standard Cruise	1/30 min.	1/30 min.	1/30 min.	1/30 min.	1/30 min.	1/30 min.	1/30min.
Standard Cr. Limit:	5 hrs.	6 hrs.	7 hrs.	8 hrs.	8 hrs.	9 hrs.	10 hrs.
Battle Cruise	3/10 min.	2/10 min.	2/10 min.	1/10 min.	1/10 min.	1/10 min.	1/10min.
Battle Cr. Limit	1 hr.	2 hrs.	3 hrs.	3 hrs.	3 hrs.	4 hrs.	4.5 hrs.
Emergency/Ramming	5/5 min.	4/5 min.	3/5 min.	3/5 min.	3/5 min.	3/5 min.	3/5 min.
Emergency Limit	10 min.	10 min.	15 min.	15 min.	15 min.	20 min.	20 min.
Racing Speed	7/5 min.	6/5 min.	5/5 min.	5/5 min.	5/5 min.	5/5 min.	5/5 min.
Racing Limit	5 min.	5 min.	10 min.	10 min.	10 min.	10 min.	15 min.
Speed Modifier	--	--	--	--	--	+10%	+15%

Endurance Points: There is a limit to men's stamina. Rowing is strenuous work, and each crew has been assigned a standard level of endurance, represented by "endurance points". Endurance points are expended as the crew rows the vessel, resulting in "fatigue".

Slow Cruise: All crew classes expend 1 endurance point for every hour of rowing at slow cruise speeds. One endurance point is deducted at the end of each game hour.

Slow Cruise Limit: The maximum number of hours that a crew can spend at the oars per day if slow cruise speeds are not exceeded for more than 3 hours. If the limit is exceeded, check for "excessive fatigue" on the Fatigue Tables every hour spent at slow cruising.

Standard Cruise: The number of endurance points expended per 30 minutes of rowing at standard cruise speeds. Even if only a brief increase from slow to standard cruise occurs before dropping the speed, at the end of the 30-minute game period in which the vessel had travelled at standard cruise, there is a 20% chance per 5 minutes spent at standard speeds that endurance points are expended, in addition to the fatigue that is experienced for slow cruising.

Standard Cruise Limit: The maximum number of hours that a crew can spend at the oars per day if standard cruise speeds are not exceeded for more than 2 hours. If the limit is exceeded, check for excessive fatigue on the Fatigue Tables every 30 minutes spent at standard cruising.

Battle Cruise: When increasing to battle speeds, crews expend endurance points every 10 minutes. As in the case of standard cruising, only a brief increase from slow or standard cruise to battle speed brings a 60% chance per 5 minutes spent at battle cruise that endurance points will be expended in addition to the fatigue experienced for slow or standard cruising. Once 10 minutes are spent at battle speed, endurance points are always expended.

Battle Cruise Limit: The maximum number of hours that a crew can spend at the oars per day if battle cruise speeds are not exceeded for more than 1 hour. If the limit has been exceeded, check for excessive fatigue on the Fatigue Table every 10 minutes spent at battle cruising.

Emergency/Ramming Speed: The moment speed increases to emergency or ramming levels, the printed number of endurance points are expended in addition to those spent at battle cruising

speed. To proceed to emergency speed, a vessel must already be at battle cruise. If at slower speeds, the vessel may accelerate quickly, at a further expenditure of 1 endurance point per speed level, to reach emergency/ramming speed.

Emergency/Ramming Speed Limit: The maximum number of minutes that a crew can row steadily at emergency speeds before checking on the Fatigue Table every 5 additional minutes spent at such speeds. Once a crew exceeds its limit, it will continue to fatigue at whatever speed it subsequently drops to except slow speed.

Racing Speed: When a crew goes "all out" to attain its maximum possible speed, the printed number of endurance points are expended in addition to those spent at battle cruising speed. To proceed to racing speeds, a vessel will expend 1 endurance point per speed level accelerated. For example, a vessel cruising at standard speeds will have to increase speed through 3 levels (battle, emergency, racing), and the crew expends 3 endurance points extra.

Racing Speed Limit: Because racing speeds represent a maximum effort on the part of the crew, there is a 25% chance that any crew that rows to its limit will become excessively fatigued. If a crew rows over its limit, there is a 25% chance that it will become totally exhausted after every 5 minute period spent over the limit. Total exhaustion results in a loss of all endurance points remaining.

Speed Modifier: The quality of the crew will determine the speed at which it can row the vessel. Superior Veteran and Veteran Elite crews add a bonus to the speed of the ship so long as their endurance point level remains above 10.

Fatigue and Excessive Fatigue

As noted above, "fatigue" is represented by the loss of endurance points.

1. When a crew falls below 10 endurance points, the speed of a vessel under oars will be reduced by -10% for each point below 10. For example, 7 endurance points = 70% of typical speed.
2. Once the limit of fatigue is exceeded at any given speed level, a fatigue check must be made:
 - Slow Cruise : Check every hour
 - Standard Cruise: Check every 30 minutes
 - Battle Cruise : Check every 10 minutes
 - Emergency Speed: Check every 4 minutes. If speed is dropped, check at time interval appropriate for that speed.
 - Racing Speed : Check every 5 minutes. There is a 25% chance of total exhaustion every 5 minutes as well. If speed is dropped, check at time intervals appropriate for that speed, and there will be no more checks for total exhaustion.
3. Once the limit of a crew is exceeded at any speed, continued exertion increases the chance of additional fatigue. Indeed, the probability of experiencing fatigue is progressive and worsens as the time is extended beyond the crew's limits until no further activity is possible. This means that the ship stops!

As soon as a crew exceeds its limits, use the following tables to determine the number of additional endurance points lost. Each time a check is made, proceed to the next table. For example, 1st check = Table 1, 2nd check = Table 2, etc.

Roll a 6-sided die:

EXCESSIVE FATIGUE TABLES

		Fatigue Table 1					
		Die Result:					
Crew Class		1	2	3	4	5	6
Raw		-	1	1	1	1	2
Green		-	-	-	1	1	1
Reservist		-	-	-	-	1	1
Regular		-	-	-	-	-	1
Elite		-	-	-	-	-	1
Veteran		-	-	-	-	-	1
Vet. Elite		-	-	-	-	-	1

		Fatigue Table 2					
		Die Result:					
Crew Class		1	2	3	4	5	6
Raw		1	1	1	2	2	2
Green		1	1	1	2	2	2
Reservist		-	1	1	1	2	2
Regular		-	-	1	1	1	2
Elite		-	-	-	1	1	1
Veteran		-	-	-	-	1	1
Vet. Elite		-	-	-	-	-	1

		Fatigue Table 3					
		Die Result:					
Crew Class		1	2	3	4	5	6
Raw		1	2	2	2	2	3
Green		1	1	2	2	2	2
Reservist		1	1	1	2	2	2
Regular		-	1	1	1	1	2
Elite		-	-	1	1	1	2
Veteran		-	-	-	1	1	2
Vet. Elite		-	-	-	-	1	2

		Fatigue Table 4					
		Die Result:					
Crew Class		1	2	3	4	5	6
Raw		2	2	2	3	3	4
Green		1	2	2	2	3	3
Reservist		1	2	2	2	2	3
Regular		1	1	2	2	2	3
Elite		1	1	2	2	2	2
Veteran		1	1	1	2	2	2
Vet. Elite		1	1	1	1	2	2

On the 5th and all subsequent fatigue checks, all crews continue to use Fatigue Table 4.

Rowing crews may recover from fatigue by:

1. Sleeping while a vessel is under sail, at anchor, or beached. Sleeping restores 10% of the crew's endurance level per hour. Eight hours of sleep fully restores rowing crews.
2. Resting on the oars restores 5% of the crew's endurance per hour.
3. Rowing at slow cruise speeds restores veteran and veteran-elite crews by 5% per hour if they are not making excessive fatigue checks.

If a crew is checking for excessive fatigue, reduce checks by one table for each 10% of endurance points recovered. However, if a crew chances to obtain a negative endurance level as a result of excessive fatigue, it becomes totally exhausted for 1-3 hours, after which it will begin recovering endurance points.

After 18 hours of rowing, crews will fatigue at 5 endurance points every 30 minutes at cruising speeds, and higher speeds are not possible. No rest short of sleeping for 8 hours will restore a crew in such condition.

NAVAL TACTICS

It is the strategic role of the fleet to protect commerce, to escort convoys of supplies and reinforcements, and to disrupt enemy commercial and military activity on the sea. The ultimate tactical objectives are men and material.

On land, the attack is always made upon the lives of the enemy. Sooner or later, an army must fight. Marching and countermarching merely delays the contest of strength until one side gains an advantage of position. Fortifications augment the fighting strength of the defender but again only delay the inevitable. Once breached, the walls no longer bar the encounter of man against man in mortal combat. The alternative to fighting in land actions is always capitulation.

On the seas, warfare is waged in a hostile environment. The sea waits to drown the defeated.

Commanders must therefore make the tactical choice of attacking the enemy crews directly or destroying the vessels which support them and letting the sea complete the slaughter. Tactics chosen are dependent upon the vessels, crews, and armaments available to both sides.

Fighting complements reflect the naval tactics characterizing a given nation. Ships with large numbers of heavily armored and well armed troops suggest a tendency to board and storm the enemy. On the other hand, vessels with limited numbers of troops or lightly armed troops will avoid close combat unless a clear superiority exists. These are the lessons taught by the Romans in the Punic Wars.

Light missile weapons such as slings, bows, crossbows, javelins, throwing axes, and muskets were used to thin enemy decks and decimate rowing crews. Vessels with large numbers of missile troops will tend to stand off and fire volleys into their enemies. Only when sufficient numbers of heavily armed troops are also aboard will they seek to board their adversaries early in a battle.

Artillery is used to attack both the ships and crews. Mechanical artillery was usually capable of throwing stones, spears, and incendiaries. Cannon fired stone shot, iron shot, or grape shot. Solid shot and incendiaries threaten both ship and crew; spears and grape shot imperil only men. The choice of "loads" is vital to effective fire. Furthermore, only larger vessels or structurally strong vessels may mount artillery of any size.

Ramming was employed to cripple or sink enemy vessels. The ram could be submerged or placed above the waterline. As most ships had planking rarely more than 2 1/2" thick, a ramming attack could be quite effective even at moderate speeds. Galleys of the later mediaeval period and invariably all galleys during the Renaissance employed a spar placed above the waterline. The spar broke up the telaro of enemy galleys and caused serious casualties amongst the rowers. Significant damage could also be done to the hulls of rammed vessels.

The Greeks developed the tactics of ramming into a science, and these remained in use throughout the period that the ram was carried aboard oared warships:

1. The beak to beak ramming attack was uncommon because it was suicidal to attempt a head-long charge with the ram unless one had a significantly larger and stronger ship. Once committed to such an attack, the slightest error or change in course made all the difference between inflicting or receiving a fatal blow. Gung-ho wargamers will have to accept the fact that, while they are willing to throw ships away, the men on the decks of those ships will have to find the courage to contemplate such tactics seriously.
2. The diekplous or "charge through" developed from the universal tendency to have squadrons and fleets drawn up in line abreast, either in straight ranks or in a crescent formation. The diekplous involved charging the enemy line. The aim was two-fold. First, a sheering maneuver could be attempted by passing close inboard and trailing or depressing one's oars within the line of the reinforced cathead. If the enemy was slow in trailing or taking in his oars, the passing vessel would snap them off. Alternately, a wider pass would be made to permit missile troops to rake the enemy's decks.
3. Grappling was fairly uncommon in the period prior to 450 B.C., although boarding actions were initiated when vessels rammed each other or a mobile attacker could catch a cripple. Grappling hooks and lines were in use after 450 B.C., but not until the Romans came on the scene did they find extensive use. The Romans also employed the Corvus or boarding ramp with devastating effect. Mediaeval and Renaissance naval warfare were passionately devoted to the tactic of grappling.
4. The anastrophe or "turnabout" was initiated if a sheering or firing pass (diekplous) was successful. The attacking captain made a fast 180° turn in order to ram before the enemy could complete his own turnabout. Such tactics require speedy, highly maneuverable vessels and a rowing crew capable of reversing oars smartly.
5. The periplous or "envelopment" required superiority in numbers or else great superiority in speed and maneuverability. The tactic involved overlapping the flank of the enemy fleet or squadron, with the flanking vessels charging abreast of the enemy and then turning in to

make broadside attacks against the outer vessels in the line. If they were able, outnumbered fleets anchored their flanks by taking position in straits or narrows, as the Greeks did at Salamis.

SQUADRON AND FLEET TACTICS:

Squadrons and fleets operated in distinct units and sub-units, under close discipline. Individual action was frowned upon if "taking the initiative" broke the integrity of the formation. Only the most barbaric of fleets and squadrons were handled in a manner that permitted each captain to do what he wanted. Thus orders will tend to apply to all vessels in a unit, with perhaps only slight variations for some given special assignments.

1. Line Astern formations were used when ships were "proceeding in company". When several squadrons were present, a number of columns of ships would be formed, with sufficient sea room between columns to permit rapid forming into line abreast.
2. Scouting Line formations saw the light vessels and any larger warships detailed for scouting in a wide line abreast, each vessel in sight of at least one other to permit signalling. Several of the fastest vessels in the fleet would be detailed as dispatch boats to carry work back to the main force following behind.
3. Battle Line would be formed when the enemy was in view. The fleets on both sides would position their vessels in line abreast, with 25 to 100 yards between ships. Often, oared vessels would stop completely to carefully dress lines and rest crews before proceeding into battle. Slower, older, or second-rate vessels would be placed in the second or reserve line. Merchantmen and transports would have some warships detailed to them for close escort, and the main body would take position to impose themselves between the convoy and the enemy at all times.
4. Viking Ship Islands were often employed when the Northern peoples fought each other, but not when they fought their enemies to the south. Large numbers of ships would be lashed together, broadsides to broadsides, creating a floating island under sail. The fastest vessels in each fleet would be left independent of the "islands" and remained on the flanks to dart in and exploit enemy weaknesses. Then the islandlike formations would come together and a grand melee would begin.
5. Tactics under Sail were similar to those performed under oars, but they were subject to the winds. Sailing vessels attempted boarding actions when they carried large fighting crews. Otherwise, they indulged in extensive archery and artillery fire. Ramming was rarely used, except in an attempt to sheer the oars of an oared enemy or to overrun small, fragile opponents.

TOURNAMENT BATTLES

For those players who desire to fight isolated naval actions on a tournament game basis, the following point values should be used. Depending upon the size of action desired, the players should set the total points to be allocated to each opponent. Point costs reflect costs of building such shipping.

<u>Type of Vessel</u>	<u>Points</u>	<u>Type of Vessel</u>	<u>Points</u>
1. Egyptian Punt Ship	6	26. Trajan's Coast Gd. Ship	10
2. Egyptian War Galley	15	27. Galea or Moneres	15
3. Phoenician Bireme	15	28. Ousiakos	30
4. Sm. Phoenician Merchantman	4	29. Pamphylos	45
5. Lge. Phoenician Merchantman	10	30. War Dromon	90
6. Early Pentekonter	11	31. Galea Sotilla	70
6. Ram-bow Pentekonter	13	32. Galea Tarida	150
7. Med. Dispatch Boat	13	33. Sagitta	14
8. Hecatonter	25	34. Vacchette	4
9. Early Greek Bireme	15	35. Galee di Mercanzia	150

10. Early Greek Trireme I	18	36. "Ordinary" Galley	80
11. Greek Trireme II	20	37. Galleass	300
12. Greek Trireme III	25	38. Usciore or Nef	300
13. Greek Trireme IV	35	39. Mediaeval Med. Merchant	40
14. Greek Trireme V	45	40. Venetian Carrack	200
15. Syracusan Pentere	50	41. Viking Warboat	12
16. Successor Pentere	100	42. Viking Longship	18
17. Successor Octere	150	43. Viking "Serpent" Type	75
18. Successor 16-er	300	44. Sm. Nordic Merchant	4
19. Sm. Med. Merchantman	8	45. Lge. Nordic Merchant	11
20. Lge. Med. Merchantman	50	46. Small Cog (pre-1250)	15
21. Carthaginian Bireme	25	46. Small Cog (post-1250)	20
22. Carthaginian Pentere	28	47. Large Cog	80
23. Roman Bireme	30	48. Great Cog	125
24. Roman Quinquereme	25	49. Caravel	20
25. Augustan Bireme	50	50. Carrack	200

Type of Armament/Fitting	Points	Type of Armament/Fitting	Points
Scorpion	1	36-pdr cannon	15
Ballista	2	24-pdr cannon	10
Catapult	3	9-pdr cannon	5
Mangronel	3	6-pdr cannon	3
Greek Fire Projector	25	4 1/2-pdr cannon	2
Corvus	1	2-pdr cannon	1
Barbotte	15	3' x 4' x 3" Mantlets	1/20' of ship
		Stone Shot (24-pdr or 36-pdr)	1
		Key of Powder	1

Construction Quality

Elite materials and design:
 Superior materials and design:
 Average materials and design:
 Reserve quality:
 Poor quality:
 Garbage:

Cost Modifier

150% of cost; ship is 10% faster.
 125% of cost; ship is 5% faster.
 cost value; speed as given in Data Tables.
 90% of cost; ship is 5% slower.
 80% of cost; ship is 10% slower.
 70% of cost; ship is 20% slower.

