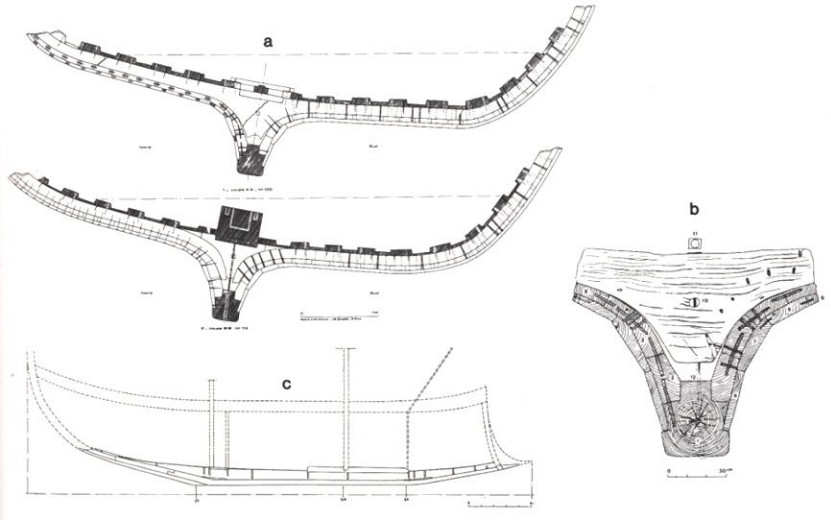
Basic Principles of Design, Construction, and Propulsion for Ancient Ships



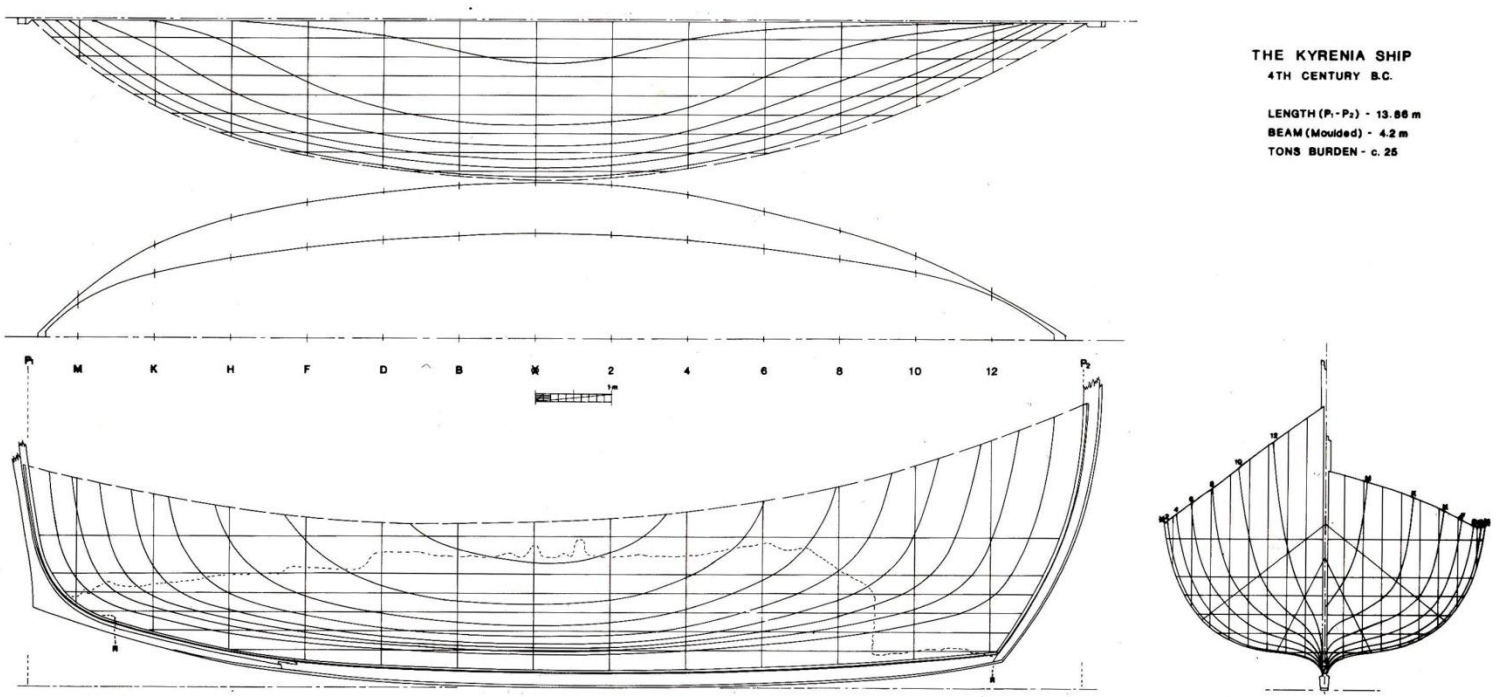
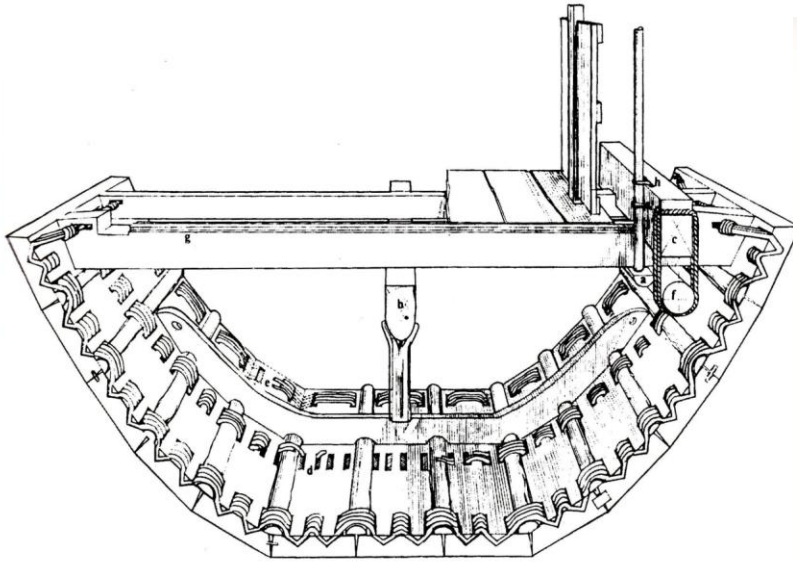
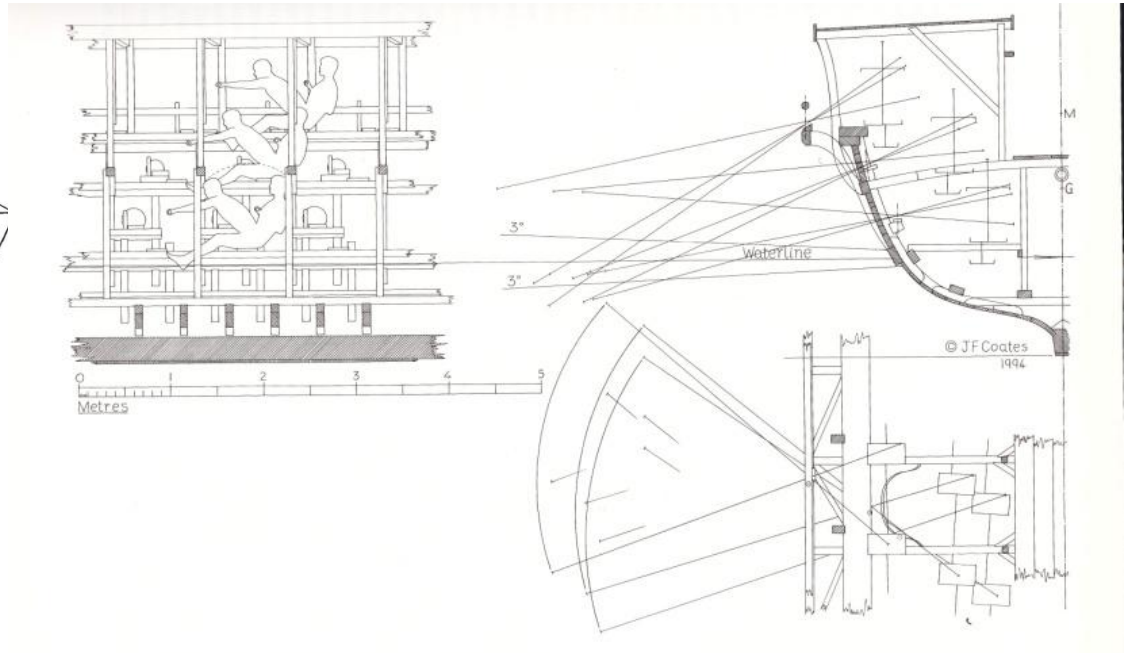


