

eastern Balkans and the Sauromatae (later called Sarmatians) east of Don—though the last mentioned slowly moved westward. A second peak of Scythian power and the golden age of their art were reached toward the middle of the fourth century BCE under King Ateas. Ateas subdued Dobrogea (since called Scythia Minor), south of the Danube River, and fought battles against the Triballoi in the central Balkans and against Philip II of Macedon. To Ateas's reign date the best-known Scythian tumuli, with royal jewelry and toreutics (as at Tolstaya mogila, Kul'-Oba, and Great Bliznitsa), and the introduction of Scythian coinage. In his last battle against Philip, in 339 BCE, Ateas (then ninety years old) was killed and his army defeated. Philip II took twenty thousand women and children as part of the booty, in addition to an equal number of horses. In 331 BCE, Olbia, with the help of the Scythians, resisted an attack of the Macedonian general Zopyrion, sent by Alexander the Great; during the third century BCE, however, the Scythians lost most of the Pontic steppe to the Sarmatians, and their kingdom became confined to the inner Crimea and to a coastal strip between Crimea and Olbia.

The Scythian kingdom in the Crimea, with its capital at Scythian Neapolis, fought, with more or less success, its Greek neighbors and the mountainous Taurae in the southern Crimea. In 110 BCE, the Scythians were severely defeated by Diofantès, a general of Mithridates VI of Pontus, but they maintained some of their positions until the third century CE, when they finally disappeared from history.

[See also Anatolia, article on Ancient Anatolia.]

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SCYTHOPOLIS. See Beth-Shean.

SEAFARING. By learning to build vessels that could travel over open water and by attaining the knowledge necessary to operate and guide them, sailors in antiquity transformed watery frontiers from insurmountable barriers to su-

perhighways. Over those routes, cultures were able to communicate in the widest sense of the term, facilitating the process of human development. The earliest evidence for Mediterranean seafaring are flakes of obsidian found on the Greek mainland in Franchthi cave in Upper Paleolithic and Neolithic strata (c. eleventh–fourth millennia) that originated on the Aegean island of Melos. This material could only have reached the mainland by means of water transport, as Melos was never connected to the mainland. It is not known how Paleolithic seafarers learned of the existence of obsidian on Melos, but it seems likely that Melos was only one of many islands visited by them without their leaving any evidence of their visits.

There are no known depictions of the vessels employed by these early seafarers. Perhaps they voyaged on primitive reed rafts, similar in construction to the *papirella* built until recently on Corfu. In an archaeological experiment, a modern 6-meter-long *papirella* was paddled successfully from Lavrion on the southwest coast of Attica to Melos, indicating that such voyages were at least theoretically possible. Skin craft are another, although less likely, possibility. Later, Neolithic tools would have permitted the construction of dugouts (monoxylons).

In antiquity, hulls were built in a method quite different from that used today. After raising the keel and posts, a modern shipwright attaches the frames to the keel and then builds up the hull's shell around the framing system, known as frame-first, or frame-based, construction. The shipwright's ancient counterpart, however, after preparing the vessel's keel and posts, built the shell of the hull's planking before inserting the frames into it. This method is known as shell-first, or shell-based, construction.

The hulls of all seagoing ships built before the end of the Roman period that have been excavated in eastern Mediterranean waters were edge-joined with closely spaced mortise-and-tenon joints. The joints were locked in place with wooden pegs, usually driven from inside the hull. No caulking was required, as the wooden planks swelled upon contact with water, effectively sealing the planking seams.

Other forms of hull construction existed simultaneously. Pharaonic Egyptians went to sea in hulls that apparently were held together primarily with longitudinal lashings. Unpegged mortise-and-tenon joints served to seat the planking. This construction method was used on the (nonseagoing) Cheops ship found at Giza. [See Giza.] Lashed hulls were particularly useful for ships on the Red Sea run to Punt. For those ventures, ships were built on the Nile River and then dismantled to permit them to be carried overland to the Red Sea coast, where they were reassembled for the voyage.

Until fairly recently, blue-water sailors had only three options for propelling their vessels: paddling, rowing and sailing. Paddlers sit facing the vessel's bow, usually in a kneeling position. Energy is transferred through the bodies of the paddlers to the vessel because the paddles are used as levers.