Crew Class	Per 100 Rowers	Per 100 Sailors	Per 100 Fighters
Raw	1	1	1
Green	2	2	2
Reservist	3	3	4
Regular	4	4	5
Elite	6	6	6
Veteran	8	8	8
Veteran Elite	10	10	10

Shield : +1 point per 100 men
 Medium Armour : +2 points per 100 men (leather cuirass, brigantine)
 Heavy Armour : +3 points per 100 men (bronze or banded cuirass, chain shirt)
 Full Armour : +9 points per 100 men (scale or chain hauberk)
 Plate Armour : +18 points per 100 men (combination chain and plate or full plate)

Slingers : +3 points per 100 men
 Archers : +3 points per 100 men
 Longbowmen : +4 points per 100 men
 Light Crossbowmen: +4 points per 100 men
 Heavy Crossbowmen: +5 points per 100 men
 Musketmen : +5 points per 100 men
 Artillerists : +6 points per 100 men
 Officers : +10 points per 100 men
 Heroes : +10 per man

Though these point allotments allow for all ships over a 3000 year period, gamers should not pit

fleets from one era against ships of a far later period.

HISTORICAL AND HYPOTHETICAL NAVAL CAMPAIGNS

The sweep of naval history is too vast to permit a comprehensive summary of most of the important naval battles and campaigns that occurred between 1200 B.C. and A.D. 1571, but a number of battle scenarios are provided below. As wargamers are an innovative lot, there is provision for designing whatever naval campaign they may choose.

The "Battle Scenarios" present several "set-piece" naval actions drawn from the full range of naval history up to 1571. Players are allotted a definite number of tournament points with which to "purchase" their ships and crews. In some instances, precise fleet or squadron compositions are given.

The "Campaign Points Table" is a review of the estimated naval strengths of the major sea powers of classical times up to the beginning of the Roman Civil Wars at the end of the 1st century BC. By using the tournament point system, players can build their fleets according to whatever appreciation they have of the naval situation and the needs of their nations. The result will not be too different from actual fact. Ships of all types indicated as being characteristic of a particular nation should be built, and players are not barred from constructing vessels that are obsolete in a given historical period. Vessels of contemporary powers which are not characteristic of a nation's own fleets may be built on an "experimental" basis at 125% of usual costs. Players are also encouraged to do some research to discover the frame of mind of the naval commanders of the time and the naval policies of the nations they rule. Successor nations, for example, had an almost fatal preoccupation with large vessels, and this should be reflected in the fleet structure. If one is playing a comprehensive campaign, with land actions using ancient rules such as Lagion (Fantasy Games Unlimited, 1976), transport and merchant vessels will be needed. Assume twice the number of campaign points allotted to warship building and replacement are used in commercial and naval transport construction. Finally, annual replacement points reflect the ability of a nation to recover from losses at sea. These are cumulative at a rate of 10% per campaign year of the unused total at the end of any year. They cannot be used to expand fleets beyond given limits, however, as the number of men to man the ships and the money to build them was limited.

The "Chivalry & Sorcery Naval Campaign" is provided as a much-needed supplement to the land campaigns based upon Chivalry & Sorcery (Fantasy Games Unlimited, 1977). It is designed primarily for medieval and Hyborean Age style campaigns, and the full range of Chivalry & Sorcery economic, political, and man-to-man combat rules may be used. Scale deck plans of a number of the ship types have been provided, suitable for re-oxing if more than one deck plan of any type is required. The deck plans can be used to simulate detailed man-to-man boarding actions, using 25mm miniatures. When large battles are in the offing it is suggested that the faster "Melee Rules" provided in this volume should be used instead of Chivalry & Sorcery individual combat systems, as the time element is important.

Players will note that campaigns are not provided for the period of history following the start of the Christian Era. The plain facts are that historical records are often vague, non-existent, or so outrageously inaccurate with regard to numbers (medieval chroniclers are notorious for their inability to comprehend large numbers) that any attempt to give an authoritative strength level to a nation is subject to violent rebuttal. Players who desire to recreate a medieval campaign are advised to use the Chivalry & Sorcery system of designing nations, along with a few good texts that estimate populations of key cities, etc., in order to establish a reasonably balanced assessment of the military and naval capacities of the various medieval seapowers.

HISTORICAL CAMPAIGNS

The following lists contain the capabilities of nations involved in major naval campaigns to make war at sea. Crews and ships should correspond to the types encountered historically. "Build Points" and "Yearly Replacement Points" are allocated to each nation to construct and crew warships, and to make up losses. About 10% of unused replacement points may be carried over to the next year, but fleets cannot be significantly increased in size because the build points represent effective maximums in maintaining fleets. Merchant fleets can be constructed

as well by using twice the build and replacement points for non-combatant ships.

<u>Historical Period and Campaign</u>	<u>Nationality</u>	<u>Build Points</u>	<u>Yearly Point Replacements</u>	<u>Characteristic Type of Ships</u>
1200-600 B.C. The Early Period and Heroic Age	Egypt	1750	100	#1,2
	Phoenicia	3500	250	#3,4,5
	Cyprus	1750	120	#4,5, then #6,8
	Greeks	2000	150	#6,8
600-450 B.C. Dawn of Seapower to the Persian Wars The first group of vessels is the Persian Navy, although a distinction may be drawn if portraying the period prior to Persian domination of Asia Minor. The second group is the Greek Navy, or rather the combined forces of the separate Greek city states.	Phoenicia	5000	450	#6,9,4,5,19
	Cilicia	1900	150	#6,9,19
	Lycia	900	70	#6,9,19
	Cyprus	2800	250	#6,9,19
	Caria	1300	100	#6,9,19
	Ionia	2250	200	#6,9,19
	Hellespont	2250	225	#6,9,19
	Doris	550	40	#6,9,19
	Aeolia	1500	150	#6,9,19
	Pamphylia	1000	100	#6,9,19
	Aegean Is.	650	50	#6,9,19
	Egypt	3000	275	#6,9,19
	450-400 B.C. The Rise of the Greeks: The Peloponnesian War The first group of vessels is the Persian Navy, although it is rather fragmented and the Greek provinces are likely to prove disloyal in a conflict with Greeks. The second Group represents Athens and the Delian League. The Peloponnesians represent Corinth, Argos, and their principal allies. All others represent neutral naval powers who may become drawn into conflicts.	Athens	6000	450
Corinth		4700	375	#6,9,10,11,19
Argos		3500	350	#6,9,10,11,19
Greek Is.		800	75	#6,9,10,11,19
Greek States		3000	250	#6,9,10,11,19
Phoenicia		5000	450	#7,9,10,19,5
Cilicia		2000	175	#7,9,10,19
Lycia		1000	75	#7,9,10,19
Cyprus		3200	300	#7,9,10,11,19
Garia		1400	125	#7,9,10,11,19
Ionia		2400	240	#7,9,10,11,19
Hellespont		2500	250	#7,9,10,11,19
Doris		600	60	#7,9,10,11,19
Aeolia	1750	150	#7,9,10,11,19	
Pamphylia	1200	120	#7,9,10,11,19	
Egypt	6500	500	#7,9,10,11,19	
Athens	14000	1000	#7,10,11,12,13,14,15,19,20	
Delian L.	2500	200	#7,10,11,19	
Peloponnesians	9500	900	#7,9,10,11,19	
Greek States	5000	450	#7,9,10,11,19	
Rhodes	2000	200	#7,9,10,11,19	
Syracuse	4500	400	#7,9,10,11,15,19,22	
Garthage	5000	500	#5,7,11,19,21,22	
335-322 B.C. The Conquests of Alexander	Macedon	3000	250	#7,10,11,12,19
	Others	All other powers are at 75% of 450-400 B.C. strengths.		As in 450-400 B.C.
322-250 B.C. The Wars of the Successors	Macedon	9000	650	All Successors and the territories they control build #7,12,13,14,15,16,17,18,19,20,22 types of vessels, as do such deapowers as Cyprus and Rhodes.
	League of Corinth	10000	900	
	Asia Minor	As for 450-400 B.C.		
	Cyprus	3000	300	
	Rhodes	4000	350	
	Egypt	13500	1100	
	Carthage	9000	750	
	Syracuse	4000	400	
Until 259 B.C.	Rome	1500	100	#7,19,24
	S. Italy	4000	600	#7,12,13,19,20
				Successor Types

<u>Historical Period and Campaign</u>	<u>Nationality</u>	<u>Build Points</u>	<u>Yearly Point Replacements</u>	<u>Characteristic Type of Ships</u>
259-250 B.C. The First Punic War	Rome	10000	1000	#7,12,13,10,20 21,24
	Carthage	9000	750	#7,12,13,19,20, 21,22
Romans must place crack troops on their vessels. Crews are regulars at best for rowing and sailing.				
250-201 B.C. Aftermath of the first Punic War and the Second Punic War	Rome	12000	1000	#7,19,20,23,24
	Carthage	7500	550	#7,12,13,19,20,21, 22
	Others	50% of 322-250 B.C. except for Cyprus and Rhodes		Successor Types
201-190 B.C.	Rome	12000	1200	As for 250-201 B.C.
	Pergamum	4000	400	Successor Types
	Selucids	8500	750	Successor Types
	Others	40% of 322-250 B.C. except for Cyprus and Rhodes		Successor Types
190-88 B.C. The Pax Romana	With the Roman defeat of Antiochus in 190 B.C., there was relative quiet in the naval sphere until Mithradates of Pontus went to war with the Republic in 88 B.C. The Roman fleet declined to 50% of its former strength, Rome now depending upon its clients like Pergamum, Rhodes, and Cyprus to maintain the sea lanes and keep them free from pirates.			
88-67 B.C. The War with Pontus	Rome	7000	900	#7,19,20,23,24,26
	Pergamum	3500	300	#7,12,13,15,18,20
	Rhodes	3500	300	#7,12,13,15,19,20
	Cyprus	3500	300	#7,12,13,15,19,20
	Pontus	13500	550	#7,12,13,15,16,19,20
67 B.C. Pompey's War against the Mediterranean Pirates	Rome	7000	500	#7,12,13,19,20,23, 24,26
	Pirates	4500	250	#6,7,10,11

FIGHTING CREWS

As a general rule, the fighting contingents aboard ships of war and commerce alike tended to correspond to the troops of the nation's land armies. Indeed, most naval troops were nothing more than units of the land forces transferred to sea duty. Only a few nations such as Rome and the merchant city-states of Italy developed "marines" who were specially trained for combat aboard ships. In all cases, sea troops were expected to function as effective landing parties, even forming armies of invasion or relief where necessary.

1. Ancient Fighting Crews

The fighting crews aboard the vessels of classical times tended to range from light to heavy infantry. The chief characteristics of each national force are given below:

<u>Historical Time</u>	<u>Nationality</u>	<u>Typical Ship's Crew</u>
1200-600 B.C.	Egypt	40% Light Infantry armed with short bows; 60% Medium Infantry armed with spears, daggers or axes, and shields. Officers armed as Medium Infantry. Seamen were light Infantry, few with bows. Rowers fought.
1200-600 B.C.	Phoenicia Cyprus	All Medium Infantry armed with daggers or axes. 25% were archers with short bows, the remainder being spearmen, with 25% javelins. Officers were armed like spearmen. Seamen were Light Infantry with few bows. Rowers fought.

<u>Historical Time</u>	<u>Nationality</u>	<u>Typical Ship's Crew</u>
600-450 B.C.	Phoenicia Cilicia Cyprus	Essentially, little difference occurred from Phoenician types of 1200-600 B.C., except for a 30-40% proportion of archers.
600-450 B.C.	Lycia	Oriental Heavy Infantry, with leather cuirasses, shields, swords, etc., about 30% archers and 40% javelinman. Officers were similarly armed. Seamen were Light Infantry with few bows but a good number of spears and javelins.
600-150 B.C.	Athens Corinth Argos Greek States Greek Islands Caria Ionia Hellas Doris Aeolia Pamphylia Aegean Islands	Greek Armaments and Heavy Infantry. At this period, all infantry and officer types wore bronze or leather cuirasses and carried the hoplite shield. Arms were thrusting spear and swords. Perhaps 20% were bowmen, and up to 50% would have javelins. Seamen were light infantry with few bows but a good number of spears and javelins. Rowers rarely fought, but elite crews in exposed rowing positions may have worn leather body armour. (Greek sea troops prior to this period were similarly armed, with rowers acting as fighting troops--there being no clear "division of labour" in crews of the Heroic Age.) In the later period, up to 40% would be archers and slingers.
450-322 B.C.	Egypt	40% Light or Medium Infantry armed with bows; 60% Heavy Infantry in leather cuirasses and armed with spears, axes, swords, and shields. Officers armed as Heavy Infantry. Seamen were Light Infantry, armed with swords, spears, and javelins.
450-33 B.C.	Rhodes	Greek Armaments and Heavy Infantry.
450-200 B.C.	Syracuse	Greek Armaments and Heavy Infantry.
450-333 B.C.	Phoenicia	Similar armaments to Egypt, 450-322 B.C.
450-201 B.C.	Carthage	Similar armaments to Egypt, 450-322 B.C.
450-150 B.C.	Cyprus	Greek Armaments and Heavy Infantry.
375-322 B.C.	Macedon	Greek Armaments and Heavy Infantry.
322-150 B.C.	Successors	Greek Armaments and Heavy Infantry. Some vessels would still carry Oriental infantry types like those of Egypt, 450-322 B.C., but these would be in a minority.
322-301 B.C.	Rome	Roman Armaments: Heavy Infantry armed with Roman pila,* short sword, legionary shield, and hardened leather or banded cuirass. Officers would have superior armour, some in chain body armour or high quality rigid cuirasses. About 20% would be slingers or archers. Seamen are Light Infantry.
201 B.C.-200 A.D.	Rome	Essentially the same as above, only regular vessels of the fleet tend to carry trained marines. Archery was increased up to 50% of the troops. Small vessels carried fighting rowers.
200-1200 A.D.	Rome, then Byzantium	Little difference from Roman troops of the previous period, although fighting complements might be augmented by heavily armed Cataphracts (full scale or chain armour) in transit.
700-1571 A.D.	European States	European fighting crews tended to be identical to those of land armies, with fighters ranging from Light Infantry to Chivalry. Archery tended to be stressed (up to 50% of the crews were bowmen, crossbowmen, or slingers). Rowers were fighting men in most instances until after 1400, when a growing number were slaves, captives, or criminals. As soon as muskets and cannon became common, they were placed aboard galleys. Seamen tended to be Light Infantry, but crews of elite vessels may have worn brigantines in battle. They were armed with a huge variety of weapons.
7-0-1571 A.D.	Islamic States	Islamic fighting crews tended to range from Light to Heavy Infantry, with the majority being lightly armoured. As in European vessels, most carried complements of up to 50% archers. Rowers were captives, slaves, and criminals.

<u>Historical Time</u>	<u>Nationality</u>	<u>Typical Ship's Crew</u>
400-1200 A.D.	Vikings	Viking fighting crews were rowers, seamen, and soldiers. In most instances they had a variety of armour ranging from none at all to full hauberks (huscarl troops), large round shields, and an excellent balance of archery and throwing weapons (usually 33% bows, 33% javelins, 33% axes).
1200 B.C.-1571 A.D.	Pirates	Pirates tended to be just about anyone who found a merchant vessel alone and unprotected. Thus arms and armaments would range from those of Light Infantry to very heavily protected troops, depending upon the historical period, the national origin, and the particular social class of the crew.

THE FLEET BATTLE

ORDERS

General orders must be written prior to the start of each 5-minute battle turn. Orders should be brief and clear, and should include course, speed, and tactical maneuvers contemplated during the battle turn.

Abasence of orders or unclear orders results in a vessel following its orders for the previous battle turn.

Orders may be modified during a battle turn if a reaction check is made. Once the time required to react has passed, the amended order may be executed. Such orders include reaction to emergency situations ("evade enemy ramming attack", etc.) or reaction to sudden opportunities that develop during the turn ("fire at enemy vessel", "grapple and board", etc.). Amended orders should not countermand general orders unless the vessel is commanded by officers of flag rank.

MOVEMENT

All movement is simultaneous.

Voyage Mode movement is plotted simultaneously on the campaign map and represents 4-hour turns. If fleets approach within view of each other, proceed to Battle Mode.

Battle Mode movement is simultaneous. Battle turns are divided into 1/10-turn segments when ships are in close action. General orders apply to the whole turn (all 10 segments), subject to modification after reaction checks.

Melee Mode movement and combat occur in 1/10-turn segments corresponding to Battle Mode 1/10 segments. Thus melee combat may be occurring in some ships while others are still maneuvering.

SEQUENCE OF EVENTS

Movement and combat follow a definite sequence:

1. Voyage Mode is plotted. Ships entering a battle zone shift to Battle Mode once they are in sight of the enemy.
2. Battle Mode movement is taken simultaneously by all vessels according to movement orders. Missile fire is taken at any time between ships during movement, but the moment of firing must be stipulated in orders (range given) and the target must be designated. Casualties

are suffered at the moment of firing.