FIG. 3–38. The lines of the Kyrenia ship.

A ‘lashed’ hull

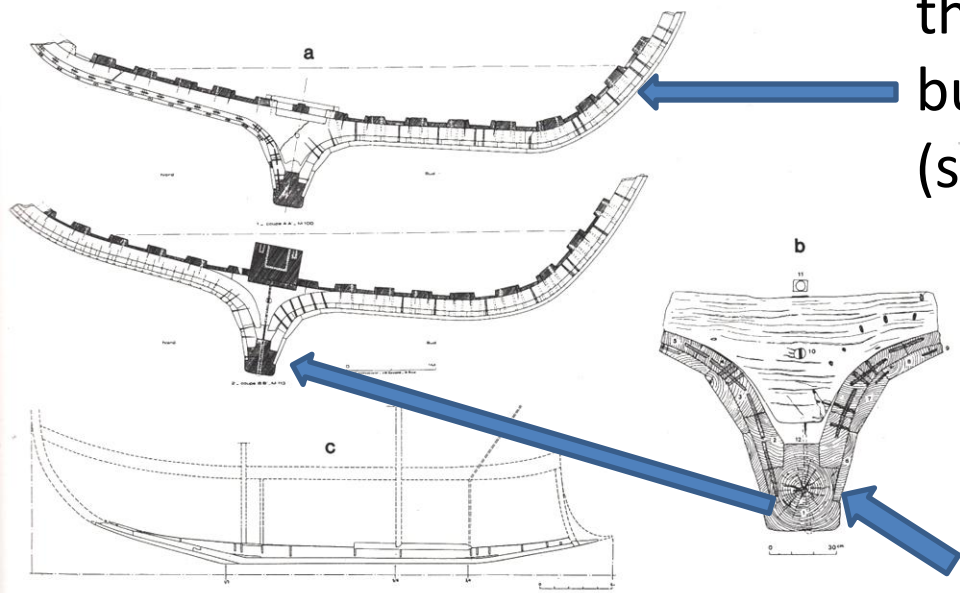


Three banks of rowers in a trireme



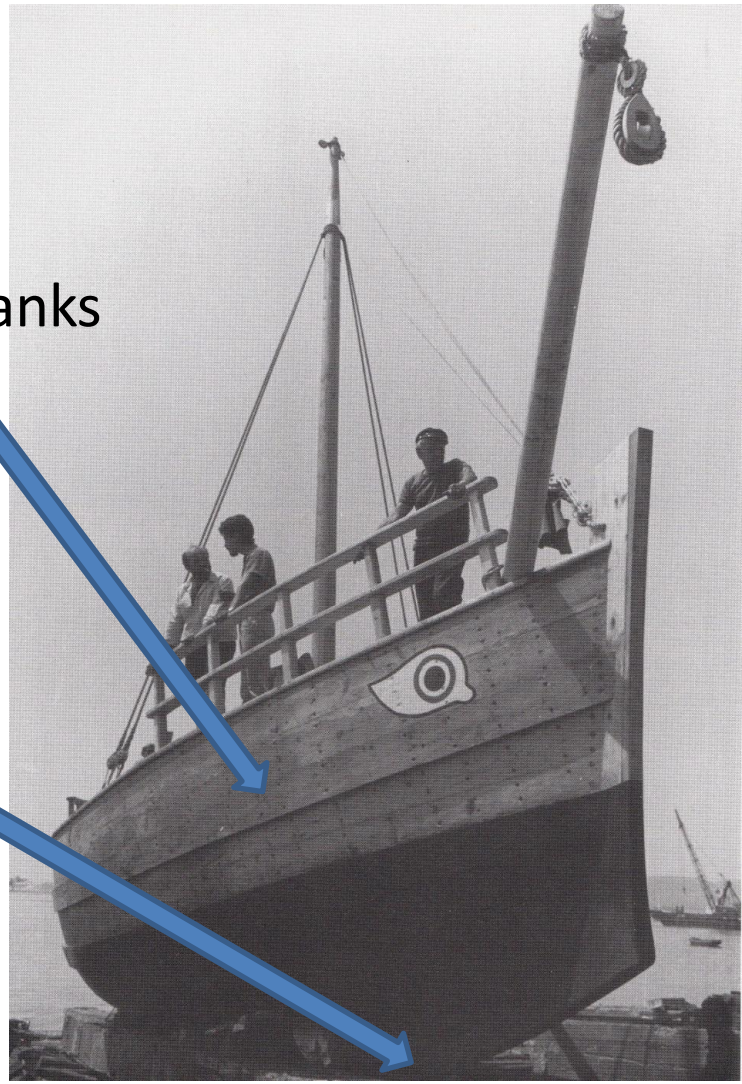
1. Basic terminology in construction and design
2. Design features of ancient ships of commerce
3. Design features of ancient ships of war
4. Principles of propulsion