SEAFARING. *Painted vase showing a ship and animals. Egypt, Predynastic period (c. 3400-3000 BCE). Inv. EO 304. (Erich Lessing/Art Resource, NY)*

The earliest-known depictions of Aegean ships (third millennium) illustrate what appears to be a type of vessel that is long and narrow with rows of lines on either side. The lines probably represent paddles rather than oars. Paddling requires significantly less inboard space than rowing, as paddlers must sit next to the sides of a vessel; therefore, narrow boats would have been paddled rather than rowed. Aegean ships were still being paddled in waterborne cultic races/processions as late as the seventeenth century BCE, even though this mode of propulsion was no longer suited to the contemporary craft used in the celebrations. Paddling thus appears to have had a long tradition in the Aegean.

In rowing, the oar is held in an oarlock or rope grommet attached to the vessel's caprails, which transfers energy directly to the vessel. Normally, the oarsman sits facing the vessel's stern and pulled the oar toward his chest while leaning backward. As rowing requires the use of lower-body muscles during the stroke, it is a far more energy-efficient manner of propulsion than paddling.

The Neolithic colonization of Crete, during the latter part of the eighth millennium or the early seventh, appears to have been a result of an organized migration. In order to establish themselves on Crete, those early colonists must have transported at least 15 tons of breeding-stock grain and

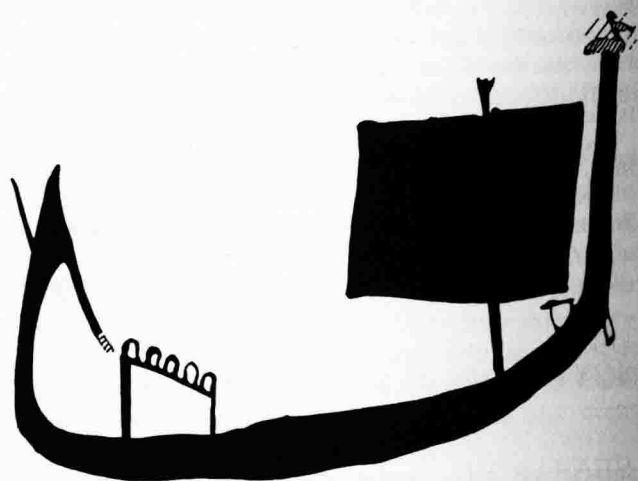
personal items in a single sailing season. Moving such masses of material would have been virtually impossible if the vessels were paddled. This consideration suggests that rowing, and/or the sail, was known by the Neolithic period in the Aegean.

A ship painted on a Gerzean-period jar carries the earliest known depiction of a sail; it is roughly square in shape and spread on a mast stepped in the ship's bow. Throughout the Bronze Age, the boom-footed sail, in a variety of shapes and variations, remained the only sail in use. In this sail system, the boom was lashed to the mast and the sail was set and lowered by raising the yard to the masthead by means of halyards. Such a rig did not permit reducing the sail. To take the sail in, the crew had to lower and remove it and then replace it with another, smaller sail.

The boom prevented the use of shrouds—the lines running from the masthead to the sides of a ship that normally supply lateral support. In place of shrouds, at least on Bronze Age Egyptian, Syro-Canaanite, and Cypriot ships, seagoing ships employed lateral cables attached to the bottom of the mast, about the height of the boom.

Toward the end of the Late Bronze Age, a new and innovative form of sail came into use. This rig, termed the brailed sail, did away with the boom. Instead, a system of lines (brails) attached to the foot of the sail was carried through vertical rows of rings sewn to the sail and carried over the yard back toward the stern. The brails acted like modern Venetian blinds. The sail could be more easily controlled by hauling on—or releasing—the brails. This apparently permitted greater ability in sailing to windward. Indeed, the enhanced seafaring abilities that mark the beginning of the Iron Age are probably to be attributed primarily to the appearance of the brailed sail.

The origins of the brailed sail are unclear. Some New



SEAFARING. *Earliest known depiction of a sail, painted on a Gerzean jar. (After Frankfort, 1924, pl. XIII)*

Kingdom depictions show ships carrying a prototype sail that was raised to the yard, yet still carries a boom. It is unlikely, however, that the brailed sail was an Egyptian invention. The brailed rig seems to have come into general use in the eastern Mediterranean in about 1200 BCE. It appears prominently on both the ships of the attacking Sea Peoples as well as those of the defending Egyptians in the scene of Rameses III's naval battle at Medinet Habu (see below). All depictions of Aegean ships, down to the end of the thirteenth century BCE (Late Helladic IIIB), in which the type of rig can be identified, show them carrying boom-footed rigs; those dating to the twelfth century BCE (and later) are all depicted carrying brailed rigs.