3. Simultaneous to ship movement, melee combat occurs:
 - a. Any vessel ramming or sheering a meeleing ship moves first and inflicts damage, with missile fire occurring at the same time (see #2 above).
 - b. Movement of troops on deck. Missile fire may be taken on boarders or defenders prior to movement.
 - c. Melee combat occurs between figures who are base to base. In large actions, this merely involves comparing attacking and defending strengths and rolling on the Combat Results Table.
4. Morale checks aboard ship and in the squadron or fleet.

RAMMING ATTACKS

The ability of a vessel to commit to a particular attack or to evade or counter it depends upon two sets of factors. First, it must be in the right position at the start of the attack run to make the desired maneuver. Second, the quality of the crew and the vessel, and the ranges and speeds involved must all be sufficient to provide the time to react and to enable the vessel to perform the maneuver.

Position

There are three basic positions from which an attack may be initiated in a sea fight. If vessels are approaching bow to bow, they will likely attempt a diekplous maneiver. If a vessel finds itself pointed bow to the broadside of the target, it is in the classic ramming position and has an excellent chance of delivering a successful attack. If a vessel is to the stern of the target and possesses sufficient speed to catch the target, it will make a damaging attack against the target's steering gear.

1. The Diekplous Maneuver: Bow to Bow Attacks

Especially since Greek times, squadrons and fleets were traditionally drawn up in line abreast, producing a formation resembling those of land forces. The diekplous or "charge through" the line involved passing between the vessels in the hostile line. Individual ships also performed the maneuver in isolated fights:

a. The Classic Diekplous: Firing Pass

The "charge through" was traditionally used to fire at enemy crews in passing, with contact between ships being avoided. No reaction check is needed if both vessels chose to make a firing pass, as they will automatically avoid contact. Use the grappling distance table to compute the closeness of passage if charging through a line.

b. The Diekplous: Sheering

When the "charge through" is converted to a sheering attack, the cathead of the attacker grazes the side of the target and snaps off oars. It can also be used for grappling and boarding actions. Reaction checks are necessary if an attacker wishes to sheer or a defender wishes to evade the attack. Evasion requires anticipating the attack in a previous battle mode segment. If both vessels order sheering, sheering occurs.

c. The Diekplous: Ramming Bow to Bow

Beak to beak ramming attacks were dangerous to attacker and defender alike. Reaction checks are necessary to order a ramming or evasive maneiver. If both vessels order the attack and can react in time, the attack always goes home. But to commit the ship to such an attack, the commander must "find the courage" (or foolhardiness) to make the attack. Roll percentage dice. There is a 15% basic chance of attacking +5% per size number the attacker is larger than the target. Vessels with "A" or "B" structural strength add an additional +10%. Veteran and veteran-elite officers add +10%. Reservist officers subtract -5%, and Raw and Green crews subtract -10%. If courage is found, press home the

attack. If courage fails, the ship is committed to a sheering attack.

Failure to make a successful ramming attack may, on the defender's option, produce a 25% chance that he evaded in the direction of the attacker and so rammed him instead.

d. The Diekplous: Conversion to Anastrophe

If the diekplous was successful and disrupted the enemy's rowing or did good execution amongst his fighters, the attacking captain could abort a straight run through the line and bring his ship about to ram the target's stern. Such a maneuver can be ordered during or after the "pass through" and takes effect subject to reaction time.

2. Periplous: The Attack to Broadside

The position most favoured by warship commanders was bow to broadside when making a ramming attack. Such attacks are especially damaging at high speeds, and there was often a chance of cutting the target in two.

When beginning a ramming attack bow to broadside, the attacker does not have to make a reaction check because he expects to make such an attack whenever he is on the flank of the enemy. The target must make a reaction check to evade, however. The attack must be made with a 45° to 90° angle from the bow to the side of the target at the start of the run. A greater angle will result in a sheering blow if a strike occurs.

If a vessel is performing a periplous or "envelopment" maneuver around the flank of the enemy line, a turn may be ordered after a reaction check. The attacker then makes his turn toward the enemy, setting up his ramming run.

3. The Stern Attack:

A fast, maneuverable vessel preferred to place itself astern of a slower or less maneuverable enemy. Once astern, it is possible to maintain position and line up for punishing blows to the steering gear of the target with little fear of the enemy's ram. Crippled victims are fine prey to stern attacks. If an attack does fail, the attacking vessel has the option of dragging oars to fall back or else continuing up the side of the target to sheer oars or grapple and board. The only chance the target has (if slower) is to hope that the attacker is too close to react successfully to a sudden turn to port or starboard.

When a vessel finds itself less than 45° from the stern of the enemy, it can attempt a stern attack. To ram the enemy, the attacker must have the speed to catch the target.

REACTION CHECKS

Men do not react instantly to a suddenly perceived opportunity or danger. Some time must pass in order to absorb what is seen, to decide on a course of action, and to act upon that decision. A superior commander and sailing crew will anticipate the actions of the enemy and react often in split seconds after the enemy changes course. Poor sailing crews, on the other hand, will fail to react quickly and let valuable seconds pass before doing anything.

Reaction checks are made when:

1. ordering or evading any diekplous maneuver;
2. ordering a turn to make a broadside ramming attack or evading such an attack;
3. ordering or evading a stern attack;
4. ordering an anastrophe from a diekplous attack;
5. ordering any maneuver not included in orders.

reaction checks provide the distance which the checking vessel will travel before the maneuver can be attempted. An attacker cannot begin his attack until the reaction distance is travelled. Evasive maneuvers cannot be applied until reaction time has passed. If there is insufficient

reaction time, no favourable bonuses can be applied but all penalties still apply when computing attack probabilities.

The following table provides the reaction distances for each class of sailing crew:

<u>Crew Class (Sailing)</u>	<u>Distance Travelled</u>	
Raw	5/10 speed	The "Battle Scale Speed Conversion Table" should be consulted to determine the distance travelled by a vessel until the crew could react to an opportunity or an emergency.
Green	4/10 speed	
Reservist	3/10 speed	
Regular	2/10 speed	
Elite	1/10 speed	
Veteran	1/10 speed	
Veteran Elite	instantly	

Example: A vessel with a green crew is moving at 5.5 knots (27.50 feet per turn). The lookout sights an enemy trireme lining up for a broadside ramming attack. The vessel would travel for $4/10 \times 2750 = 1100$ feet before the crew could begin evasive action.

Example: An Athenian trireme commander has just successfully completed a sheering run against a Peloponnesian vessel and orders an instant anastrophe to come about on the stern of the cripple. The trireme is moving at ramming speed, 7.8 knots or 3900 feet per turn. Since he has a Veteran sailing crew, the Athenian ship will begin the turn $1/10 \times 3900 = 390$ feet or 2" in scale past the target. By reversing oars on the side of the turn, the Athenian could make a very tight turn and perhaps deliver a ramming attack to the stern or broadside of the stricken Peloponnesian in the same turn because of his quick reaction time!

RAMMING ATTACK PROBABILITIES

In addition to the position of the attacker and the target, there are a number of variable factors which will affect the success or failure of a ramming run:

1. Basic Chances of a Successful Ramming:

Diekplous:	Firing Pass = 100%
	Sheering = 30%
	Ramming = 20%
Bow to Broadside Ramming=	30%
Ramming from the stern =	20%

The basic chance of ramming is the percentage chance of delivering the attack as ordered. This probability may be modified upward or downward by the variables which follow.

2. Effect of Sailing Crew: (under oar or sail)

<u>Sailing Crew Class</u>	<u>Ramming Vessel</u>	<u>Evading Vessel</u>
Raw	= -10%	+20%
Green	= - 5%	+15%
Reservist	= 0%	+ 5%
Regular	= 0%	0%
Elite	= + 5%	- 5%
Veteran	= +10%	-10%
Vet. Elite	= +15%	-15%

The quality of the sailing crew will affect chance of ramming or evading. A navigator of superior ability is able to obtain a maximum of performance and maneuverability from his vessel, whether attacking or evading an attack. Poor navigators, on the other hand, will be slower in reacting or will make unfortunate "mistakes" in the heat of battle. For bonuses to be applied, a successful reaction check is required for attacking or evading vessels.

3. Length of Target Vessel:

under 25'	= -15%
25-49'	= -10%
50-74'	= - 5%
75-110'	= 0%

When broadsideramming attacks are made, the length of the target will affect the chance of success. Long vessels take more time to pass a given point, and short vessels take less time; so the longer the

111-120'	= + 5%
121-130'	= +10%
131-150'	= +20%
151' +	= +35%

vessel, the better the chance of striking it.

4. Difference in Turning Ability:

<u>Turning Ability</u>	<u>Ramming Vessel</u>	<u>Evading Vessel</u>
Table I	= +10%	-15%
Table II	= 0%	0%
Track 1-2	= +15%	-15%
Track 3-4	= +10%	-10%
Track 5-6	= + 5%	- 5%
Track 6-7	= 0%	0%
Track 8-10	= - 5%	+ 5%
Track 11-12	= -10%	+10%
Track 13-14	= -15%	+20%
Track 15	= -20%	+30%

The turning ability of a vessel is affected by its basic design and by its speed (see "Turning Radius"). Of course, in battle a commander will do everything he can to make improvements to the maneuvering capabilities of his vessel (drag oars, reverse oars, etc.). When considering this variable, players will declare the tactic used to keep the attack line steady on the enemy or to evade the ram. Violent maneuvers are subject to "Stress Damage". As in "Effect of Sailing Crew", reaction checks are necessary for bonuses to be applied.

5. Difference in Speed:

Ramming Vessels gain +1% for every 0.1 knot of current speed they possess over the speed of the target.

Evading Vessels gain -1% for every 0.1 knot of speed they possess over the speed of the attacker unless ramming. Vessels committed to an attack with the ram use their speed to come into collision, not to evade it. Sheering vessels, however, will attempt to evade the ram, but not a sheering attack.

RAMMING SUCCESSFULLY

If a ramming attack is successful, there is a good chance that the target will suffer damage. The type of damage sustained depends upon the nature of the attack:

ATTACKS AGAINST THE HULL:

The hull of a target will be liable to damage from any attack not explicitly aimed at a "sheering" maneuver. The amount of damage depends upon the following factors:

- Roll one 6-sided die for each size number possessed by the attacking vessel. Then add or subtract the following bonuses and penalties where applicable:
- Broadside attack:
Per knot of attacker's speed: +1 damage die per 4 size numbers of attacker.
+1 pip per damage die if attacker has ram.
- Bow to bow attack:
Per knot of combined speed: +1 damage die per size number of difference between attacker and target (to larger vessel)
+1 pip per damage die.
- Stern attack:
Per 1/2 knot of superior speed possessed by the attacker: Reduce damage by 25%.
Increase damage by 5%.
- Attacker has armoured prow: +1 pip per damage die.
Attacker has spur-type ram: No bonus or penalty.
Attacker has no ram: -2 pips per damage die.

6. Target is of "A" type construction: 50% damage.
 Target is of "B" type construction: 75% damage.
 Target is of "C" type construction: Normal damage.
 Target is of "D" type construction: 110% damage.
 Target is of "E" type construction: 125% damage.
 Target is of "F" type construction: 150% damage.

If the attack itself delivers sufficient damage to sink the target outright (100% of the basic SSTR of the target), a bow to bow attack is deemed to have caused an overrun of the target, sinking it instantly if the attacker is 3 size numbers larger. Similarly, 100% damage in a broadside attack cuts the target in two, but the stricken vessel may take 5-30 minutes (per half) to sink. In both instances, the speed of the attacker is reduced 25% in the following 1/10 battle turn. Water is shipped whenever an armoured prow is used by the attacker.

LOCKING THE RAM

In any attack involving a submerged ram, there is a 3% chance per knot of the attacker's speed that the ram will become locked in the hull of the target unless the target has been completely destroyed. To free a locked ram requires backing astern, with the chance of freeing the ram depending upon the quality of the sailing crew:

Raw = 20%	Reservist = 35%	Elite = 60%
Green = 25%	Regular = 50%	Veteran = 75%
		Veteran Elite = 90%

An attempt to free the ship may be made once per reaction time interval available to the crew. If the ram is freed, the ship may back away and then proceed as ordered.

DAMAGING THE RAM

Whenever a successful strike is made with a ram or spur, there is a 10% chance that it has been damaged. If the ram becomes locked in the hull of a target, there is an additional 5% chance per attempt to free it that it will be damaged (cumulative).

VESSELS LOCKED TOGETHER

If a ship has caught its ram in the hull of a sinking target, it must check each battle turn for possible shipping of water if it is no more than 3 size numbers larger than the victim. From 1-20% of flotation may be lost per turn from shipping water. Smaller vessels will ship an additional 1-10% water as a larger victim drags them down.

ATTACKS AGAINST THE ROWING ORGANIZATION

Whenever two vessels are approaching bow to bow, or when a vessel makes a broadside or stern attack, and the attacker has been ordered to "sheer" the oars of the target, roll two 6-sided dice and use the following table upon scoring a successful strike:

<u>Attacking Crew</u>	<u>Ram Class</u>	<u>Target Crew</u>	<u>Target Vessel</u>
Raw crew -3	Armoured Prow -	Raw crew +3	No outrigger -
Green crew -2	Spur type ram +2	Green crew +2	Outrigger -1
Reserve crew -1	Ordinary bow -2	Reserve crew +1	Galeass -4
Regular crew +0		Regular crew -1	
Elite crew +1		Elite crew -2	
Veteran Crew +2		Veteran crew -4	
Vet. Elite crew +3		Vet. Elite crew -5	

In the case of vessels equipped with a talero (galley types; refer to Italian vessels), damage sustained to the talero from spur rams must be taken into account. In addition to the casualties inflicted upon the rowing crew, roll one 6-sided die and consult the sheering result table. This represents damage to the rowing frame and an additional loss in speed. The talero cannot be repaired at sea. (Use in all ramming and sheering attacks by spur-equipped vessels.)

Each 5% loss of the total rowing crew reduces the speed of the stricken vessel by 5%.

In a sheering attack, the attacker runs the risk of being sheered by the hull of the tar-

BIREME & GALLEY: Errata Sheet

Attacks Against the Rowing Organization: page 74

Insert the following table:

Roll 2 six sided dice:

Die Roll	Attack Result
0-3	No effect: opposing rowers succeed in trailing oars.
4-5	5% casualties to rowing organization: reduce speed by 5%.
6-7	10% casualties to rowing organization: reduce speed by 10%.
8-9	15% casualties to rowing organization: reduce speed by 15%.
10	20% casualties to rowing organization: reduce speed by 20%.
11	25% casualties to rowing organization: reduce speed by 25%.
12	30% casualties to rowing organization: reduce speed by 30%.
13+	35% casualties to rowing organization: reduce speed by 35%.

Roll two six sided dice as the defender. This represents the time required for one half of the casualties to be 'patched up' and come back into action as rowers. The others are considered too injured to resume their duties immediately. The dice roll represents five minute intervals for those capable of returning to duty quickly, and four hour intervals for those more seriously injured. If battle is joined, only one half the casualties can enter into melee, the rest are considered incapacitated.

get if he passes by from the bow or stern. Thus the target also conducts a sheering attack. However, the attacker is prepared to trail oars as a defensive measure and subtracts -1 to -6 from the dice roll, in addition to any other modifiers.

ATTACKS AGAINST THE RUDDER

An attacking vessel that successfully strikes the stern of an enemy may elect to try to damage the target's rudder. This precludes normal ramming damage. Roll two 6-sided dice:

Dice Roll:

- 2 - 7 Glancing blow! Attacker has the option of dropping back astern or else attempting a sheering pass along the side of the target (no bonuses to attacker, but all penalties apply).
- 8 - 9 1/2 die of damage per size number of the attacker.
- 10 - 12 50% chance of carrying away target's steering assembly +1 die of damage per size number of the attacker.

DAMAGED SHIPS

"SINKING VESSELS"

Light oared warships like the Greek triremes will not literally sink. When holes by a ramming attack, they will sink to the upper decks (turning "turtle" 25% of the time) once 100% damage has occurred or all flotation has been lost due to flooding. Such vessels can be salvaged and repaired. Vessels of heavier construction, merchant ships, and any vessels cut in two or overrun in a ramming attack will tend to sink in 5 - 30 minutes (roll a 6-sided die, with each pip representing 5 minutes afloat).

"STRIKEN VESSELS"

All vessels in collision for any reason are deemed to be "stricken". If it is the victor in an action (it has successfully carried out its attack), a vessel must continue on its last course and speed for its reaction distance, if possible. If it is the loser (rammed or sheered and damaged), a ship must continue on its last course for its reaction distance x 2, if possible. Of course, full ramming attacks that do not result in the target's being sunk result in both vessels stopping dead in the water.

All damage and penalties become effective immediately. Thus, if a ship suffers a 20% loss of speed because of a sheering attack, its speed immediately drops by 20% for the remainder of the battle turn. Furthermore, it must reduce to slow cruising speed for the duration of the turn while it reorganizes its rowers. Again, if a target sustains damage, consult the Stress Damage Result Table to determine what effect the damage has had on the ship.