Basic terminology in construction and design



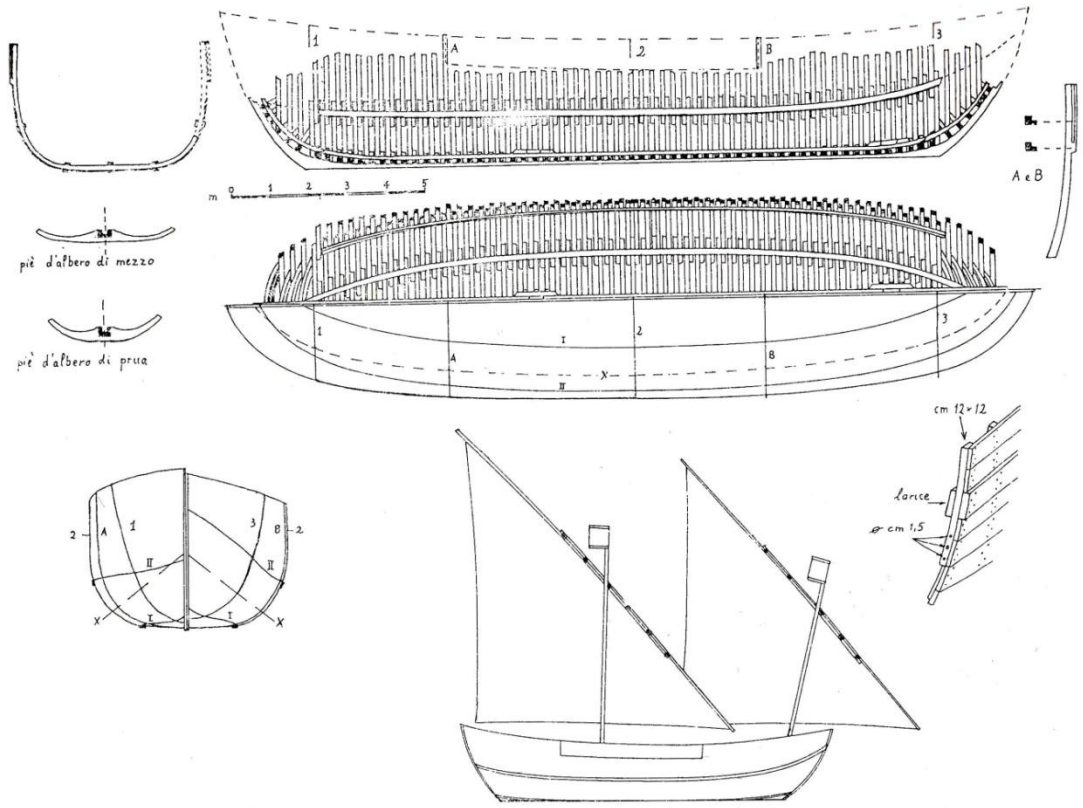
the hull
built of planks
(skin)

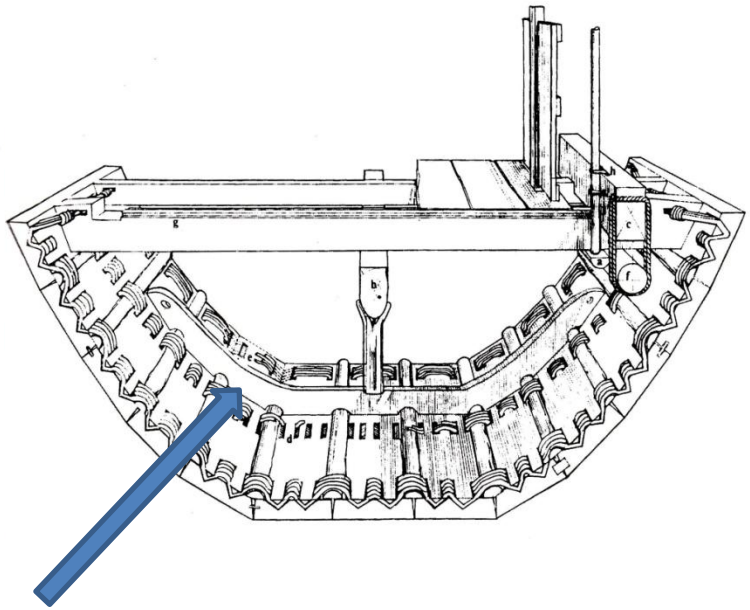
the keel
(spine)