Sails were woven primarily of linen. No remains of sails have been found on any ancient Mediterranean shipwrecks; however, part of a sail, with a wooden fairlead still attached, was found among the wrappings of a second-century BCE mummy.

The square sail was intended primarily for sailing before the wind. Crews either took to their oars or bided their time when winds were contrary. The ability of a ship mounting a square sail to sail into the wind depends on a variety of considerations, including the specific type of rig and the design of the hull and its ability to prevent drift to leeward. The *Kyrenia II*, a replica of a fourth-century BCE merchantman, employing a brailed sail, was able to sail 50–60 degrees (4–5 points) off windward. A boom-footed sail would have severely hampered these abilities.

The lack of shrouds, and the curious consideration that seagoing ships were built with their keel (or keel planks) rising upward, inside the hull, instead of protruding below it (where it would have served to prevent leeward drift), both suggest that the Bronze Age seafarers who employed the boom-footed square sail were not unduly concerned with utilizing winds from far off the stern.

From the lines used to control ships' sails to the hawsers, which allowed ships to anchor, ropes were an integral part of ships' equipment, used for a variety of purposes. In antiquity, a variety of fibers were used in rope making.

Models of Middle and New Kingdom ships that have been preserved with their rigging have a number of recognizable knots, primarily hitches and lashings. While the use on models of such knots does not necessarily prove their use at sea, it does indicate that such knots were known.

The ability to navigate to a destination after crossing an expanse of water, often out of sight of land and seemingly lacking in directional signs, is a prerequisite of seafaring. In antiquity the sailing season was relegated primarily, although not exclusively, to the summer months. During those months the predominant wind in the eastern Mediterranean is northwesterly. This had a profound influence on sea routes. With a square sail it was relatively easy to reach Africa from Europe. Returning was, however, another

matter. A return trip required a counterclockwise voyage around the entire Levantine coastline. Although there is little archaeological evidence for it, ancient Mediterranean seafarers must have had access to a broad body of knowledge relating to navigational techniques and meteorology. At the same time, a lack of navigational tools need not reflect a lack of navigational knowledge. It is possible to have a remarkably developed navigational system that would leave no trace in the archaeological record, beyond evidence that voyages were indeed being made.

Ancient navigation was an art, rather than a science, and was based on an broad knowledge of position-locating factors committed entirely to memory, as studies of Polynesian navigational techniques have demonstrated. In Oceania, no position-determining instruments were ever carried on board ships, despite remarkable feats of navigational skill. Theoretically at least, a similar situation may have existed in the Mediterranean during the Bronze and Iron Ages.

There are two methods for determining the direction of land lying beyond the horizon with birds. In one, land birds that were unable to land on water—ravens, crows, doves, and swallows—were carried on board ship and released when needed. Upon gaining height, if the bird saw land it would invariably make a beeline toward it, and freedom, indicating the direction of the nearest landfall. If, however, it did not sight land, the bird had no choice but to return to the ship. This land-finding technique is of high antiquity; Noah (*Gn.* 8:6–12), as well as his Mesopotamian counterpart Utnapishtim, are reported to have used this land-finding method. Seabirds have also been utilized as a navigational aid. By acquiring an intimate knowledge of the habits of seabirds that nest on rookeries on shore yet feed far out to sea, it is possible to determine landfall by taking careful note of the direction in which flocks of seabirds fly in the morning or during the late afternoon.

As has been shown by Oceanic navigators, winds can be significant indicators of direction. Before the introduction of the magnetic compass there was the wind rose. By noting the “signature” characteristics of each wind, it was possible to determine the direction from which it blew. The Phoenicians are credited with introducing the wind rose into the Mediterranean. [See Phoenicians.] Homer knew of four winds. Later Greeks developed this wind rose into the eight-wind system portrayed on the first-century BCE Athenian Tower of the Winds (horologium or water clock).

Winds, however, are directional indicators of a secondary nature that must be compared with more reliable directional phenomena. When in sight of land, landmarks were valuable navigational aids. In classical times, seafarers could avail themselves of *periploi*, “handbooks” containing information on anchorages, landmarks, and other details valuable to seafarers. The sun could also be used as a navigational aid, although its points of rising and setting vary throughout the

year. However, only stellar navigation—a sidereal compass—can supply fixed points in open water. As demonstrated by Oceanic navigators, stellar navigation is based on an intimate knowledge of the rising and setting points on the horizon of numerous stars.