If an attacking vessel cuts another in two or overruns it, it continues on at one speed level below its ramming speed for its reaction distance before returning to the speed ordered for the battle turn. Sheering collisions do not noticeably slow vessels down.

MISSED BROADSIDE ATTACKS

If a vessel fails to ram the broadside of its target, several possibilities arise:

If the target is more than 1 knot slower than the ramming vessel, the attacker passes safely astern.

If the target is less than 1 knot slower or is indeed faster than the ramming vessel, the target has a chance of outmaneuvering the attacker to become the attacker itself in a broadside ramming action. Roll two 6-sided dice and add 1 pip for Elite, Veteran, or Veteran Elite sailing crews. Subtract 1 pip for Reservist, 2 for Green, and 3 for Raw sailing crews:

<u>Dice Roll</u>	<u>Result of Defensive Maneuvering</u>
2 - 7	Attacker still passes astern. No chance of ramming.
8 - 9	20% chance of ramming.
10 - 11	30% chance of ramming.
12	40% chance of ramming.

A typical encounter might employ dragging oars at the last minute to slow the target vessel slightly so that the attacker misjudges the speed and passes in front of the target's ram. The target then sprints the last few yards and rams the attacker amidships. A miss in such circumstances always means that the target-now-attacker passes to the stern of the enemy. No modifications are made to the chance of ramming; this is a split-second maneuver that either hits or misses.

GRAPPLING

In order to grapple with the enemy and "reel him in" for a boarding action, a firing pass or a sheering attack must be ordered. If a ramming attack occurs and is successful, an attempt may be made to grapple once the reaction time has passed.

GRAPPLING WITH HOOKS AND LINES

Until the Romans adopted boarding tactics with a vengeance, the use of grappling hooks and lines was relatively limited in naval tactics. Prior to the Punic Wars, the chance of such equipment being aboard a vessel is 20%. Boarding was accomplished by leaping to the decks of an enemy when ships were locked together after ramming or by grappling with boathooks after colliding or coming from astern.

Boathooks : Flat 10% chance of grappling and holding a vessel, provided a dieklous approach of more than 5 knots combined speed is not used to sheer or make a close firing pass. There must be contact between the vessels sufficient to temporarily slow them enough to permit men to hold them together.

Hooks and Lines: There is a 10% chance per 10 men in the sailing and fighting crews of grappling a vessel. Thus 30 men would have a 30% chance of grappling. There is a -5% chance per 10 men in the other vessel's sailing and fighting crews, representing their ability to cut away the lines in time to prevent grappling. Finally, the closeness of approach improves or lessens the chance of grappling:

10 feet = +10%	If vessels collide, ram, or sheer each other, the range is considered to be 10 feet or less.
20 feet = + 5%	If vessels merely pass close aboard, roll a 1-10 die to represent the distance, with 1 = 10 feet, 2 = 20 feet, etc.
30 feet = 0%	
40 feet = - 5%	
50 feet = -10%	
60 feet = -15%	
70 feet = -20%	Vessels making a firing pass have a 1-50% chance of being within 100 feet of each other at the point of closest approach. If the chance does turn up, determine the distance.
80 feet = -25%	
90 feet = -30%	
100 feet = -35%	

Grappling with hooks and lines is not possible over 100 feet away, as the range is too great and the strain on the lines tends to have them carry away.

GRAPPLING WITH THE CORVUS

Roman vessels used the Corvus extensively to effect boarding, although the tactic was revived in later periods on individual ships (but never extensively). The Corvus may be used on any approach which carries the target within 20 feet of the Roman's bow (bow to bow ramming or sheering, passing close inboard or sheering from astern, or any broadside ramming performed by the vessel carrying the Corvus). Chance of grappling = 50% at 20 feet, 60% at 10 feet.

CONDUCTING RAMMING ATTACKS

Subject to reaction checks and the general orders written for squadrons and individual ships,

ramming attacks may be conducted at any time during the movement turn. All that a player has to do is declare at any point in the turn that his vessel is beginning a ramming run and designate the vessel under attack. Ramming is, after all, a matter of opportunity.

Movement of vessels is perhaps the most vital single consideration in all sea battles. As soon as vessels approach within striking range of one another, a turn should be divided into 1/10th segments. Vessels will thus move a limited distance even at the highest speeds and permit players to react to each other's maneuvers. Such a procedure also reduces disputes as to whether a ship could perform a particular maneuver or strike another because everyone will see the tactic develop, step by step. Vessels will also be able to maneuver under the demands of the moment, avoiding the rigid limitations of slavishly following written orders drawn up before the tactical situation has developed. Ideally, a referee should be present.

EXAMPLE: DIEKPLOUS ATTACK

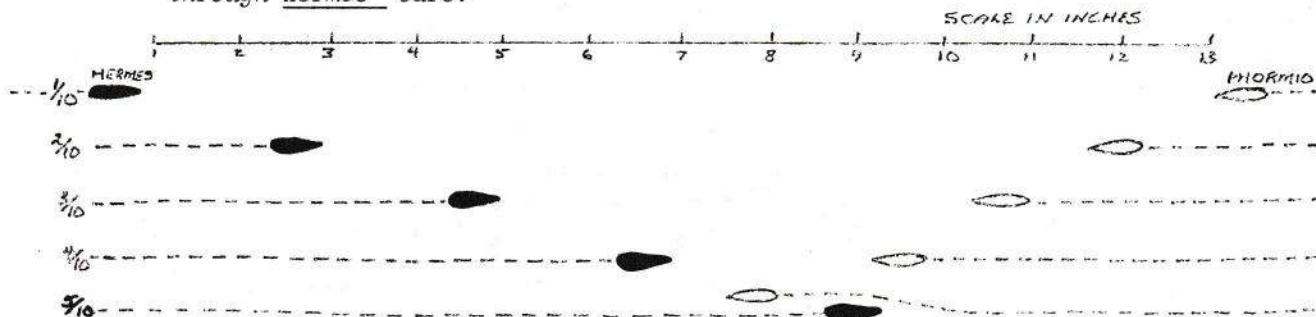
1/10 Turn: The Trireme Hermes has increased to ramming speed (7.8 knots or 10.5" per turn) or 2" per 1/10th turn. The Trireme Phormio is proceeding at 5.3 knots (13.25" per turn) or 1.3" per 1/10th turn. Both vessels are Trireme III's with Veteran crews, equal in all respects. Hermes' captain is a fire-eater and decides to ram beak to beak; 15% + 5% for Veteran sailing crew = 20% chance of finding the courage. Percentage dice are rolled, and a 15 runs up, so Hermes is committed to ramming. Meanwhile, Phormio decides to sheer Hermes' starboard side. Since the initial range is 12", reaction checks are more than sufficient to permit either maneuver.

2/10 Turn: Both vessels proceed as ordered.

3/10 Turn: Both vessels proceed as ordered.

4/10 Turn: Both vessels proceed as ordered.

5/10 Turn: Both vessels will be within attacking distance this 1/10th turn. Hermes will have the first attack because its ram will reach Phormio before Phormio's cathead will have a chance to tear through Hermes' rowing banks. Since all other variables cancel out (the vessels are equal), Hermes has an advantage of +23% for 2.3 knots higher speed, giving a ramming possibility of 20% + 23% = 43%. However, percentage dice are rolled and Hermes misses with a 57! Phormio rakes the side of her enemy with a 30% chance of sheering (speed difference is negated because ramming includes sheering). A 16 is rolled, and since 1-30 was needed, Phormio's cathead rips through Hermes' oars.



6/10 Turn: Both ships check to see if they can trail oars under the cathead in time to prevent damage to the rowing organization. Phormio saves. Hermes suffers 20% losses in his rowing crew, which permanently reduces his speed by 20%. Since Hermes was struck and crippled speed drops to slow cruise or 3.5 knots x 80% = 2.9 knots (0.7" in scale). Hermes must proceed at that speed until the end of the battle turn. Hermes must also proceed on course for 1/10th turn for a reaction check. Phormio's captain orders an anastrophe, the rowers reverse oars, and the vessel comes about in a tight turn. Phormio travels 1.3" while the rowers are reacting to the new orders (1/10 turn reaction).

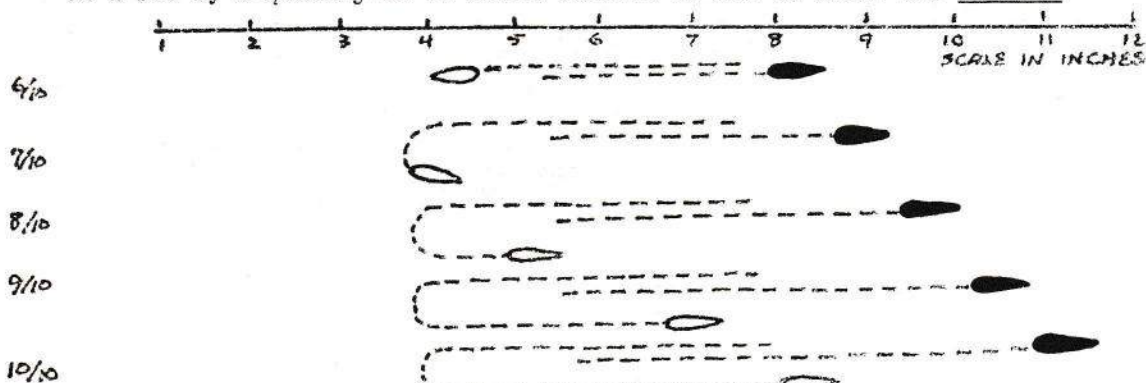
7/10 Turn: Phormio, being a Trireme III with a veteran crew, comes about on turning track #3 minus 1 for reversing oars and minus 1 for being veterans = turning track #1. Such a maneuver at battle speeds carries with it a decrease in speed of 5% per 90 degrees turned, and also a 10% chance of stress damage per 45 degrees turned. Phormio

rolls percentage dice (40, 81, 11 and 63), sustaining no stress damage from the violence of the 180 degrees turn. Phormio's speed is reduced to 90% of 5.5 knots, yielding a new speed of 4.9 knots for the rest of the turn or 1.2" per 1/10th. Using the "Turning Track Overlay," the course is plotted and the ship is moved. The "Distances Travelled on Turning Tracks" table indicates that a 180 degrees turn on track #2 is 1.5" in circumference, so Phormio will complete the turn and straighten out during 8/10 Turn.

8/10 Turn: Phormio has come about and is in hot pursuit of Hermes.

9/10 Turn: The pursuit continues, with Phormio closing the gap slowly but inevitably.

10/10 Turn: The stern chase continues, and Phormio is preparing to order ramming speed to make a stern attack. Hermes' captain is also considering an increase in speed and is in a bit of a quandry as to which tactics to use to evade the Phormio.



Note that a crew may attempt to "ungrapple" in any turn after grappling is successful at a 5% chance per 10 men in the deck crew. If a ship does ungrapple, the opposing vessel may attempt to grapple it again before it escapes at a 5% chance per 10 men of deck crew minus the distance modifier.

Grapples cannot be thrown from the stern of a vessel if it has been rammed from the stern. If a vessel has been rammed from the bow or broadsides, reduce its chance of grappling by a percentage equal to 1-20% (roll 20-sided die) because of confusion aboard.

ARTILLERY & SMALL ARMS FIRE

All artillery, missile, and small arms fire is simultaneous and occurs immediately prior to melee combat. In the case of fire between ships, the ranges at which fire will be taken must be written in orders (eg: at point of closest approach or 500', etc.).

Weapon Type	RANGES AND RATE OF FIRE			Rate of Fire
	Close Range	Effective Range	Maximum Range	
Throwing Axe	25'	50'	100'	1/10 combat turn
Javelin	25'	75'	150'	1/10 combat turn
Sling	100'	200'	350'	2/10 combat turn
Staff Sling	150'	300'	500'	2/10 combat turn
Short Bow	100'	200'	500'	1/10 combat turn
Longbow	200'	400'	700'	1/10 combat turn
Composite Bow	200'	400'	600'	1/10 combat turn
Lt. Crossbow	200'	400'	600'	3/10 combat turn
Hv. Crossbow	200'	500'	800'	4/10 combat turn
Musket	50'	100'	250'	5/10 combat turn
Scorpion	200'	600'	1000'	1 combat turn
Ballista	200'	900'	1500'	1 combat turn
Catapult	200'	1000'	1800'	1 combat turn
2-pdr gun	100'	300'	500'	5/10 combat turn
4 1/2-pdr gun	200'	400'	600'	5/10 combat turn

6-pdr gun	200'	400'	800'	1 combat turn
9-pdr gun	300'	500'	900'	1 combat turn
36-pdr gun	300'	500'	1000'	1 1/2 combat turns
Greek Fire Projector	100'	200'	300'	3 combat turns

DECLARING TARGETS

Orders should be written for all fire prior to firing. For example, "Fire 10 Lt. X-bows at forward quarter of galley A at 500' range" could be abbreviated to "LO LX fwd A at 500." Change of fire orders require a reaction check before new orders may be written.

Targets that may be designated are:

Rigging		Forward Quarter	Only incendiaries and hull hits by
Deck	plus	Midships	solid shot cause structural damage.
Hull		Stern Quarter	

The angle of the target to the firing vessel is important, for the target area must be visible to the missile troops or artillerists. If a target is approaching with an angle of less than 45° or is running with an angle of less than 45°, only the bow or stern, respectively, could be fired upon.

ARTILLERY FIRE

All artillery weapons use the following tables to determine whether a hit or a miss is scored on the ship under fire, then a given number of 6-sided dice are rolled and all bonus or penalty modifiers are added or subtracted from the total to give the number of combat factors lost and the damage to the vessel.

When firing artillery, it is necessary to specify the exact target area (rigging, deck, hull and position on the ship), as damage will vary considerably. In the event of unclear orders, penalize chances of hitting by -40 on the initial die roll.

Artillery can be served only by trained gunners with any effect. Non-gunners may attempt to serve the guns, but with a hit probability penalty of -25%.

There is a 5% chance that 24-pdr and 36-pdr guns will burst upon firing. An explosion wipes out anyone within 10 feet of the gun and does 10 dice of damage to the vessel.

Artillery Hit Probability: Roll percentage dice:

Dice Roll	Close Range	Effective Range	Long Range
0-30	miss	miss	miss
31-50	hit	miss	miss
51-80	hit	hit	miss
81-100	hit	hit	hit

Use the following die modifiers when computing the accuracy of artillery fire:

Veteran Elite Artillerists:	+20%	Speed of Target	: - 3% per knot
Veteran Artillerists	: +10%	Unfavourable Seas	: -10%
Elite Artillerists	: + 5%	Target less than 45°	: -10%
Regular Artillerists	: -	Rigging is Target	: -40%
		Target shorter than 50'	: -10%

If artillery scores a hit, check for casualties by rolling the indicated number of 6-sided dice and adding the die modifiers:

Weapon Type	Casualty Points	Damage to Hull of Target Vessel			
		A Hull	B Hull	C Hull	D, E, F Hull
Scorpion	5+3 dice	nil	nil	nil	1 die
Ballista	5+4 dice	1 die	1 die	2 dice	3 dice
Catapult	5+5 dice	1 die	2 dice	2 dice x 2	2 dice x 3

cont.

2-pdr gun	5+2 dice x2	nil	nil	1 die	2 dice
4 1/2-pdr	5+2 dice x3	1 die	1 die	2 dice	2 dice x 2
6-pdr gun	6+2 dice x4	2 dice	2 dice	2 dice x 2	2 dice x 3
9-pdr gun	9+2 dice x5	3 dice	2 dice x 2	2 dice x 3	2 dice x 5
24-pdr gun	24+2 dice x5	2 dice x 3	2 dice x 4	2 dice x 5	2 dice x 7
36-pdr gun	36+2 dice x5	2 dice x 4	2 dice x 5	2 dice x 7	2 dice x 9

Modifiers:

Long (Max.) Rang:	50% damage to hull.
Stone Shot	: 10-60% additional damage to hull (24-pdr and 36-pdr only).
Grape Shot	: 10-100% additional casualty points (close range only, at deck).
Mantlet	: Reduce casualties by 10-60% except for 24-pdr and 36-pdr guns when firing on men on deck.
Below Deck	: Reduce casualties by 10-60% guns when firing into the hull.
Rigging	: Special damage effects. No casualties unless a 1 or 2 is rolled on a 6-sided die (falling rigging, etc.)
Gunwales	: Gunwales of cogs, uschere, and galea tarida = mantlets.
Galleys	: Bows of galleys = A type hull and protect gun crews as if below decks, except for fire from above..
Galeass	: Forward gun deck is completely covered = below decks of A type hull. Reduce casualties by an additional 20% from all types of artillery fire.

INCENDIARY MISSILES; GREEK FIRE

Incendiaries may be fired by ballistae or catapults and inflict 5 dice of damage and 5 dice of casualty points upon impact. There is a 1-35% chance of ignition, whereupon the ship catches fire and burns at a rate of 5 dice of damage per turn. Also, 3 dice of casualties are caused each 5-minute turn the fire burns. Ships using incendiaries run a 10% risk that an accident will set the vessel on fire. Preparing incendiaries must be written in orders the turn preceding fire and a check for "accidents" is made.