The keel supports the ‘length’ of the ship

Basic terminology in construction and design

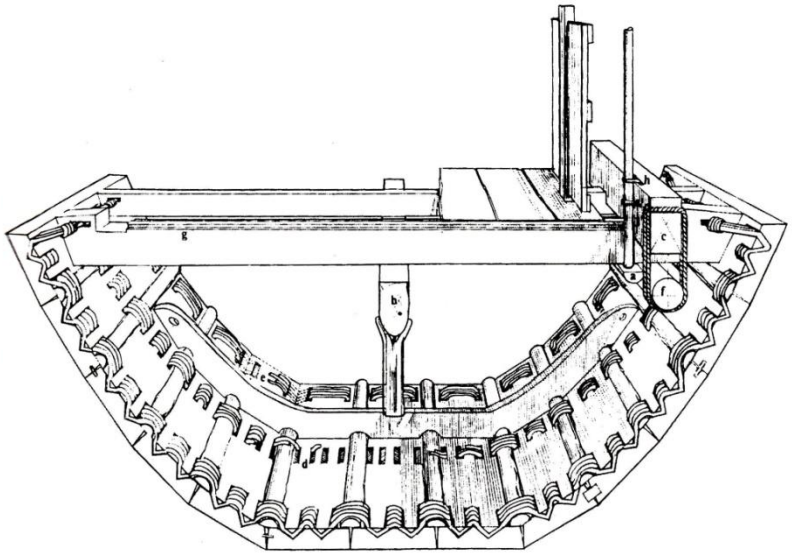




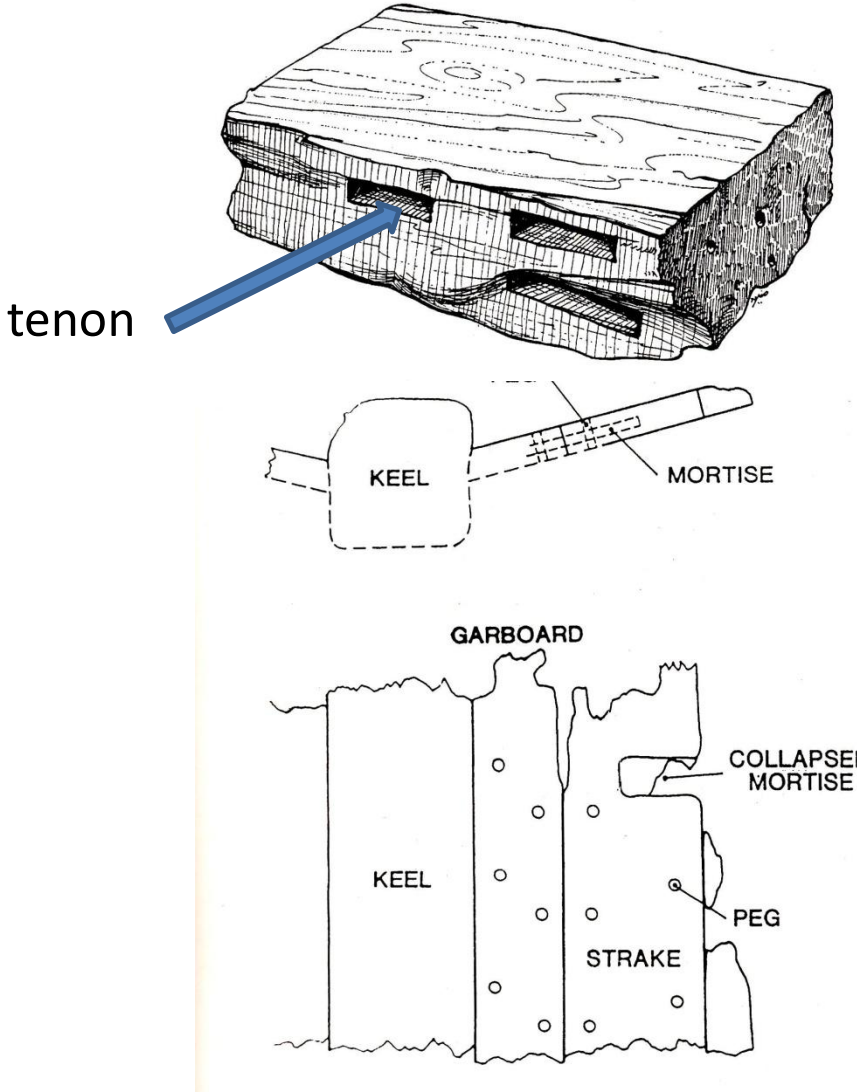
The frames (ribs)

The frames support the ‘beam’ of the ship

Fastening the planks of the hull in the ancient Mediterranean region

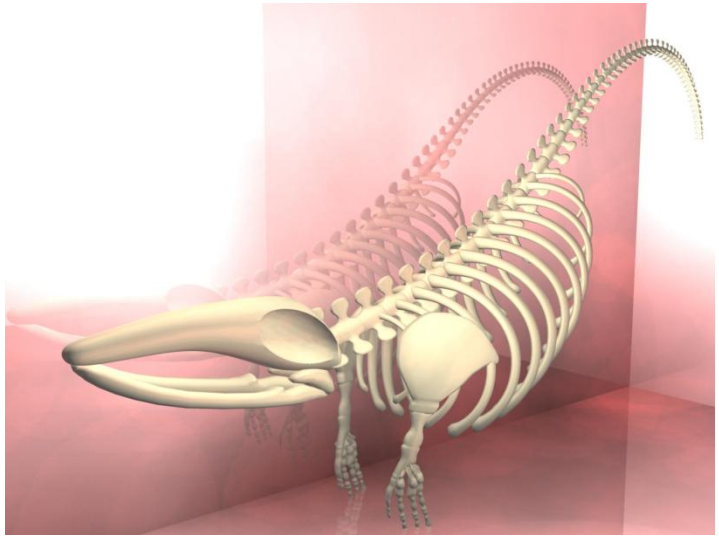


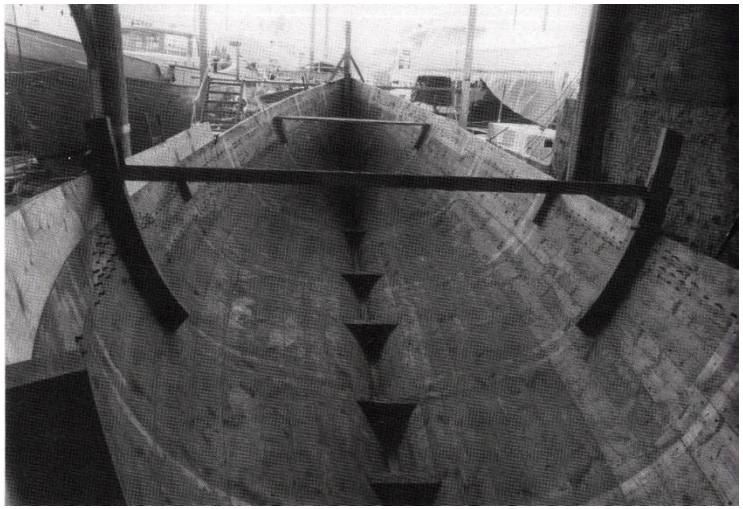
Lashing the planks with ligatures (most Egyptian river craft, sometimes used in combination with mortise and tenon joinery on Mediterranean seagoing ships)



Joining the planks with mortise and tenons (all ancient Mediterranean seagoing ships)

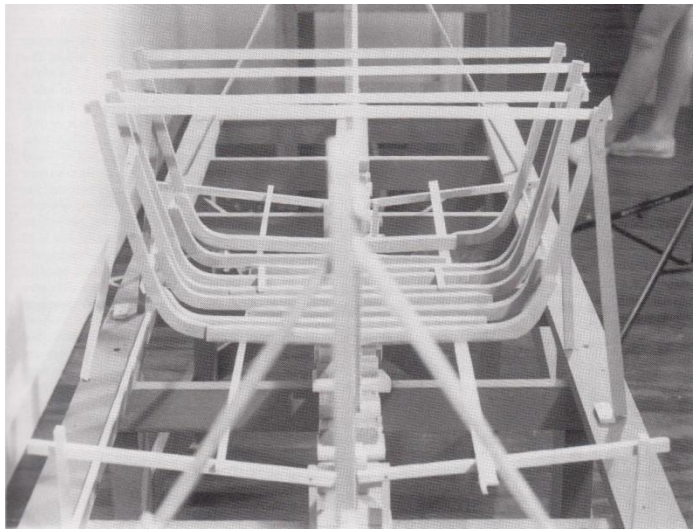
Skeleton (frame)-first is far less labour intensive (fewer or no tenons!) and more uniform or ‘industrial’





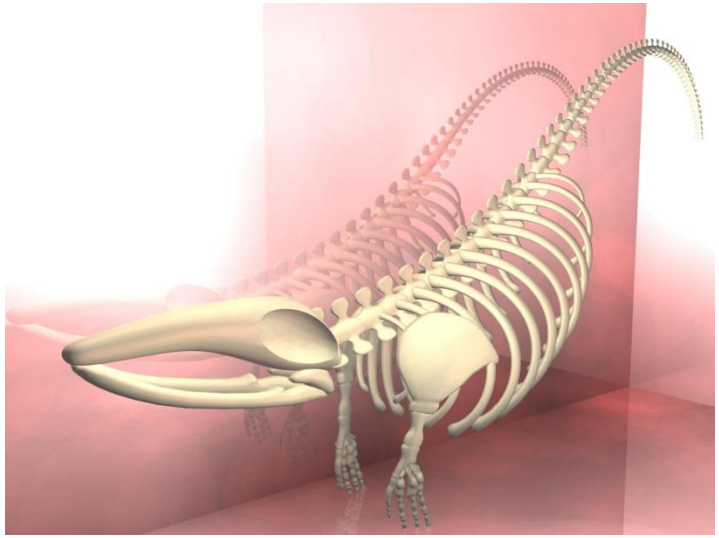
Reconstruction of the shell (hull)-first Kyrenia shipwreck (ca. 300 BCE)