Ships are at the mercy of the weather, and therefore seafarers, no doubt from earliest times, developed an intimate knowledge of weather lore. The biblical writers considered the east wind particularly dangerous and repeatedly describe it as destroying the large seagoing merchantmen called Tarshish ships (*Ps.* 48:7; *Ez.* 27:26). Josephus describes the “black norther” that destroyed the Jewish rebel fleet at Jaffa in 67 CE, as well as the destructive tendencies of the southwest wind (*War* 1.409; 3.421–426; *Antiq.* 15.333). The best-known weather lore from antiquity appears in the New Testament (*Mt.* 16:2–3; *Lk.* 12:54).

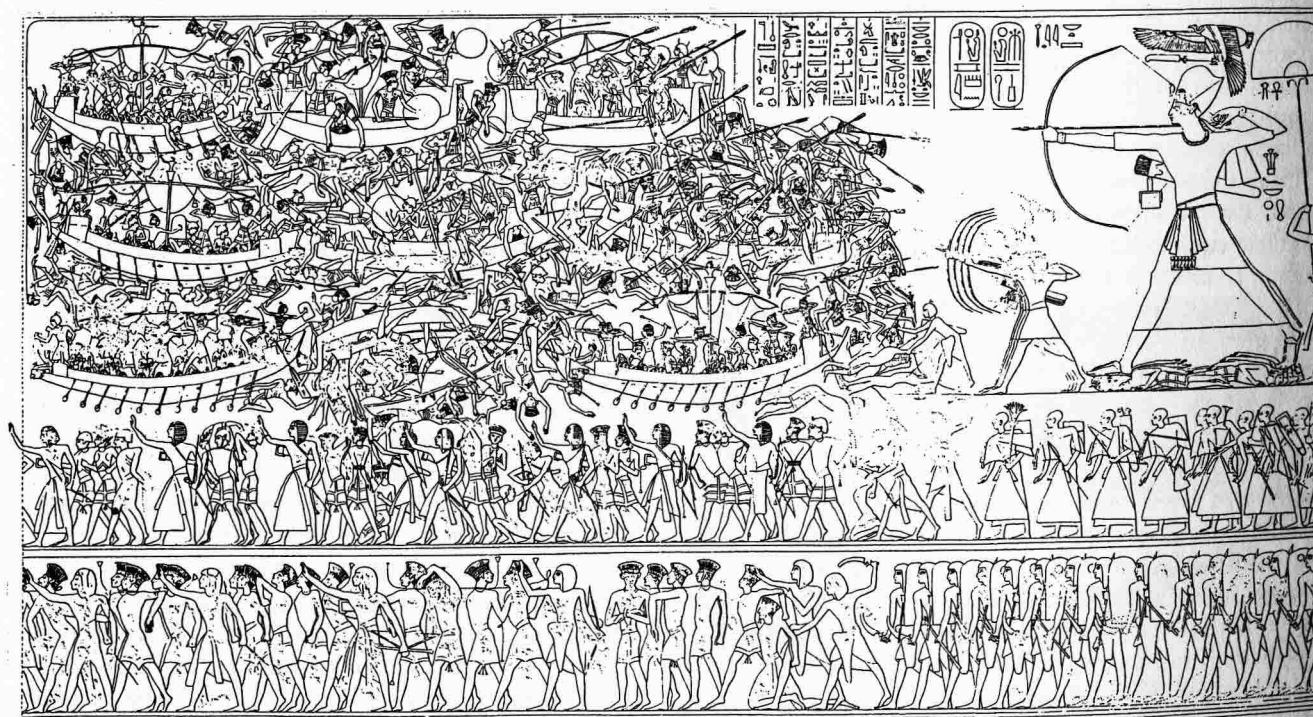
International and local trade were carried out by ships that were able to move heavy and bulky cargoes for great distances at appreciably lower rates than land-based transport. Shipwrecks, like those uncovered at Uluburun and Cape Gelidonya in Turkey and off Kyrenia on Cyprus, have provided intimate, and often surprising, information about the types of cargoes carried. [See Uluburun.] Ships, as well as timber for their construction, were in themselves also an important trade item.

Ugaritic texts and the Tale of Wenamun indicate that by the end of the Late Bronze Age a code of maritime laws

existed along Levantine shores. This was a prerequisite for maintaining seaborne commerce and diplomacy.