Greek Fire is possessed only by the Byzantines. Fire projectors are targeted like artillery and cast a cloud of flame. Damage and casualties are 5 dice + 1-6 additional dice, with a 1-50% chance of igniting the target vessel. Each 5-minute turn a ship is on fire thereafter causes 5 dice of damage and casualties. Greek fire must be ordered two turns before ignition and discharge; and there is a 15% chance of an explosion when the weapon is discharged.

If a ship is "barbotte" (clad in hides soaked in vinegar), chances of ignition are reduced by 25% and only 50% casualties are sustained by incendiary or Greek fire.

To extinguish fires, 10 men may be assigned to fight the blaze with a 5% chance of success each 5-minute turn. Each 10 men additional will increase the chance of extinguishing the fire by 5%. In the case of Greek Fire, there is a maximum 50% chance the fire can be put out. Crews involved in fire fighting cannot perform any other function. Ships with magazines risk a 10% chance of explosion each turn they are on fire (non-cumulative).

CASUALTIES FROM ARTILLERY FIRE:

Casualty points from artillery fire are assessed against all classes of crewmen within the target area. Damage is apportioned according to the percentages of each type of crewman present. Casualties are assessed at the moment of firing.

DISMOUNTING GUNS:

Ballistae, catapults, and guns of 6-pdr size or larger have a chance of dismounting artillery in the target area. Each player rolls a 6-sided die. If the firing side has a higher die result, a gun is dismounted. Smaller guns go before bigger ones. A gun will take one 5-minute turn to be remounted for each 2 pounds of shot it fires (4-pdrs require 2 turns). Ballistae, catapults, and scorpions are more delicate and may suffer permanent damage 25% of the time, and otherwise require 2-12 turns to be put back into action.

RELOADING GUNS: OPTIONAL RULE

Players desiring realism must face the fact that guns burn a lot of powder and that the crews of the larger guns had to expose themselves to enemy fire to reload (flexible ramroads and re-coiling gun carriages had not been invented by 1571).

Gunners tended to wear body armour to protect themselves from enemy fire while they reloaded their cannon. Players should equip their gunners accordingly or else see them wiped out.

The amount of powder and shot carried in the ship is equally important. The quantity of powder used is as follows:

2 1/2-pdr gun	1/30 keg per shot	A keg of powder does 5 dice of damage if it explodes and inflicts 5 dice of casualty points. Treat explosions as equal to incendiary missiles for starting fires.
4-pdr gun	1/20 keg per shot	
6-pdr gun	1/10 keg per shot	
9-pdr gun	1/5 keg per shot	
24-pdr gun	1/2 keg per shot	
36-pdr gun	1 keg per shot	

RIGGING HITS

Catapults and ballistae were relatively ineffective against rigging. Early cannon were also inaccurate, but they could score a lucky hit in the rigging. If a rigging hit is obtained, roll percentage dice. The result is the amount of damage done to the mast and sails. If more than one mast is possessed by the target, divide the percentage by the number of masts. Reduce the effectiveness of 2-pdr, 4 1/2-pdr, and 6-pdr guns by one-half.

For example, a 6-pdr is fired at the forward mast of a great cog and hits the rigging. Percentage dice are rolled, with a 52 result. Since there are two masts, this is $52/2 = 26$. Also, 6-pdr guns are less effective, so half the damage or $26/2 = 13\%$ occurs. The speed of the cog under sail is reduced 13%.

Repairs may be made to rigging at a rate of 10% per 3 combat turns (15 minutes) by 10 sailors.

ANTI-PERSONNEL FIRE

Roll percentage dice, adding or subtracting the modifiers which follow. Loss of combat factors is given per man firing, so multiply the resulting damage times the number firing. When large groups of men are firing, roll for each 10 men or fraction:

Percentage Result	Axes and Javelins	Slings	Short Bows	Composite or Longbows	Lt. X-Bows	Hv. X-Bows	Muskets
0-5	0	0	0	0	0	0	0
6-10	0	0	0	1	1	1	1
11-15	0	0	0	1	1	2	2
16-20	0	1	1	2	2	3	3
21-30	1	2	2	3	3	4	4
31-40	2	2	2	3	3	4	5
41-50	3	3	3	4	4	4	5
51-60	4	4	4	4	4	5	5
61-70	4	5	4	5	5	6	6
71-80	5	5	5	6	6	7	7
81-90	5	6	5	7	7	8	8
91-95	5	6	5	7	7	9	9
96-100	6	6	6	8	8	10	10
101-110	6	6	6	8	8	12	12
111 +	7	7	7	9	9	14	15

(1) Range to Target:

Close : +10%
Effective: -
Maximum : -20%

(4) Target behind cover:

Behind mantlet: -20%
Behind gunwale: -15%

(2) Class of Troops Firing:

Veteran Elite:	+15%
Veteran	: +10%
Elite	: + 5%
Regular	: -
Reservist	: - 5%
Green	: -10%
Raw	: -15%

(5) Target Height Relative to Firing Troops:*

Target Higher:	-10%
Target Lower :	+10%

(3) Target has Shield: -10%

(6) Number of Targets in Target Area of Ship:

1-5 men	: -25%
6-10 men	: -20%
11-20 men	: -15%
21-35 men	: -10%
36-50 men	: -
51-100 men:	+10%
100 + men	: +20%

*Target height is irrelevant if firing from ranges beyond 200 feet.

INDIVIDUAL MISSILE FIRE

When using the individual combat option, players have the choice of volley fire into a chosen section of the opposing vessel or individual fire at a specified target. In the last case, there is a chance of hitting the target equal to the percentages rolled on the Anti-Personnel Fire Table, but the following modifiers are applied in addition to the others normally used:

Target is moving	: - 5%	Target in plate armour:	-15%
Per 10' of range	: - 5%	Target in hauberk	: -10%
Target is officer/hero:	-10%	Target in body armour :	- 5%

MISSILE FIRE CASUALTIES

Casualty points caused by massed missile fire against all personnel in the target section of the enemy vessel are assessed proportionately against all crew types present. Casualties are assessed at the moment of firing.

Individual missile fire casualty points are assessed against the specified target figure. A miss (no casualty points) means that no one is hit, however dense the mob around the target figure.

FIRE INTO MELEE

Missile troops cannot fire into meleeing figures because of the chance of hitting their own men. However, if targets can be seen behind the line of meleeing troops (direct line of sight), fire may be taken against them immediately prior to melee combat. If a height advantage is enjoyed by archers, they automatically have line of sight. In any event, fire under such circumstances cannot be attempted over 100' because missiles cannot be accurately aimed beyond that range sufficiently to prevent casualties amongst one's own troops.

MASS DECK ACTIONS

When large numbers of ships are involved, time prohibits a detailed simulation of the fight between crews engaged in a boarding action. The Mass Deck Action System should therefore be used to conduct large squadron and fleet battles. Such deck actions are fought "on paper" by comparing the combat strengths of opposing troops.

DETERMINING COMBAT STRENGTHS

The combat strength factor (CSF) of each member of each crew class aboard ship is found by adding one of the point values in each of the categories given below, then multiplying it by the number of men in that crew class:

A. ARMOUR

None	:	0
1/2 Leather, Brigantine	:	1
1/2 Bronze breastplate	:	3
1/2 Scale, Banded, Chain	:	5
Scale or Chain Hauberk	:	8
Full Plate Armour	:	12

B. SHIELD

None	:	0
Shield	:	2

C. FIGHTING CLASS

Slave Rowers	:	1
Captive Rowers	:	2
Free Rowers	:	3
Sailors	:	3
Soldiers, Artillerists	:	5
Romans, Marines	:	6
Officers	:	10
Knights	:	15
Pirates	:	6
Vikings	:	9
Heroes	:	25

D. TRAINING & MORALE

Raw	:	1
Green	:	2
Reservist	:	3
Regular	:	4
Elite	:	5
Veteran	:	6
Veteran Elite	:	8

E. COMMAND STATUS

Squadron Flagship	:	2
Fleet Flagship	:	4

COMPUTING COMBAT STRENGTH FACTORS

Add up the point values for each class of crewman aboard the vessel to obtain the individual CSF. Then multiply by the number of men in that class:

$$\begin{aligned} \text{Individual CSF} &= A + B + C + D + E \\ \text{Crew Class CSF} &= \text{Indiv. CSF} \times \text{number} \end{aligned}$$

Example: Suppose that a vessel had the following classes of crewmen. Note that all members of a particular class must be identical:

Officers: 1/2 bronze breastplates, shields, officer-types, veteran elite, squadron flagship crew: (x6)

$$\begin{aligned} \text{Individual CSF} &= 3 + 2 + 10 + 8 + 2 = 25 \\ \text{Crew Class CSF} &= 20 \times 6 = \underline{150} \end{aligned}$$

Soldiers: 1/2 leather cuirasses, shields, soldier-types, veteran, squadron flagship (x30):

$$\begin{aligned} \text{Individual CSF} &= 1 + 2 + 5 + 6 + 2 = 15 \\ \text{Crew Class CSF} &= 15 \times 30 \end{aligned}$$

Sailors: no armour, no shields, sailor-types, veteran, squadron flagship (x15):

$$\begin{aligned} \text{Individual CSF} &= 0 + 0 + 3 + 6 + 2 = 11 \\ \text{Crew Class CSF} &= 11 \times 15 = \underline{165} \end{aligned}$$

Rowers: The number of rowers that may fight in a deck action depends upon the historical position of such crews. Unless it is the practice to put fighting men at the oars (early Greek, late Roman, Byzantine, Mediaeval European, Viking), only 10% of the rowers will be aroused to fight if Freemen. Slaves sometimes revolt against their masters, and captives may rise if freed by their countrymen (a set of percentage dice is rolled for the numbers who will fight once released from their chains). Suppose the vessel is rowed by freemen: no armour, no shields, rower-type, veteran, squadron flagship (120 x 10%):

$$\begin{aligned} \text{Individual CSF} &= 0 + 3 + 6 + 2 = 11 \\ \text{Crew Class CSF} &= 11 \times 12 = \underline{180} \end{aligned}$$

The total CSF of the vessel considered in the example is $150 + 480 + 165 + 180 = 975$, the fighting strength of a superior vessel of the Trireme II variety.

Since a relatively large number of ships will tend to have identical crews, the computation made for one can be used for quite a few others. Thus relatively few computations will have to be made.

COMMITTING COMBAT STRENGTH FACTORS TO BATTLE

The advantage of the CSF System is that it sums up the total combat strength of a vessel and yet can be divided into its component crew classes to reflect differences in fighting ability of each man in the crew. The CSF can be allocated easily on paper in whatever manner a commander desires, subject to the following conditions:

Broadside to Broadside: When vessels are engaged along their entire lengths, one man may be engaged for every 3 feet of side of the shortest vessel. The use of a Roman Corvus will produce the same result, even if an attack is made over the bow or stern, because of the ease with which boarders can reach enemy decks, so Roman ships can bring twice the number of men into an

attack if using a Corvus while broadsides to broadsides. (Such actions tend to involve 100% of the fighting crews on both vessels.)

For example, suppose a vessel 120 feet long is broadsides to broadsides with a vessel 90 feet long. The length of the shorter vessel determines the fighting front: $90/3 = 30$ men can be engaged along the sides in close combat from either ship. To determine the CSF brought to bear by either vessel, merely allocate boarders and defenders by stipulating the numbers of each class of fighter involved and multiplying individual CSF's x the number in each class.

To compute casualties, merely consider the proportions of each class of fighter in the deck fight. Suppose that 20 men in the above example were soldiers, 9 were sailors and 1 was an officer. This gives a total of $20/30 = 67\%$ soldiers, $9/30 = 30\%$ sailors, and $1/30 = 3\%$ officers. The total CSF lost by this boarding party will be divided among them according to these proportions. Thus, if 200 CSF were lost, the soldiers would suffer 67% or 134 CSF, the sailors 30% or 60, and the officer 3% or 6. At the end of the melee turn, CSF losses can be compared to the individual CSF of each class of fighter to determine how many men were lost. In the next round of melee, combat strengths will be adjusted to the numbers of men remaining.

BOW TO BOW, BOW TO STERN, BOW TO BROADSIDE, ETC.

Follow the same procedure as given above. One man may be engaged for every 3 feet of waterline beam of the smaller vessel + 2 men. The additional 2 men reflect the greater beam at deck level.

For example, if the smaller vessel had a beam of 14 feet, $14/3 + 2 = 7$ men could be engaged at a time. The CSF is allocated as outlined above. Clearly, such fights are battles of attrition and will last for a long time before a decision is reached.

Deck actions are brutally fast, with die rolls occurring every 1/10 of a melee turn. Because of the savagery of such actions, casualties are very high.

RESULTS OF DECK ACTIONS

The following Combat Result Table is used to determine close action results. For attacking CSF over 60, merely roll again for the difference. Using several dice at once will speed the fight. Keep a running total of the casualties inflicted in CSF points, and at the end of a 1/10 melee turn, compute the number of men killed on both sides and adjust the fighting strengths of each class of fighter accordingly.

Each side rolls a set of percentage dice and modifies the die roll upward or downward according to the modifiers listed below.

Die Result	Combat Strength Factor of the Attackers						
	1-5	6-10	11-20	21-30	31-40	41-50	51-60
0-10	0	0	0	1	2	3	4
11-15	0	0	1	2	3	4	6
16-20	0	1	2	3	5	7	9
21-25	1	2	4	5	7	8	10
26-30	1	2	4	6	8	10	12
31-40	2	3	6	9	10	12	15
41-50	2	3	6	10	12	15	20
51-60	2	4	8	12	15	20	25
61-70	3	6	12	15	20	30	35
71-80	4	7	14	20	25	35	42
81-90	4	8	16	25	30	40	48
91-95	4	9	18	27	35	45	55
96-100	5	10	20	30	40	50	60
101 +	5	10	25	35	45	55	70

Where possible, the CSF for each die roll should be made up of troops of the same class to obtain the best advantage in die roll modifications.

Add the following die modifiers where applicable for each die roll:

<u>Fighting Class</u>	All CSF from officers, soldiers, pirates	: +10
	All CSF from Roman legionaries or marines	: +15
	All CSF from Vikings or Knights	: +20
<u>Training Status</u>	50% attacking CSF from Elite troops	: +10
	50% attacking CSF from Veteran troops	: +15
	Average defender is Elite	: -10
	Average defender is Veteran	: -20
<u>Position</u>	Attacker is on higher deck	: +10
	Defender is on higher deck	: -10
<u>Shields</u>	Defenders have shields	: -10
<u>Leadership</u>	Attackers have Elite Officers	: +10
	Attackers have Veteran Officers	: +15
	Defenders have Elite or Veteran Officers	: -10
<u>Boarding</u>	On initial boarding turn, unless Corvus is used, boarding party subtracts	: -10
	Crew of defending vessel adds	: +10

BOARDING

Once the initial boarding attack is made, the attackers must check to see whether they have won a foothold on the deck. If they succeed, penalties and bonuses from position and attempting an initial boarding are not applied to further combats. If they fail, all penalties and bonuses still apply. Roll a 6-sided die for the entire boarding party:

- 1 - 4 = Boarding not successful
- 5 - 6 = Boarding successful

Modify the die roll by +2 if using a Corvus or if boarding party is twice the strength of the defenders at the rail.

MAN TO MAN DECK ACTIONS

Players desiring a detailed, ultra-realistic hand-to-hand combat should use the Chivalry & Sorcery individual combat systems. These rules are recommended especially for engagements between solitary ships carrying player-characters.

The "Mass Deck Action" rules presented in this volume can easily be adapted for a simplified man-to-man deck battle:

- Determine the average CSF for each man in each class of crew. This CSF represents the attack strength of one man. It also represents the CSF loss he can absorb until he is killed. To conduct individual fights, merely roll a 6-sided die on the Result of Deck Action Table for the attacking CSF possessed by the fighter.
- Man-to-man actions are staged by placing miniatures on the 1" = 6' scale deck plans provided with this volume.
- Movement on deck is at the following rates:

Men in no armour	: 6" per 1/10 melee turn	Troops on their own deck always
Men in 1/2 armour	: 5" per 1/10 melee turn	move before boarders from another
Men in hauberks	: 4" per 1/10 melee turn	vessel may move.
Men in plate armour:	3" per 1/10 melee turn	

Normal movement occurs before combat, but see #7 below.

- Each figure controls the area covered by its base, and no movement is permitted through that zone. Friendly troops may pass through a space 1/2 the width of their bases. Hostile troops cannot pass through a space between opposing figures that is smaller than the

width of the enemy's base.

5. Blows are exchanged simultaneously between opponents. The space occupied by a slain opponent is immediately occupied by the victor. Thus boarders not using a Corvus must kill a defender at the rail to gain the enemy deck, unless it is undefended.
6. The number of blows exchanged per 1/10 turn depends upon the class and training of the combatant. Add all factors which are relevant to a maximum of 4 blows. Blows are taken simultaneously with each blow equalling a die roll (6-sided) on the Deck Action Table. A figure with extra blows continues to roll after his enemy can no longer strike back.