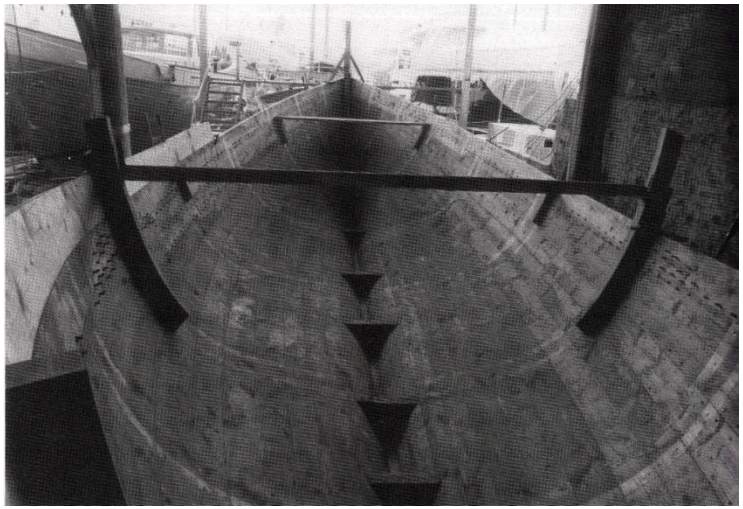
A chronological trend



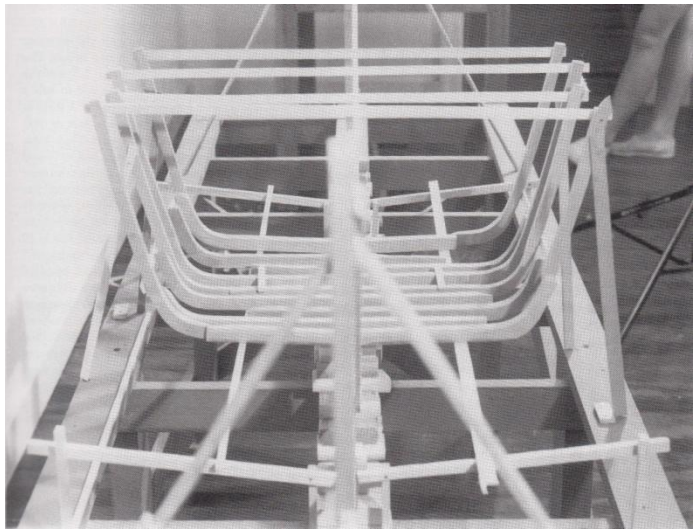
Reconstruction of the skeleton (frame)-first Serce Limani shipwreck (ca. AD 1000)

Shell and skeleton as design and construction concepts in ancient Mediterranean shipbuilding





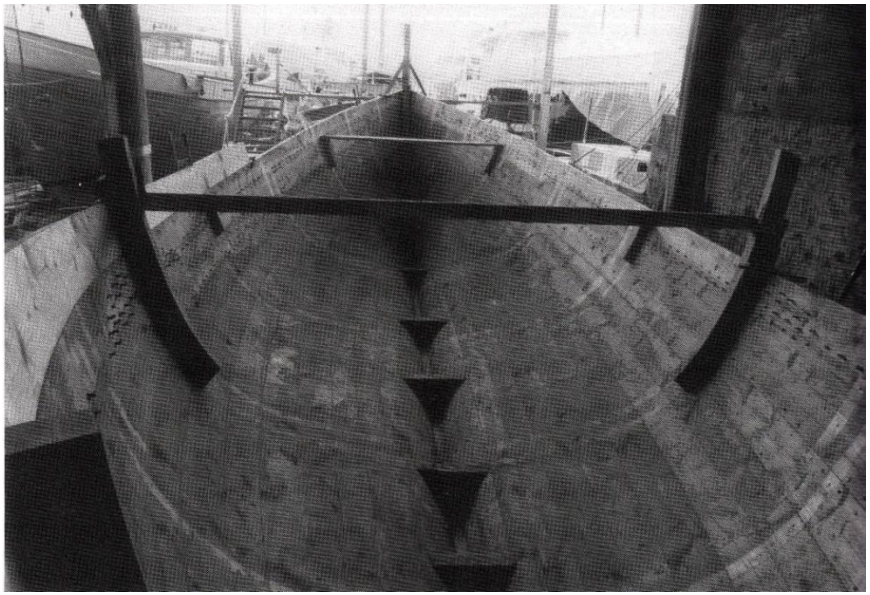
A chronological trend



Reconstruction of the shell (hull)-first Kyrenia shipwreck (ca. 300 BCE)

Reconstruction of the skeleton (frame)-first Serce Limani shipwreck (ca. AD 1000)

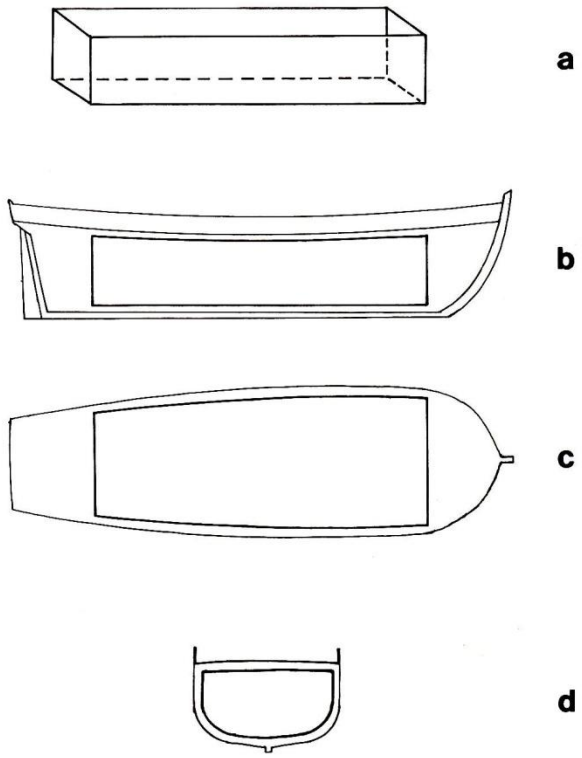
All of the ship projects you have chosen will be based on the shell-first principle (labour intensive, idiosyncratic, more intuitive than engineered)



Skeleton-first concepts do not begin to be formulated in the Mediterranean until ca. AD 600