Ship-based warfare played a predominant role in seafaring. By the sixth dynasty, and probably earlier, Egyptian oared ships were employed as rapid military transports for attacks along the Syro-Canaanite coast and for transporting the resultant spoils back to Egypt. Unas (Wenis), an officer who served under Pepi I, describes in his cenotaph at Abydos how he used ships to transport forces, landing them behind a prominent landmark he calls the Antelope’s Nose, perhaps an early name for the Carmel Mountains in the region of Haifa, Israel. Throughout the Bronze Age, the purpose of ships in military ventures was the rapid transport of forces to their destination. In sea battles, ships were used as floating platforms on which soldiers fought. Šuppiluliuma II, the last king of the Hittite Empire, refers to three sea battles in which he fought against “the ships of Alashiya,” perhaps an allusion to contingents of ship-based Sea Peoples who used Cyprus as their base of operations. Rameses II mentions doing battle against ships of the Shardanu, one of the groups of Sea Peoples, on a stela from Tanis. [See Hittites.]

The earliest-known depiction of a naval battle is carved in relief on the outer wall of Rameses III’s mortuary temple at Medinet Habu. The scene graphically describes a successful surprise attack by Rameses’ forces against an invading fleet of Sea Peoples. The engagement apparently took



SEAFARING. Naval battle depicted at Medinet Habu. (After Nelson et al., 1930, pl. 37)

place in the Nile Delta region. In the first phase of the engagement, Egyptian archers, located on ships and on shore, used composite bows to pick off the invading warriors at long range. Against this, the Sea Peoples, armed only with medium-range throwing javelins and swords, were defenseless. Once the enemy was neutralized, the invading ships were capsized by tossing four-armed grapnels into their rigging. The grapnel is the only strictly nautical weapon depicted in the relief.

The naval weapon par excellence of antiquity was the waterline ram, which is believed to have evolved first in Greece during the Geometric period. A badly damaged Assyrian wall painting dating to about 700 BCE is the earliest pictorial representation of one war galley ramming another ship. The first battle known to have taken place after the introduction of the ram transpired off Alalia on the eastern coast of Corsica in 535 BCE. From then until the Battle of Actium (31 BCE), some sixty naval battles of varying size and intensity are recorded.

The ram went through four distinct evolutionary phases. Between about 900–600 BCE, it was a metal-sheathed point, apparently a development of the protruding bow structures that appear on Mycenaean galleys. In the sixth century BCE, a blunt ram in the form of a boar's snout replaced the point. The boar's head ram was popular for the next two centuries. Then, toward the end of the fifth century BCE, a three-finned ram came into widespread use. It was this device, typified by the 'Atlit ram, that destroyed Anthony's fleet at Actium—and it may have been used earlier, in the waning years of the Peloponnesian wars. [See 'Atlit Ram.] The fins apparently were intended to prevent the ram from piercing the enemy's hull, which would have endangered the attacking ship by locking her into a deadly embrace while other ships could ram her. The three-finned ram was employed to open the planking seams by breaking the mortise-and-tenon joints holding them together, thus permitting seawater to enter the hull and render it inoperable. To use the ram effectively, galleys had to be heavy: the weight contributed the momentum necessary to damage the enemy's hull. The ship itself was the weapon; the ram was only the "warhead" by means of which the attacking ship's momentum was imparted to its victim. In about 100 CE, the three-finned ram fell out of use. The last phase of the ram was during the Byzantine period.

[See also Anchors; Fishing; and Ships and Boats.]

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SEALS. Small stones (5–10 cm) whose flat or cylindrical surfaces are carved in intaglio with a design or inscription have been used as seals since the Late Neolithic period (7600–6000 BCE) in Syria (Wickede, 1990). The engraved surface was designed to be read in the impression left on receptive materials (clay, wax, soft metal). Through the impression a seal could convey a message of ownership, authorization, or responsibility (Gibson and Biggs, 1977). An inscription most commonly contains the owner's name, patronymic, and office, although prayers and religious dedications are not uncommon. As Dominique Collon demonstrates in *First Impressions* (1988), the inscription and the design offer information on onomastics, political hierarchy, myth, ritual, and activities of daily life. Not all engraved stones were used as seals: some were amulets and others were used as personal ornaments. Seal impressions themselves also may have had an apotropaic, magical, or purely decorative function. Seal stones often were pierced to be worn as rings, pendants, or bracelets. Fired clay, wood, bone, ivory, and metal are used for seals as well, but these more fragile materials have not survived in the quantities stone seals have. Flat-surfaced stamp seals appear before cylinder seals in the Near East and were the preferred form of seal in Anatolia, Egypt, and the Levant. Stamp seals are divided into typological classes according to the presence or absence of a handle and according to shape. Cylinder seals were the preferred form of seal in Mesopotamia, Iran, and Syria-Palestine, areas that used cuneiform script during the Bronze Age. Cylinder seals are characterized by place of manufacture, historical phase, and design.