Basic number of blows	: 1 per 1/10 turn	Knights	: +1 per 1/10 turn
Soldier type	: +1 per 1/10 turn	Vikings	: +1 per 1/10 turn
Veteran or Veteran Elite	: +1 per 1/10 turn	Officers	: +1 per 1/10 turn

7. Movement during combat permits victors to advance through gaps and for reserves to follow behind. Remaining blows can then be used on newly accessible enemies.
8. When crossing from rail to rail, a boarder has a chance of falling into the water or of stumbling once he gains the enemy deck:

<u>Armour Worn by Boarder</u>	<u>Chance of Falling</u>	<u>Chance of Stumbling</u>
no armour :	7%	7%
1/2 armour :	10%	10%
hauberk :	15%	15%
plate armour:	20%	20%

9. Any man falling overboard has a chance of drowning. There is a 50% chance he knows how to swim and can return to his own vessel. If he can swim, his chances of success per turn he is in the water are:

no armour	: 95% of staying afloat each turn; 10" swimming speed (60' per turn).
1/2 armour	: 85% chance of discarding armour; then check as for no armour.
hauberk	: 50% chance of discarding armour; then check as for no armour.
plate armour:	20% chance of discarding armour; then check as for no armour.

Failure to discard armour means that the man has been dragged under and drowned. To climb back on deck requires a full turn.

10. Stumbling after leaping to an enemy deck gives one enemy defender an extra blow* in the first round of a melee turn. *This is a first blow, taken unopposed.
11. In individualized melee, a character may desire to swing across to the enemy deck hanging to a line from the yard (Errol Flynn Style). The results are as follows: roll a pair of 6-sided dice:
 - 2 = The rope broke, landing the character in the water.
 - 3 = The rope was too long and the character hit the side of the enemy vessel! Reduce chances of swimming or discarding armour by -10% on the first turn.
 - 4-5 = The character reached the enemy deck but stumbled upon landing.
 - 6-9 = The character landed safely and has an extra blow for landing on his chosen opponent from above.
 - 10 = The character overswung and landed near the opposite side: 30% chance of stumbling overboard.
 - 11 = The character overswung and landed on the opposite rail: 75% chance of falling overboard.
 - 12 = The character completely overshot the enemy deck: 1-40% he manages to swing back safely to his own vessel; 41-60% he lands safely on the enemy deck while swinging back; 61-80% he stumbles upon swinging back to the enemy deck; 81-100% he loses his hold on the rope and falls into the sea on the opposite side of the enemy vessel.
12. To board by leaping from one deck to another, vessels must be less than 10 feet apart (less than 5 feet if in hauberk or plate armour). Characters may swing across 25 feet of open water to an enemy deck.

13. When using a Corvus, no risk of falling overboard exists, as the tactic assumes the equivalent of running across the deck of a ship.

Each side rolls a set of percentage dice and modifies the die roll upward or downward, according to the modifiers below:

Die Roll	Combat Strength Factor of the Attackers						
	1-5	6-10	11-20	21-30	31-40	41-50	51-60
-0-10	0	0	0	1	2	3	4
11-15	0	0	1	2	3	4	6
16-20	0	1	2	3	5	7	9
21-25	1	2	4	5	7	8	10
26-30	1	2	4	6	8	10	12
31-40	2	3	6	9	10	12	15
41-50	2	3	6	10	12	15	20
51-60	2	4	8	12	15	20	25
61-70	3	6	12	15	20	30	35
71-80	4	7	14	20	25	35	42
81-90	4	8	16	25	30	40	48
91-95	4	9	18	27	35	45	55
96-100	5	10	20	30	40	50	60
101 +	5	10	25	35	45	55	70

The following modifiers to the dice roll are cumulative and added where applicable:

C.S.F.

Fighting Class :	Officers, Soldiers and Pirates.....	+10
	Roman Legionaries or Marines.....	+10
	Vikings or Knights.....	+15
Training Status:	Attacker is Elite.....	+10
	Defender is Elite.....	-10
	Attacker is Veteran.....	+15
	Defender is Veteran.....	-20
Shields :	Defender has shields.....	-10
Position :	Attacker is on Higher Deck.....	+10
	Defender is on Higher Deck.....	-10
	Boarding without Corvus (1st boarding turn).....	-10
	Defending vs. Boarding w/o Corvus (1st turn).....	+10
Wound Status :	Deduct from the C.S.F. of each individual points equal to his wounds. (An officer with a C.S.F. of 19 has suffered 6 pts. of wounds and is now treated as a C.S.F. of 13).	

Note that these rules involve individual figure melee and the paperwork associated with skirmish type games. It is only recommended for individual ship actions or in role playing campaigns. In mass fleet actions, use the simplified deck action system in the preceding section of the rules.

SHIP MORALE

The morale of men aboard ship is dependent upon the casualties sustained in a deck action and from missile fire. Morale is determined by the morale level of the highest ranking troops on board. The order of rank is (1) Officers, (2) Soldiers, (3) Sailors, and (4) Rowers in the fighting portion of the crew. When the highest ranking group has suffered a 50% reduction in CSF or numbers, morale is checked at the next level:

<u>Class of Crew:</u>	<u>Morale Level:</u>	A morale check will be required aboard a vessel any time that:
Raw :	-3	
Green :	-2	1. The squadron commander is sunk and is unable to transfer his flag to another vessel or is captured or flees the battle.
Reservist :	-1	
Regular :	0	

Elite	:	+1
Veteran	:	+2
Veteran Elite	:	+3
Flagship Crew	:	+1
per 10% casualties	:	-1
Ship over 50% damaged	:	-1

- The vessel sustains 10% casualties amongst its fighters in a round of melee or missile fire. (10% increments of original starting strength)
- The vessel has sustained 50% structural damage or a total of 25% of its crew has been lost.

To check morale, roll a 1-10 die and add or subtract the Morale Level Modifier for the highest ranking troops on board. When a vessel has reached the status described in #3 immediately above, it will check morale at the beginning of every battle turn that an enemy vessel is within 1000 feet of it.

Result of Morale Check

- 2 to 0 = Crew becomes totally demoralized. If engaged in a deck fight, it will surrender 1-50% of the time. In a sea fight, it will attempt to flee 1-50% of the time and will continue in flight so long as an enemy ship is within 6000 feet of it. If escape is impossible, it will surrender 1-25% of the time and will fight otherwise.
- 1 to 4 = Crew is severely shaken. If engaged in a deck fight, it will surrender 1-25% of the time. In a sea fight, it will attempt to flee 1-25% of the time if an enemy vessel is within 6000 feet of it. If escape is impossible it will surrender 1-10% of the time and will fight otherwise.
- 5 to 6 = Crew is shaken but not panicky. If engaged in a deck fight, the crew will continue the action bravely. In a sea fight, it will attempt an orderly withdrawal behind the reserve line (if any) or else to a distance 6000 feet from the nearest enemy. If an enemy vessel attempts to attack or pursue, it will engage or continue withdrawal according to the captain's wishes.
- 7+ = Crew will perform bravely.

One special situation in which a morale check will be performed occurs the moment a rowing crew's endurance level falls below 10 points. The speed of the vessel is noticeably slowing as the rowers become tired, placing the ship in greater danger. If a morale die result of less than 5 occurs, the vessel will withdraw or else stop to rest crew. It will, of course, engage any attacking enemy or continue in any pursuit situation, depending upon the captain's wishes.

SQUADRON/FLEET MORALE

When large numbers of ships are involved, the morale of the squadron or fleet as a whole must be considered.

Basic squadron or fleet morale is 60%, meaning that it will accept losses of 60% of the first 10 ships in the force. Above that number, it will accept fewer and fewer losses proportionate to the total number of vessels because of the high numbers of ships sunk or captured.

<u>Ships in the Force:</u>	<u>Losses Requiring a Morale Check:</u>
1 to 10	60% of the force
11 to 20	6 ships + 40% of the remaining vessels
21 to 30	11 ships + 35% of the remaining vessels
31 to 40	15 ships + 30% of the remaining vessels
41 to 60	19 ships + 25% of the remaining vessels
61 +	24 ships + 20% of the remaining vessels

Squadron and fleet morale checks are a serious matter, for on the turn that acceptable losses are exceeded, every ship in the squadron or fleet will check morale as if it had taken 50% casualties and will continue to do so each turn the ship remains in action.

On the first turn that squadron or fleet morale is checked, use the Ship Morale Check Table. All Vessels that flee or withdraw will continue to do so until the battle area is cleared or

the enemy is 5 miles distant. They will avoid battle wherever possible.

On the second and all subsequent turns that squadron or fleet morale is checked, there is a flat 20% chance that any vessel, whatever its crew morale may be, will withdraw from the battle and retire in the safest direction. If a squadron or fleet flagship retires, its command will follow. However, an enemy pursuing too closely still risks possible counterattack because the withdrawing ships are not panicked unless they fail a ship morale check.

CHIVALRY & SORCERY CAMPAIGNS

The following rules are provided to add a naval dimension to campaigns based upon Chivalry & Sorcery (Fantasy Games Unlimited, 1977).

1. INITIAL BUILD

If a campaign is just starting, no one will possess a fleet and the cost of constructing one from scratch is so high that no one will ever have one worth mentioning. However, we may assume that the ancestors of the current lords were wise enough to build ships. To arrive at an investment value, add the total tax revenue of all seaports in the land, as outlined for "building the nation" in Chivalry & Sorcery. Multiply the total tax revenue by 150. This gives the amount spent on ships by the government (30% for naval vessels) and by the citizens (70% for merchant vessels).

For example, suppose that a nation contained 9 ports with a total revenue of 3750 GP per month (add all taxes to the Overlords and to the towns). The amount spent on ships is $3750 \times 150 = 562,500$ GP. As 70% or 393,750 GP is expended on merchantmen, 30% or 169,750 GP remains for the fleet. The number and types of vessels desired can then be purchased retroactively, using the costs given in section #3 below. At least 30% of naval and 30% of merchant vessels will be below average in quality, and no more than 20% of the merchant fleet costs may be expended on large trading vessels.

2. REVENUE FROM MARITIME TRADE

Once the composition of the mercantile fleet is determined, the revenue the state obtains from trade can be determined.

Mediterranean Trade: 10-20 GP per ton of shipping per year in customs duties.

Atlantic Trade: 5-10 GP per ton of shipping per year in customs duties.

Large Vessels: 10 GP per ton of shipping plus the normal duties per year as more valuable cargoes were carried on larger vessels.

Rich Trade Routes: Players may attempt to simulate the vast potential of the richest trade routes, such as the Levant trade. Such trade could bring 1-6 times the normal duties in income.

Losses: Not all vessels reached port. Storms, unknown waters, and pirates took their toll. In peacetime, roll a ten sided die:

- 1-4 = no significant losses, full duties received.
- 5-7 = 1-6% losses in revenue. Reduce total tonnage by loss percentage.
- 8-9 = 1-10% losses in revenue. Reduce total tonnage by loss percentage.
- 10 = 1-20% losses in revenue. Reduce total tonnage by loss percentage.

War: Vessels must be escorted. If the escorting player convoys his ships with a greater number of warships (use points to determine relative strengths) than his enemy details to commerce raiding, he suffers normal losses as above under "Losses." If, however, he is outnumbered by the enemy's commerce raiders, double the losses for each 25% stronger the enemy is than he. For example, the escorting player has 150 tournament points of ships and crews at sea on escort duty; the enemy details 250 tournament points of ships and crews to the task of destroying trade. $250/150 = 167\%$ of the escort strength. Because he is 67% stronger, three times normal losses are caused to the trade of the escorting player.

Individual Ship Values: Players may wish to know the value of a particular ship and cargo for purposes of running pirate or war scenarios. The prize value of a ship is 75% of its building cost plus the value of its cargo. Cargo values in ships under 250 tons range from 5-30 GP per ton of shipping. Cargo values of large ships range from 10-60 GP per ton of shipping. Cargoes carried by large ships on a rich trade route range from 10-100 GP per ton of shipping.

In non-contested actions (when computing general losses,) commerce raiders manage to seize 25% of ships lost. Thus, when nations are at war, and losses exceed the normal levels, 25% of the individual ship values is obtained by the raiding player. This figure can be computed from the ship data on costs or it can be expressed as 5-30 times the revenues lost by the player whose ships were taken. This is known as making war pay!

Replacement of merchant losses is at a rate of 10% per year. If war is being waged at sea, replacement of merchant shipping tonnages is reduced by 1-2% per year of war.

Compute maritime revenues from customs duties on an annual basis, made payable at the end of the sailing year (usually the end of October.) After computing the year's revenues, subtract the losses. The balance goes into the treasury as income at the end of October.

3. COST OF WARSHIPS AND MERCHANTMEN

The types of vessels available to players is almost limitless. There are 50 basic types, with 5 classes of vessel possible for each type, not to mention a great variation in the tonnages of certain types of merchantmen. To avoid anachronisms where, for example, Greek-style Triremes are pitted against Galleasses armed with cannon, there should be agreement as to what period of history is being depicted. The ship types available would be governed by a reasonable assessment of naval evolution. In fantasy campaigns, players could go so far as to assign particular types to various nations as characteristic designs in their navies. In a Hyborean Age campaign, for example, Argos might specialize in Greek types, Aquilonia in Roman types, and so on.

Type of Vessel	Cost to Build	Type of Vessel	Cost to Build
1. Egyptian Punt Ship	10 GP/ton	26. Trafan's Coast Gd.	1000 GP
2. Egyptian War Galley	1500 GP	27. Galea or Moneres	1500 GP
3. Phoenician Bireme	1500 GP	28. Ousiakos	3000 GP
4. Sm. Phoenician Merchantman	12 GP/ton	29. Pamphylos	4500 GP
5. Lge. Phoenician Merchantman	15 GP/ton	30. War Dromon	9000 GP
6. Early Pentekonter	1100 GP	31. Galea Sottila	7000 GP
6. Ram-bow Pentekonter	1300 GP	32. Galea Tarida	25 GP/ton
7. Med. Dispatch Boat	1300 GP	33. Sagitta	1400 GP
8. Hecatonter	2500 GP	34. Vaccheete	200-800 GP
9. Early Greek Bireme	1500 GP	35. Galee di Mercanzia	30 GP/ton
10. Early Greek Trireme I	1800 GP	36. "Ordinary" Galley	8000 GP
11. Greek Trireme II	2000 GP	37. Galleass	30000 GP
12. Greek Trireme III	2500 GP	38. Usciere or Nef	25 GP/ton
13. Greek Trireme IV	3500 GP	39. Mediaeval Med. Merchant	20 GP/ton
14. Greek Trireme V	4500 GP	40. Venetian Carrack	30 GP/ton
15. Syracusian Pentere	5000 GP	41. Viking Warboat	1200 GP
16. Successor Pentere	10000 GP	42. Viking Longship	1800 GP
17. Successor Octere	15000 GP	43. Viking "Serpent" Type	7500 GP
18. Successor 16-er	30000 GP	44. Sm. Nordic Merchant	12 GP/ton
19. Sm. Med. Merchantman	20 GP/ton	45. Lge. Nordic Merchant	15 GP/ton
20. Lge. Med. Merchantman	25 GP/ton	46. Small Cog (pre-1250)	15 GP/ton
21. Carthaginian Bireme	2500 GP	46. Small Cog (post-1250)	18 GP/ton
22. Carthaginian Pentere	2800 GP	47. Large Cog	20 GP/ton
23. Roman Bireme	3000 GP	48. Great Cog	25 GP/ton
24. Roman Quinquereme	2500 GP	49. Caravel	20 GP/ton
25. Augustan Bireme	5000 GP	50. Carrack	30 GP/ton

The building cost of a vessel includes only the hull, masts, sails, running gear, oars, and ram, if any. If special armaments and fittings are desired, these must be purchased at extra cost. As in the case of the ships themselves, care should be taken to avoid any historical inaccuracies. Also, the very structure of the vessels should be considered: a trireme, for example, was too light in construction and too cramped to mount any form of mechanical artillery except, perhaps, a Roman-type "scorpion" in the bow. A Successor Octere, however, could mount several catapults and scorpions with ease. Artillery (guns) cannot be mounted safely until naval architecture reaches a period equivalent to A.D. 1400.

Type of Armament/Fitting	Cost	Type of Armament/Fitting	Cost
Scorpion (small spear-thrower)	100 GP	36-pdr cannon	1000 GP
Ballista (medium spear-thrower)	150 GP	24-pdr cannon	850 GP

Catapult (solid, incendiary)	200 GP	9-pdr cannon	500 GP
Mangronel (multi-spear thrower)	200 GP	6-pdr cannon	300 GP
Greek Fire Projector	2000 GP	4 1/2-pdr cannon	200 GP
Corvus	35 GP	2-pdr cannon	150 GP
Grappling irons & line	2 GP	36-pdr stone shot	40 GP
"bilging" weight	35 GP	24-pdr stone shot	30 GP
"Barbotte" (per foot of vessel)	10 GP	Large iron shot	15 GP
3' x4' x3" mantlet	5 GP	Small iron shot	5 GP
		Keg of gunpowder	20 GP

One other factor to be considered when building a vessel is the quality of the construction.