Moving large wooden containers through water

Design principles for ancient ships of commerce and war



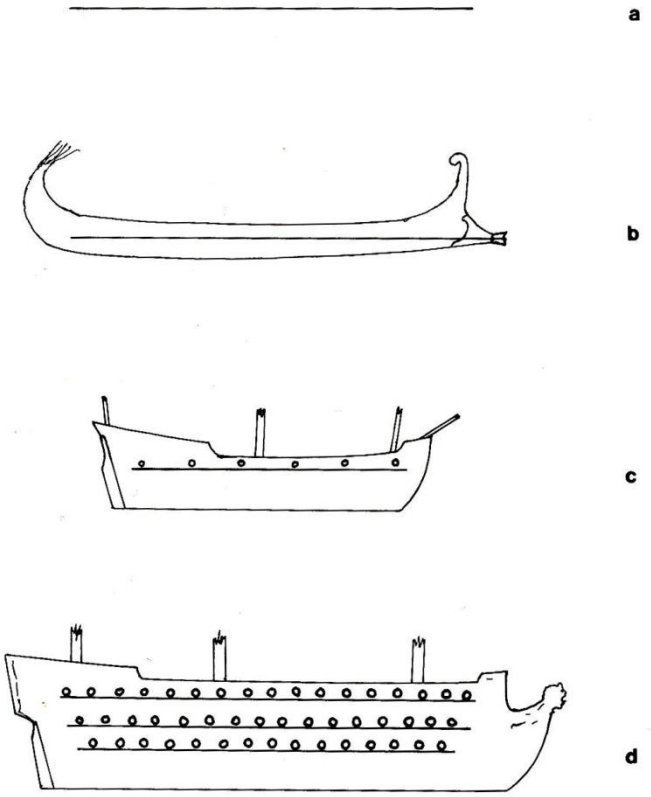
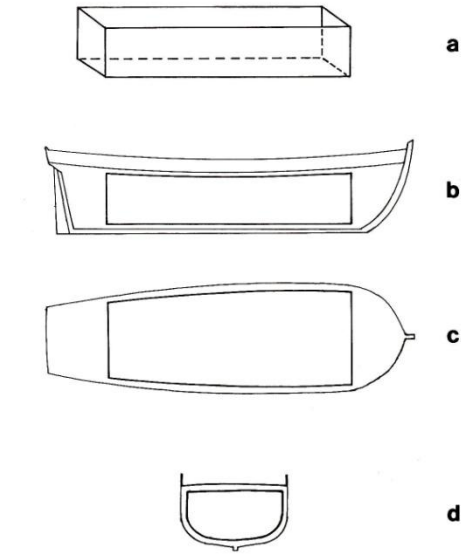


FIG. 2–5. (a) The functional portion of a warship; (b) with ram attached to bow; (c) as a gun platform; (d) as a multi-decked warship.

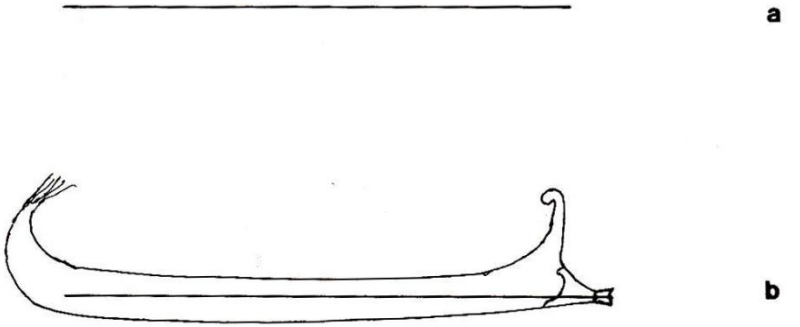
All ships of commerce are designed as cargo boxes (in concept they are relatively invariable)

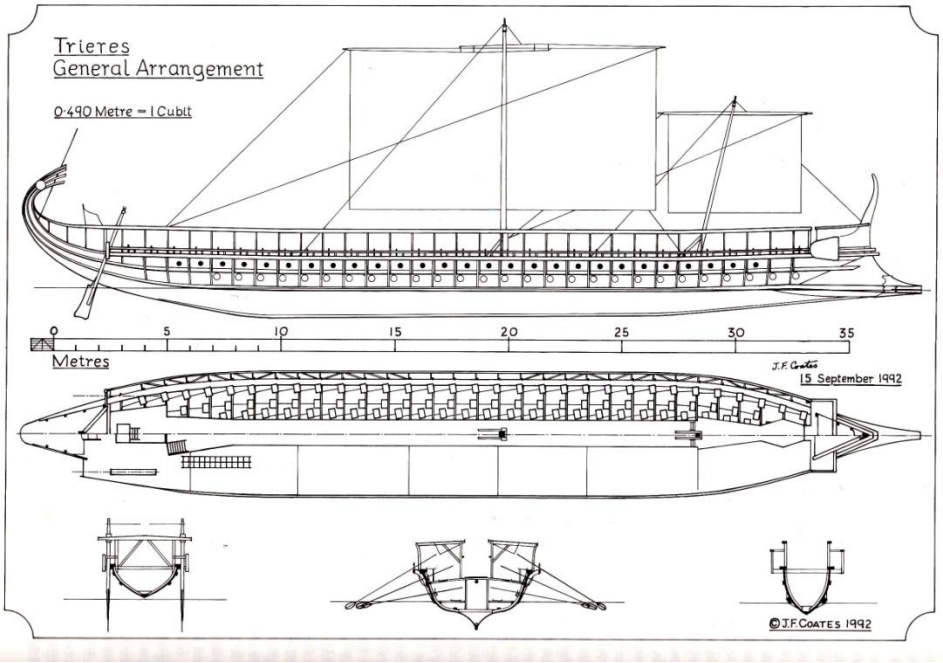
Ships of war are much more variable (depending on the weaponry, fighting force, and desired speed)

A floating cargo box under wind propulsion

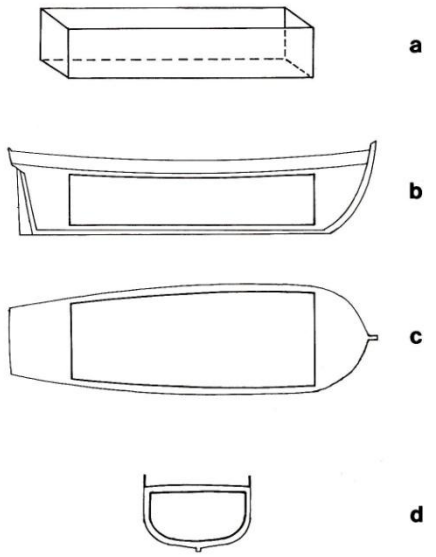


A floating (battering) ram and fighting force under wind propulsion (cruising) and oar propulsion (fighting)



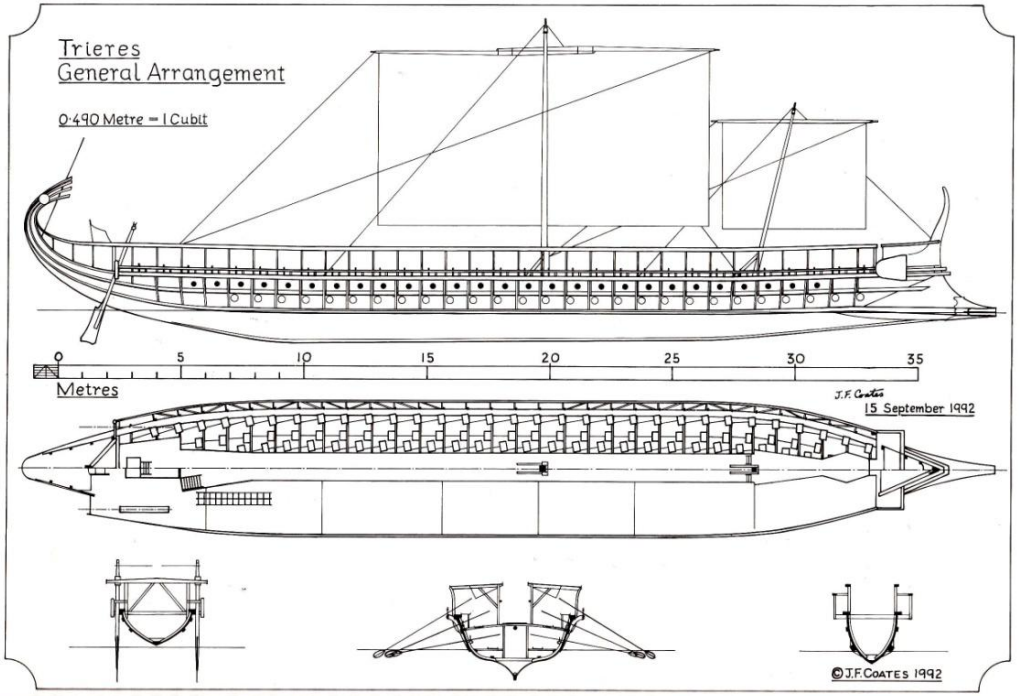


Some design considerations for ancient ships of commerce and war



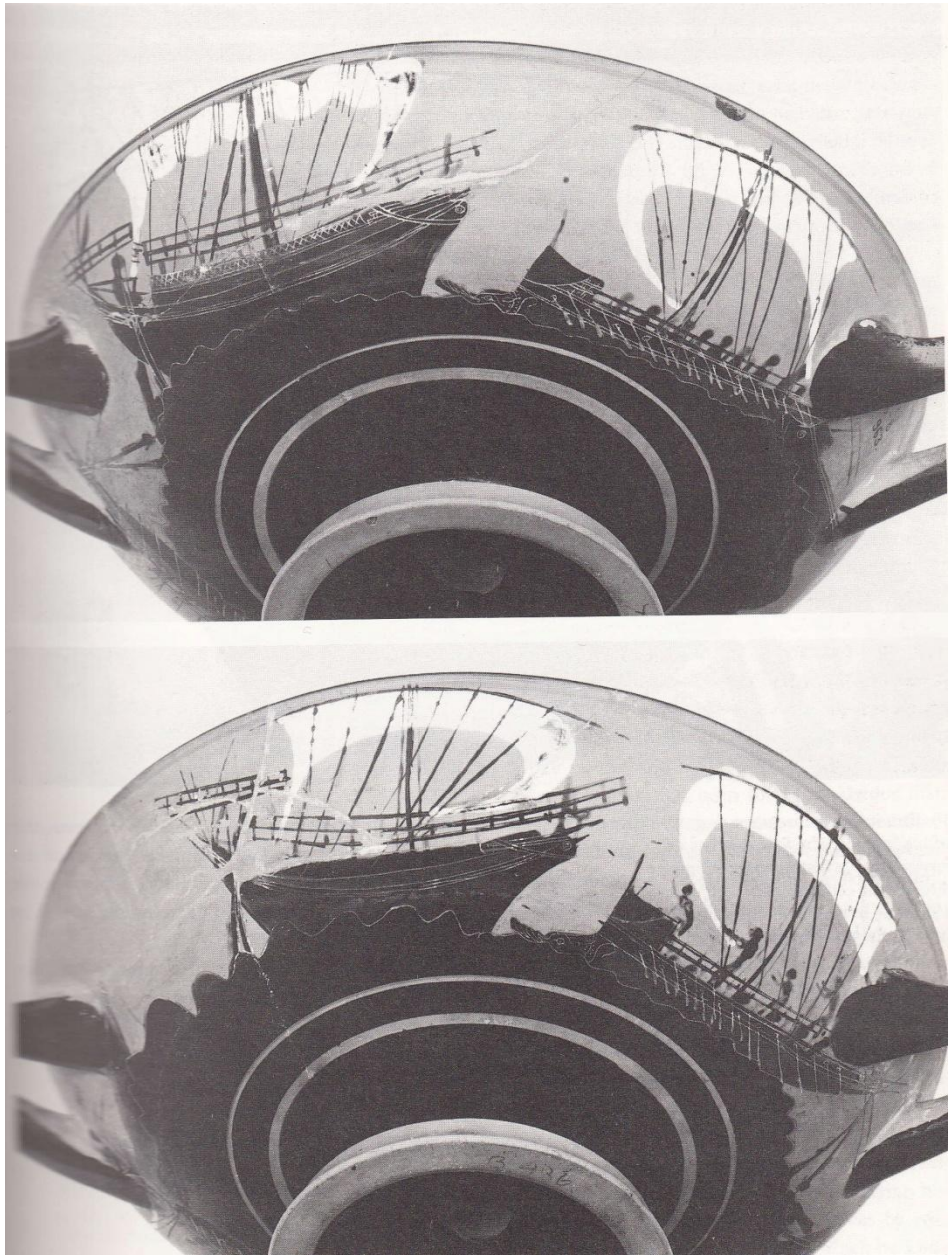
Cargo ships can be built heavily (or sturdily) and length to beam ratio is normally 1:3