<u>Construction Quality</u>	<u>Cost</u>	<u>Building Time</u>
Elite materials and design	150% of basic cost	120% of normal time
Superior materials and design	125% of basic cost	110% of normal time
Average materials and design	basic cost as listed	normal time
Reserve quality	90% of basic cost	95% of normal time
Poor quality	80% of basic cost	80% of normal time
Garbage	70% of basic cost	70% of normal time

The quality of a vessel's construction will affect its ability to absorb damage.

4. SHIPS' CREWS

Once the mercantile and naval fleets are built, they must be manned. Good crewmen demand good pay for their service, and even the greenest mariner has to be paid for his trouble.

One of the most important tasks facing a naval commander is the choosing of his crews. The following costs reflect the monthly pay scales of crews of various classes. In most instances, pay is somewhat lower than in the mercantile fleet because naval service does imply "patriotic self-sacrifice". Besides, there is always plenty of opportunity to win loot and capture prizes. All costs are given in terms of 100 men. In the case of slaves, costs refer to purchase price rather than monthly pay.

<u>Class of Crew</u>	<u>Rowing Crew/100 Men</u>	<u>Sailing Crew/100 Men</u>	<u>Slave Rowers/100 Men</u>
Raw	20 GP	20 GP	100 GP
Green	25 GP	25 GP	150 GP
Reservist	50 GP	60 GP	-
Regular	75 GP*	90 GP*	400 GP
Elite	90 GP*	100 GP*	600 GP
Veteran	125 GP*	150 GP*	1000 GP
Veteran Elite	150 GP**	200 GP**	

*All crews marked with a single asterix are paid on a minimum of 7 months each year, as they are part of the standing fleet and must be retained for continual service.

**All crews marked with a double asterix are paid on a 12-month basis. Otherwise, they will seek service elsewhere.

25% of all slave rowing crews die from disease and physical breakdown each year and must be replaced by new purchases.

Fighting crews are drafted from freebooting mercenaries, feudal vassals, and militia units. The types of troops aboard parallel those distinguished in the chapter on "Warfare in the Age of Chivalry" in Chivalry & Sorcery:

<u>Fighting Crew (100 Men)</u>	<u>Type D</u>	<u>Type C</u>	<u>Type B</u>	<u>Type A</u>	<u>Armour Type</u>
Light Infantry	40 GP	50 GP	75 GP	90 GP	none
Medium Infantry	75 GP	90 GP	125 GP	150 GP	leather cuirass, brigantine
Heavy Infantry	125 GP	150 GP	175 GP	200 GP	banded cuirass, chain shirt**
Armoured Infantry	-	200 GP	225 GP	250 GP	chain or scale hauberk**
Chivalry	-	-	700 GP	900 GP	superior hauberk or plate**

Marines	-	-	+50 GP	+90 GP	The troops listed here are
Light X-Bowmen	+25 GP	+40 GP	+50 GP	+60 GP	specialists and are rated
Heavy X-Bowmen	-	-	+75 GP	+100 GP	according to their infantry
Archers	+10 GP	+15 GP	+25 GP	+50 GP	class (light to heavy), and
Musketmen	-	+50 GP	+75 GP	+100 GP	are paid according to that
Gunners & Artificers	-	+150 GP	+300 GP	+500 GP	rate plus specialist bonuses.

To convert Chivalry & Socery troop classifications to naval force classes, use the following guidelines:

Type A = 25% Veteran Elite, 75% Veteran

Type B = 30% Elite, 70% Regular

Type C = Reservists

Type D = 50% Raw, 50% Green

Heavy and Armoured Infantry and all Chivalry carry shields.

Crews must be paid regularly if they are to be expected to serve loyally. Feudal navies have the advantage of 60 days' service before pay starts when vassals, militia, and reservists are used. However, all crews of the "regular" navy are paid monthly. If pay is in arrears for more than 30 days, much "muttering" and "grumbling" will be heard below decks, and there is a 10% chance that the crew will mutiny and go home to be paid instantly. The chance of mutiny rises 10% per week thereafter.

5. NAVAL NOBILIZATION

No matter how rich a nation may be, its ability to muster enough able-bodied men to crew its ships is related to its "maritime population". To compute the number of people along a coastal region, add the population of all the port cities and double the result. This is the total from which crews may be drawn for naval service.

Regular navy crews may be drawn from 5% of the maritime population. (Type A crews.)

Reservists may be drawn from 10% of the maritime population. (Type C crews.)

Merchant Marine are 10% of the maritime population. (10% Type A, 90% Type B crews). These seamen are vital to the commercial wellbeing of the nation, however, and for each 1% pressed into naval service, revenues from maritime trade drop by 10% for the duration + 1 to 3 months. Naval service includes both aboard naval vessels and transports used to carry troops or supplies.

Recruits may be drawn from 10% of the maritime population. (Type D crews.) However, for each 1% so recruited, total revenues from coastal areas drop by 15% to reflect the disruption of trade and industry.

Slaves may be used in nations that have institutionalized slavery, and acquiring crews is largely a matter of finding the money to purchase rowers. The better the crews, the less the chance of finding appropriate slaves. Roll percentage dice for each 100 slaves purchased for galley duty:

<u>Dice Result</u>	<u>Type of Rowers</u>	<u>Death Rate</u>
1-3	Veteran Elite	10% per year
4-7	Veteran	10% per year
8-12	Elite	10% per year
13-30	Regular	20% per year
31-55	Reservist	25% per year
56-75	Green	35% per year
76-100	Raw	50% per year

Captives may be used to row vessels. They drop one level because of reluctant service. They can and will revolt at the first opportunity. (Rules for revolt can be devised by players to suit a particular campaign.)

6. REPLACEMENTS

Except for slaves, which are purchased "catch as catch can" to replace losses from battle and physical breakdown, 20% replacements may be obtained for any class of sailor or rower each year.

7. FIGHTING CREWS

Fighting crews may be drawn from various sources, depending upon the type of military system existing in the nation:

Barbarians like the Vikings would draw their fighters/rowers/sailors from the military strength of the nation. They have no maritime population as such.

Feudal states draw fighting crews from vassals and militia forces, as well as from the maritime population.

Civilized nations like Byzantium, Rome, Greece, etc., possessed a regular army which provided the fighting troops for the fleet. To reflect the more urbanized populations of such states, when building them the cities should have populations far in excess of the 25000 typical of large feudal towns. Cities would have a 10% mobilization level. The countryside around a city would have an equivalent to tripled population, with a 10 to 20% mobilization. Troops would have to be equipped and paid out of public coffers. Taxes can be computed on the basis of 1 GP per month per 5 citizens (double in port and capital cities).

8. MAINTAINING THE FLEET

Ships are extremely costly and therefore have to last a long time. Maintenance costs are therefore incurred:

Refitting: To maintain naval vessels constantly at sea, 5% of their cost must be expended annually for refitting, careening, modification, etc.

Repair: When vessels are damaged in battle, the cost of serious repairs is 50% of the damage. For instance, if a galley came into port with 75% battle damage, the cost of repair would be $1/2 \times 75\%$ of the original cost of the vessel. Time taken to repair is a function of the size of the vessel. For each 10% of damage sustained, a number of days equal to the size number of the vessel is required to complete work. Thus, if the damaged vessel mentioned above had a size number of 12 (very large), the time would be 12×7 ($75\% = 7/10$'s) or 84 days.

Building: New vessels may be constructed in a number of days equal to the size number $\times 10$.

Shipyards: The number of vessels that could be built or repaired at any one time is a function of the population of a port. Generally, 1 vessel may be worked on for every 500 people in the town or city. In the case of very small vessels (size number 1 or 2), 2 vessels may be worked on for every 500 people.

Laid Up Ships: Vessels may be laid up "in ordinary", awaiting commissions to go cruising. Such vessels form the naval reserve and are drawn up in ship sheds or are moored in port and maintained against some naval emergency. The cost of keeping a ship "in ordinary" is 1% of its building cost per year.

Replacement: The life expectancy of Mediterranean ships is 30 years, and Atlantic ships last 40 years. Players should develop a replacement program so that one ship in 30 or 40 is replaced by a new one each year.

MAGICK ABOARD SHIPS

Magick Users are not prone to risking their skins in naval battles, but it might chance that one could be present aboard a ship while journeying to some important destination. Thus it might chance that his services will be required to fight off pirates or improve on the weather:

BASIC MACICK SPELLS, especially those dealing with fireballs, stone missiles, and lightning bolts, will probably be used offensively. Treat each "volume" of material hurled as an incendiary or solid missile with 1 die (6-sided) of damage. Thus a 10 volume stone would strike with 10 dice of damage against the hull and would inflict 10 dice of damage against crewmembers present. Targeting is on the vessel (inanimate object).

WEATHER CONTROL spells will serve to create the effects indicated in Chivalry & Sorcery. These are area effects and thus all vessels inside the weather pattern created will be affected by the spell. In addition, weather spells permit a Magick User to manipulate the wind and weather tables in these rules by +2 or -2 per magick level he possesses. If two Magick Users on opposing sides are attempting weather manipulation, subtract the difference between their manipulation bonuses for the superior Magick User. (The inferior will have his efforts cancelled.) For example, a Magick User with MKL 10 wants to alter the foggy conditions (6-10 in the Atlantic on the Weather and Visibility Table) to something better. A MKL of 10 gives him a +20 or -20 variation, and he can choose any weather inbetween. He applies the full +20, raising the table to 26, let us say, which is light rain.

ILLUSIONS are very effective at sea, for seamen are highly superstitious and believe almost everything they see. Non-player characters are rated at an average IQ of 10. Targeting is on the vessel or vessels within range of the Magick User.

COMMANDS must be targeted against the specific character or characters to be dominated.

MOVE AIR spells may be used to increase the wind pressure on the sails of one's own vessel for the duration of the spell. Such spells increase speed (at the current wind velocity) by 5% per magick level possessed by the caster. In no case may the speed of a vessel be more than twice its maximum speed until a Magick User reaches level 21, at which point he may increase speed by 10% per magick level! Such spells prevent the masts and running gear from carrying away, and no water will be shipped in favourable seas.

Clearly, there are a great many possible spells which could be cast aboard ships, and to deal with them all would require a prohibitive amount of space. Players are encouraged to work out reasonable and playable "house rules" to cover situations not dealt with here.

Ranges and the strength of effects are determined by the Personal Magick Factor of the spell caster, as described in Chivalry & Sorcery. Where player-characters or individual non-player characters are involved in a given effect, they must be dealt with individually according to C & S magick procedures. For example, a fireball might explode aboard ship, killing some crewmen, but to injure a player character it must be targeted against him separately.

GUIDE TO THE CUT-APART COUNTERS

1. *Early Pentere or Quinquereme, War Dromon, large, undecked Bireme or Trireme.*
2. *75'-90' cataphracted Bireme or Trireme.*
3. *Viking Vessel or Phoenician Merchantman.*
4. *75'-90' Bireme, Trireme, Pamphylos (undecked, cataphract I or II, or aphract.)*
5. *Successor Pentere, large Successor Lenantine types.*
6. *Pentekonter, Dispatch Boat, Galea or Nomes, Ouisakos, Vachette.*
7. *100'-130' Bireme or Trireme.*
8. *Great Cog (Uschere, Nef), Carrack, large Roman or Mediterranean Merchantman.*
9. *Large Cog.*
10. *Galea Sotilla, Ordinary Galley, Large Dromon.*
11. *Galeass.*
12. *Small Cog, small Ancient or Medieval Merchantman.*

Ancient & Medieval Naval Warfare

1. Naval Strategy

Naval warfare is prehistoric in origin. At first, it was an armed seizure of booty and tribute from a passing merchant ship by a party of freebooters in a fast boat, a purely piratical act lacking in real military organization and exhibiting little in the way of naval science. The first navies were basically large numbers of pirate adventurers who were gathered together by no less predatory princes to serve their national objectives. The Greek fleet that sailed for Troy doubtless ventured forth to eliminate that city as a tribute-levying power who denied free access between the Aegean and Black Seas. The destruction of Troy meant immediate profit in the form of rich loot, less risk to future commerce, and higher profits because no tribute would have to be paid later. Helen was just an excuse to eliminate an economic rival. The relatively recent navy of Elizabeth I was composed of "gentleman" privateers, brigands, freebooters, and cutthroats whose own mercenary instincts matched those of their Queen. Their example was equalled and often surpassed by the Barbary Pirates, the Spanish, Portuguese, Dutch, and, indeed, virtually every seapower of the ancient, mediaeval, and modern world. The only difference between piracy and lawful war until well into the last century was the "Letter of Marque", the official approval of one's government to make war on the enemy's property as well as the lives of his subjects.

Whatever degree of sophistication the war at sea might reach, the strategic objectives remain the same. Secure national wealth and power (1) by dominating the seas in order to make them safe for commerce and (2) by denying the sea to any and all adversaries. The pattern for success was established by the Phoenicians and Greeks, who sent out colonies to establish naval bases that would protect maritime commerce and attack any enemies. The pattern was repeated successfully throughout history by Carthage, Rome, Byzantium, Venice, Genoa, Pisa, Spain, Portugal, England, and the Netherlands. Today, the naval race between the U.S.A. and the Soviet Union depends not only upon numbers of ships but the possession of strategic bases from which to operate. It is a situation that Bomlicar from ancient Tyre could easily comprehend; the Phoenicians had the same problem.

The sea is a cheap and convenient route for commerce, transportation, and communication. It had the virtue until modern times, of being eminently faster than any form of land travel. All war upon the sea had, therefore, the ultimate objective of control of the sea. The battle of fleets is not profitable unless victory alters the economic balance in favour of the victor. For economics is the reason for naval warfare.

All naval strategy therefore aims at two objectives. First is the direct attack upon the life of the adversary, the destruction of his fleets. This is usually the strategy of the stronger adversary, although the weaker can never afford to refuse battle when he has a clear local superiority and has a good chance of inflicting heavy losses without great loss himself. Second is destruction of the commerce, wealth, and property of the enemy, cutting off his livelihood and reducing his resources to make war. This is the strategy of the weaker adversary, although the stronger will also choose it to further weaken an already inferior enemy.

Any naval campaign contemplated by players should be set up so that such objectives may be served. The complete naval campaign envisaged by Chivalry & Sorcery (Fantasy Games Unlimited, 1977) provides amply for economic objectives, for it will be seen that vast sums of money needed to maintain large fleets can come only from overseas trade. Thus players who desire to wage a total naval and land campaign are advised to make use of the Chivalry & Sorcery systems of designing nations so that economic, demographic, and military factors are present. The more simplified tournament point system given in this volume provides, basically, only for the contests of strength between fleets. It may be linked with land campaigns, however, and innovative players could devise a point-system to provide an economic dimension. That makes conquest of territory, capture of overseas ports, and commerce raiding a viable possibility and renders the simulation.

THE PELOPONNESIAN WAR

After the victory over Persia, Athens possessed the largest navy and a rapidly growing merchant fleet. She dominated the newly formed Delian League, collected much tribute from her subject allies, and aroused Corinthian jealousy as Athens made a determined bid to control the western sea trade as well as commerce in the Aegean and Euxine (Black) Seas. After an inconclusive conflict in 459-453 B.C., general war broke out between Athens and the Peloponnesians in 431 B.C. Peloponnesian strategy was to destroy the Attic crops and starve the Athenians out. However, Athens had by now acquired the means to support her population by selling her manufacture overseas for provisions. Her access to the sea introduced a new strategic concept: maintenance of economic and military power by far-flung trade. So long as her navy of 250-300 triremes could protect commerce, supply her when besieged, command the loyalty of her subject allies, and give her the means of counterattacking where she pleased, Athens could hold out.

The first phase of the war ended indecisively in 421 B.C. The Athenians had based naval operations upon fast, maneuverable vessels utilizing ramming tactics and avoiding the traditional boarding action. The Peloponnesians, led by the Corinthians at sea, preferred to board the enemy and carry the decks by virtue of stronger fighting contingents. The Athenian tactic was successful so long as there was room to maneuver. However, when fighting in close waters, with land adjacent to both flanks of the battle line to prevent the fatal periplous so often performed by the fast Athenian trieres, Corinthian close combat tactics evolved during the course of the War.

The second phase of the war opened in 418 B.C., the great event being the disastrous siege of Syracuse by the Athenians in 413-412 B.C. After that, Athens was worn down by the steady attrition of her best crews, the defections of her subject allies, and by the endless fleets of her enemies - often financed by Persian gold. Finally, in 405 B.C. the brilliant Spartan general Lysander made a thrust against the Hellespont to block Athenian trade in the Euxine Sea. The Athenian fleet arrived to break the blockade but was captured on the beach by a surprise raid led by Lysander. The victory at Aegopotami destroyed Athenian seapower and forced an ignominious surrender upon Athens.

Petras, 429 B.C.: The Battle of Maneuver

A Corinthian force of 47 trieres and 5 supply ships carrying a large landing party set out to conduct operations against the Athenian base at Naupactus in the Gulf of Corinth. The 20-ship squadron at Naupactus was commanded by Phormio, who intercepted the heavily laden Corinthians in open water. Outclassed at the best of times, the Corinthian trieres were at least 20% slower than normal because of the weight of extra troops and supplies. The Corinthians especially feared envelopment, the periplous, by the speedier Athenians, so they placed 42 trieres in a circle about 300-500 yards across, the vessels facing outward ready to ram. The supply vessels and a reserve of 5 trieres were placed in the center of the circle. Phormio began to circle the Corinthians warily at two or three ship-lengths distance, not fearing ramming attacks because the Corinthians could not accelerate fast enough to catch the Athenians before they turned away to avoid the charge. Phormio waited for the morning breezes to throw the enemy ships against each other, for they could not long maintain relative position without moving. The breezes arose, confusion broke out in the Corinthian ranks as ships drifted together, and Phormio attacked with a classic diekplous maneuver, breaking into the center of the circle to sink one flagship and then ram many others in the stern. The battle ended with 12 Corinthians captured and the rest damaged, sunk, or fleeing.

Athenians : 20 x #12 Trireme III superior vessels, with Veteran crews in all categories.

Corinthians: 30 x #10 Trireme I and 17 x #11 Trireme II average vessels, with Regular crews in all categories. The fighting complements are 3 times normal, as the vessels were equipped for land service. The supply vessels are 5 x #19 small merchantmen. The Corinthian trieres are 20% slower than normal.

The battle opens with both sides 2000 feet apart, the Corinthians approaching from the south-east, the Athenians from the north-west. Land is 6 miles away to the north and south, and 4 miles to the east. The Corinthians will attempt to form circle to prevent envelopment and to force boarding actions on the Athenians to make use of their superior fighting contingents.

Victory Conditions: The breaking and fleeing of either squadron due to morale failure. Athenians win a crushing victory if they capture 10 ships and do not suffer more than 5 vessels "sunk".

Erineus, 413 B.C.: The Battle in Closed Waters

The Corinthians finally learned that they could not defeat the Athenians in a battle of maneuver. So, in 413, the Corinthian squadron opposite the Athenians at Naupactus made preparations for a battle on their terms. Preparations were structural and tactical. First, to avoid the dread Athenian periplous, the envelopment of the flank, the battle would be fought in constricted waters, with the flanks anchored by nearby land. It was a reversion to the tactics of Salamis. Second, the waters chosen for battle were a re-entrant bay, so shallow that soldiers stationed on either headland on the flanks could wade out to the vessels. Third, the epotides or cathead on the cheeks of the bow was strengthened on each vessel so that a beak to beak ramming attack would cause less damage to the Corinthian vessels. Thus they awaited a frontal attack. The Athenians arrived and took position outside the headland, waiting. Finally, the Corinthians advanced and entered into battle just outside the bay. The Athenians sank 3 vessels but had 7 of their own disabled by the heavy Corinthian epotides. Both sides claimed victory, since the Athenians recovered all the wrecks which drifted out to sea, while the Corinthians were proud of having inflicted greater damage than they suffered. Erineus demonstrates the weakness in Athenian naval policy. Athens had built up a system of ram tactics based on light, speedy vessels carrying few soldiers and avoiding boarding actions. The system required maneuvering room and was inapplicable in closed waters. This fact was perceived by Polyanthes, the Corinthian commander, and he restored the concept of naval fighting as an infantry battle. The ram became a secondary weapon, useful in the right conditions, but never the primary means of gaining victory at sea.

Athenians : 1 x #13 Trireme IV elite vessel with Veteran Elite crew.
12 x #12 Trireme III superior vessels with Veteran crews.
20 x #13 Trireme III average vessels with Veteran crews.

Corinthians: 5 x #11 Trireme II superior vessels with Veteran crews.
10 x #11 Trireme II average vessels with Veteran fighters and Regular crews.
15 x #10 Trireme I average vessels with Regular crews.
5 x #10 Trireme I average vessels with Reservist crews.
The Corinthian Trireme II's are capable of absorbing a beak to beak ramming attack made against them as if they were structural class B. Beak to beak attacks will not be ordered unless the captain finds the courage to do so (roll a 6-sided die; a 5 or 6 gives the needed courage).

The battle opens with both sides 500 feet apart, the Corinthians holding a line between two headlands. The depth of water in the bay is about 4 to 7 feet. Both sides roll a 6-sided die. The loser initiates the attack with a general charge.

Victory Conditions: The Athenians must inflict losses on the Corinthians greater than those suffered. Damaged vessels will drift toward the sea unless sunk inside the bay, where they will rest upon the bottom and be recovered by the Corinthians, whose land troops will wade out to the wrecks and occupy them.

Methymna, 406 B.C.: Fleet Action

With 140 ships, the Peloponnesian commander Callicratidas moved upon Methymna in Lesbos. Immediately after the capture of the town, Conon arrived with an inferior Athenian force of 70 vessels. Laying to over night, Conon discovered that he faced twice his numbers and made a run for Mytilene, some 35 miles farther south. He had to break through a Peloponnesian squadron to do it, however, and the engagement brought losses of 30 ships. The remaining 40

Athenian vessels took refuge in Mytilene and were blockaded by the enemy.

Athenians : 70 vessels. Build and man #12 and #13 Trireme III's and IV's with 2650 tournament points.

Peloponnesians: 140 vessels. Build and man #9 Biremes and #10 and #11 Trireme I's and II's with 3450 tournament points.

The action begins with Conon discovering 100 Peloponnesians making a sortie from Methymna 8000 feet to the west. The coastline runs south. A squadron of 40 Peloponnesians is 3000 feet to the south of Conon's force, taking up blocking positions to delay his passage long enough for the main body to catch up.

Victory Conditions: Conon must escape with at least 40 vessels and reach Mytilene. The Peloponnesians must inflict greater losses than 30 vessels upon the Athenian squadron. Point counts may be used in place of these conditions: Conon cannot lose more than 1140 tournament points in ships and crews. However, given these conditions, Conon can win a decisive victory if he inflicts three times the casualties on the enemy than are suffered by his own squadron.

Arginissae, 406 B.C.: Fleet Action

Conon managed to slip two of his fastest ships out of Mytilene to summon aid from Athens, and one managed to escape the pursuit. Meanwhile, an Athenian squadron of 12 ships lost 10 while trying to get to Mytilene to reinforce Conon, the two survivors managing to enter the harbour. Athens made a great effort and managed to raise 140 ships to send to Conon's relief. However, many of the vessels were old and were manned by "scratch" crews. Callicratidas, who now had 170 ships, left 50 to maintain the blockade and took the other 120 to Point Malea, some 4 miles south of the city. The Athenians stopped that night some 7 miles away at the Arginissae Islands. Callicratidas saw the fires of the Athenians and got under way at midnight to make a surprise attack, but squalls held him up until daybreak. He crossed over and formed a single line of ships. The Athenians formed a double line of vessels not far from the Arginissae Islands and waited for the Peloponnesians to approach. The Athenians used the islands as a background of maneuver, compelling the Peloponnesians to fight in two bodies. While the Peloponnesians had slightly better vessels and should have been able to perform a periplous to envelop one or both flanks, the Athenians maneuvered surprisingly well while the Peloponnesian squadrons chose to execute diekplous attacks. The result was that superior Athenian seamanship sank 70 vessels for a loss of 25 of their own. Unfortunately, bad weather came up and the Athenians were unable to salvage the wrecks, recover bodies, or catch the fleeing enemy. Meanwhile, the commander of the blockading squadron had a dispatch vessel covering the battle and was able to extricate his force without being engaged.

Athenians : 140 vessels. Build and man #12 and #12 Trireme III's and IV's with 4400 tournament points.

Peloponnesians: 120 vessels. Build and man #9 Biremes and #10 and #11 Trireme I's and II's with 3600 tournament points.

Conon's Sqn. : 42 vessels. Build and man #12 and #13 Trireme III's and IV's with 1650 tournament points.

Blockade Sqn. : 50 vessels. Build and man #10 and #11 Trireme I's and II's with 1550 tournament points.

There is a possibility (25%) that Conon has learned of the battle, and he will sortie if this is the case. Callicratidas must row 7 miles to engage the Athenian relieving force (expend fatigue to do so) before engaging the enemy, while the Athenians will be fresh and waiting.

Victory Conditions: Defeat the enemy and cause him to flee. If more than 3 times the casualties are inflicted (point count) than are suffered, a crushing victory is obtained. This is a battle "to the knife", for Athens must smash Callicratidas and relieve Conon if it is to have any hope for a naval recovery. Failure here will probably end the War with an Athenian Defeat.

THE FIRST PUNIC WAR

The First Punic War was almost a replay of the Peloponnesian War in that two distinct naval doctrines characterized the tactics of the belligerents. Like the Athenians, the mariners of Carthage preferred the oblique attack, keeping distance and using the ram and archery. The Romans, realizing that they were hopelessly inferior at seamanship, chose tactics that would bring to the decks of their enemies the thing they knew best: the invincible thrust of the Roman short sword. Thus the Romans adopted the grappling hook and the Corvus to restrict the movements of their enemy on the open sea, just as the Peloponnesians and the Syracusians had used close waters to restrict Athenian maneuvering more than a century earlier.

Mylae, 260 B.C.: Grapple, Board, and Storm!

No sooner had the Romans completed the building of their fleet of 140 ships than their enemies attempted a ruse to draw it out into open seas and destroy it. The Carthaginians raided Mylae near Messina in Sicily, threatening to cut off the Roman troops in the island. When Duilius appeared with the 140 triremes and quinqueremes of the Roman fleet, Hannibal, the Carthaginian admiral, cast all caution to the wind. With 30 vessels he headed away from the beach in a precipitous charge, not waiting for his remaining 100 vessels to get under way. Passing close inboard of the leading line of Romans to perform the classic diekplous attack, the Carthaginians were caught by grappling hooks and reeled into the range of the Roman Corvi. Within minutes after the engagement began, the entire lead squadron had been captured, including the great heptere of the admiral, who managed to escape in a small boat. The following squadrons of the Carthaginians approached more cautiously, having seen the disastrous defeat of the first wave. They maneuvered, using their superior speed and seamanship to attack the broadsides and sterns of the Roman ships, well away from the Corvi. But the Roman fleet now outnumbered them, and despite their sluggishness, there always were enough disengaged Roman vessels nearby to sneak up on a Carthaginian recovering from a collision or ramming attack to drop a Corvus on to his decks. After another 20 ships were lost, the Carthaginians withdrew in panic.

Romans : 100 x #24 Quinqueremes with Corvi, 50% with Reservist crews and 50% with Green crews. Fighting complements are all Veteran heavy infantry on the Roman model.

40 x #11 Trireme II's, 50% with Regular crews and 50% with Reservist crews. Fighting complements are all Veteran heavy infantry on the Roman model.

Carthaginians: 1 x #16 Successor Pentere (heptere flagship) with Elite rowing crew and Veteran fighting complement of medium infantry (40% archers). Two catapults are mounted forward.

29 x #11 Trireme II's with Veteran crews.

60 x #11 Trireme II's with Regular crews.

40 x #22 Penteres with Regular crews.

The Carthaginians begin with the heptere and the 29 Veteran triremes off the beach. The squadron must attempt a diekplous attack on the Romans, not waiting for the remaining 100 vessels anchored close inshore. The second Carthaginian line is placed 2000 feet astern of the first once the first line has joined battle. The Romans are formed in a double line, with 40 Triremes and 50 Quinqueremes in the first line, and the Reservist quinqueremes forming a second line of 50 ships 300 feet behind.

Victory Conditions: Defeat the enemy in detail. At this time, neither side had any more ships around Sicily, and the one who seriously damaged the other would cut off the loser's troops in the island, assuring victory on land. Determine victory by a point count. A 35% loss must be inflicted on either side over and above casualties sustained. Count captured ships as part of the victor's fleet when computing losses.

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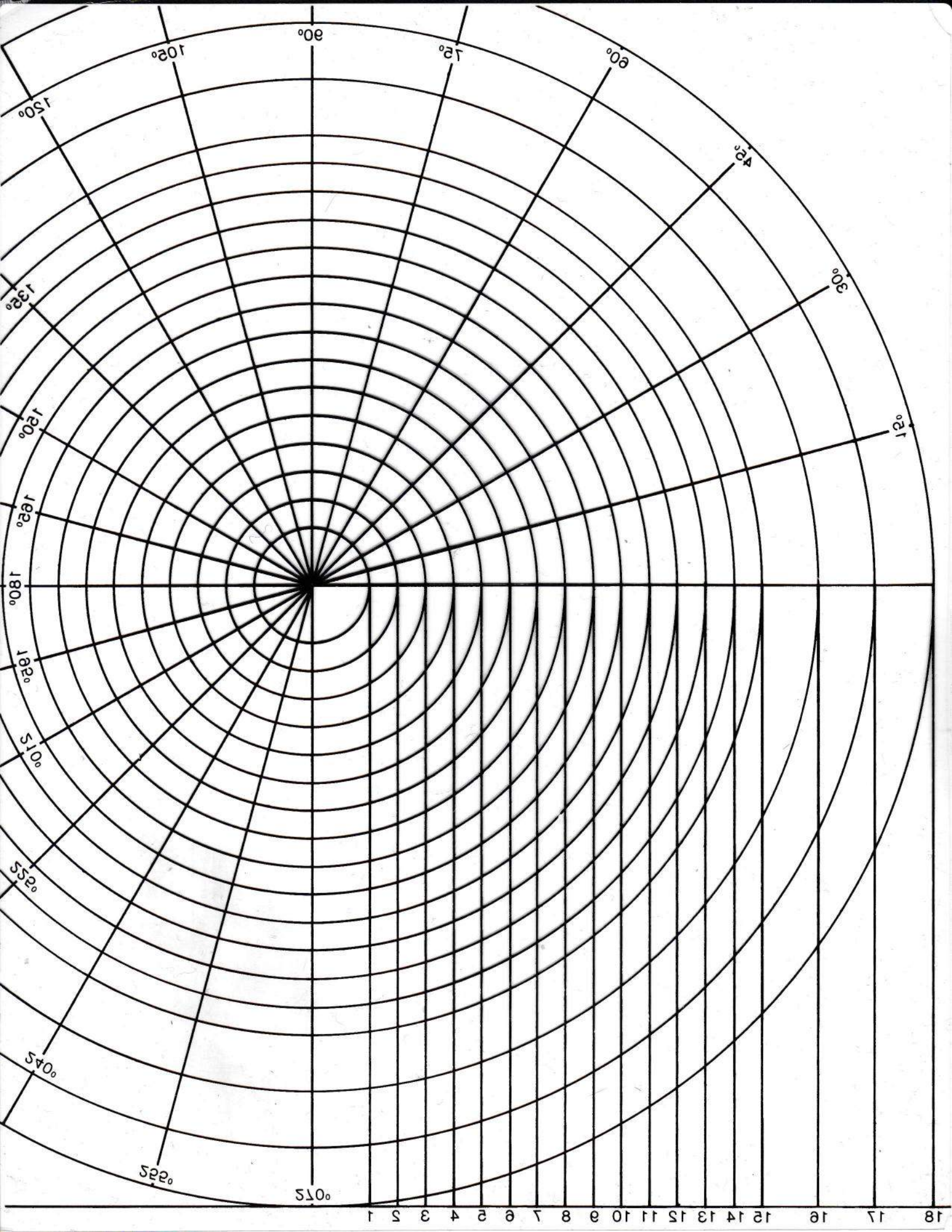
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BIREME & GALLEY

Type of Ship: _____ Name/Number of Vessel: _____ Size No.: _____

Construction: _____ SSTR _____ Strength Points _____

Flotation Points: _____ Rigging: _____

SAILING SPEEDS: Lt. Breeze: _____ ROWING SPEEDS: Slow Cruise: _____

Good Breeze: _____ Standard Cruise: _____

Good Wind: _____ Battle Cruise: _____

Strong Wind: _____ Ramming Speed: _____

Maximum: _____ Racing Speed: _____

TURNING MODE: _____

<u>CREW TYPE</u>	<u>Class</u>	<u>No. of Troops</u>	<u>Individual CSF</u>	<u>Endurance Level</u>
Officers	_____	_____	_____	
Sailors	_____	_____	_____	
Soldiers	_____	_____	_____	
Rowers	_____	_____	_____	_____
Archers*	_____	_____	_____	
Artillerists*	_____	_____	_____	
Other	_____	_____	_____	

* These tend to be the same as the soldiers aboard.

<u>ARTILLERY</u> : Scorpion:	x _____	2½-pdr.:	x _____	+ _____	shot.
Ballista:	x _____	4½-pdr.:	x _____	+ _____	shot.
Catapult:	x _____	6-pdr.:	x _____	+ _____	shot.
Greek Fire:	x _____	9-pdr.:	x _____	+ _____	shot.
Corvus:	x _____	24-pdr.:	x _____	+ _____	shot.
Kegs of Powder:	x _____	36-pdr.:	x _____	+ _____	shot.
Stone Shot:	x _____				

BATTLE ORDERS:

Turn 1 _____

Turn 2 _____

Turn 3 _____

Turn 4 _____

Turn 5 _____

Turn 6 _____

Turn 7 _____

Turn 8 _____