Some design considerations for ancient ships of commerce and war



Warships need to be built lightly, and the length to beam ratio is normally 1:6

Propulsion: all ancient seagoing ships harnessed wind power



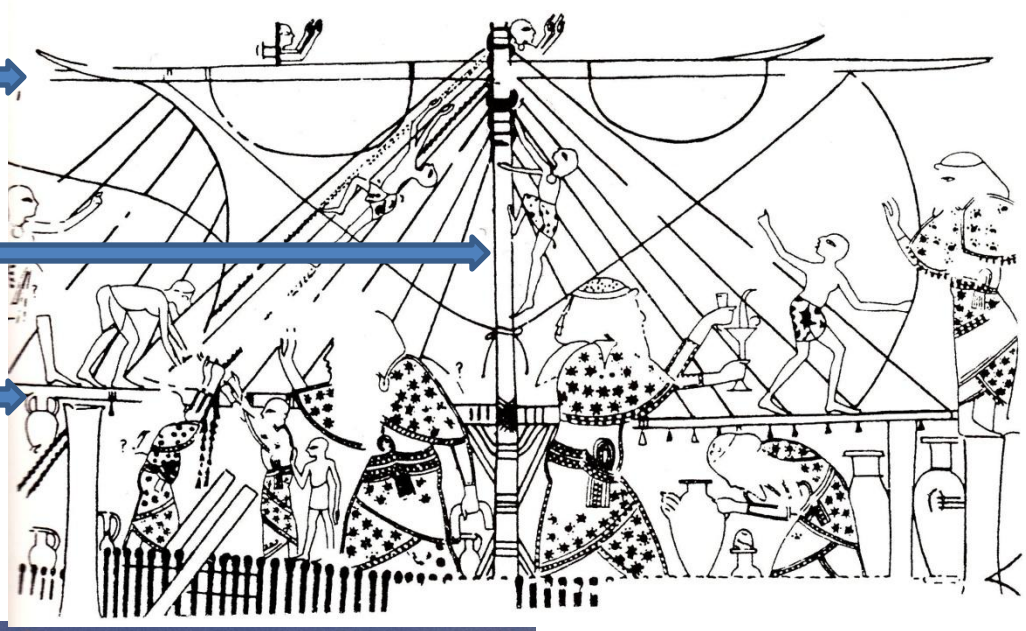
A galley giving chase to a merchantman on a Classical Greek cup (ca. 500 BCE)

Under (boom-footed) sail in the Bronze Age (ca. 3500-1200 BCE)

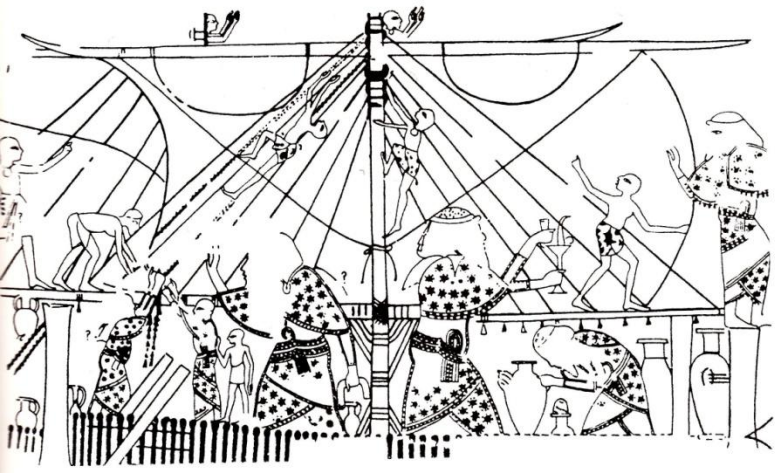
(movable)Yard

Mast

(fixed) Boom

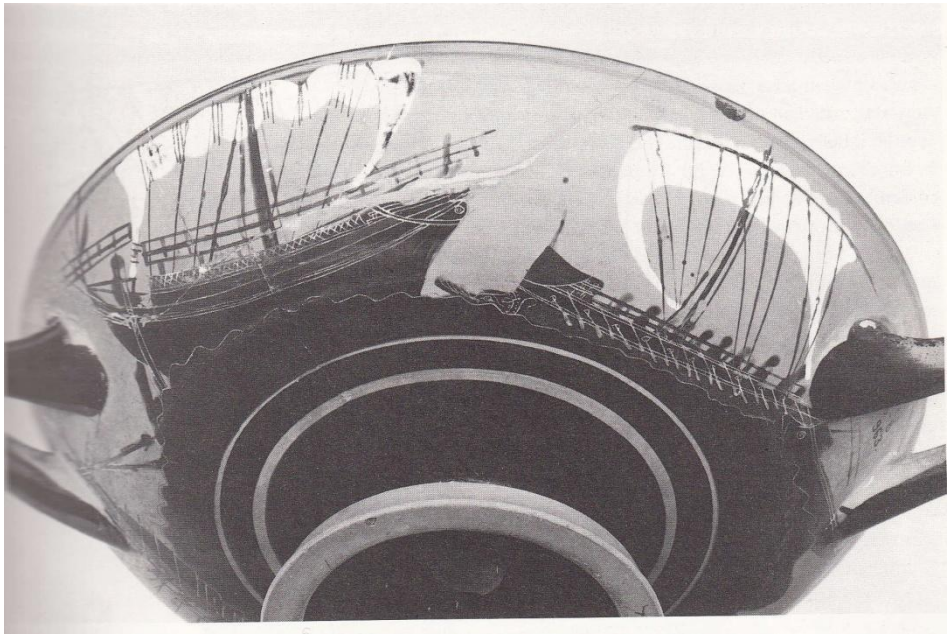


An ‘evolutionary’ development in sailing technology: the loose-footed sail



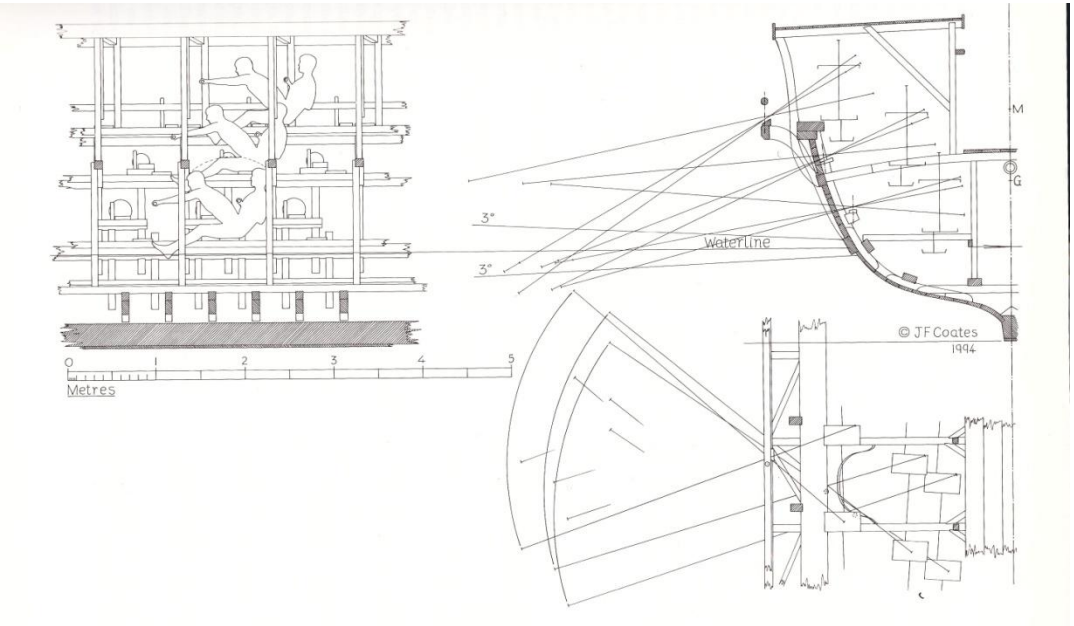
ca. 1350 BCE

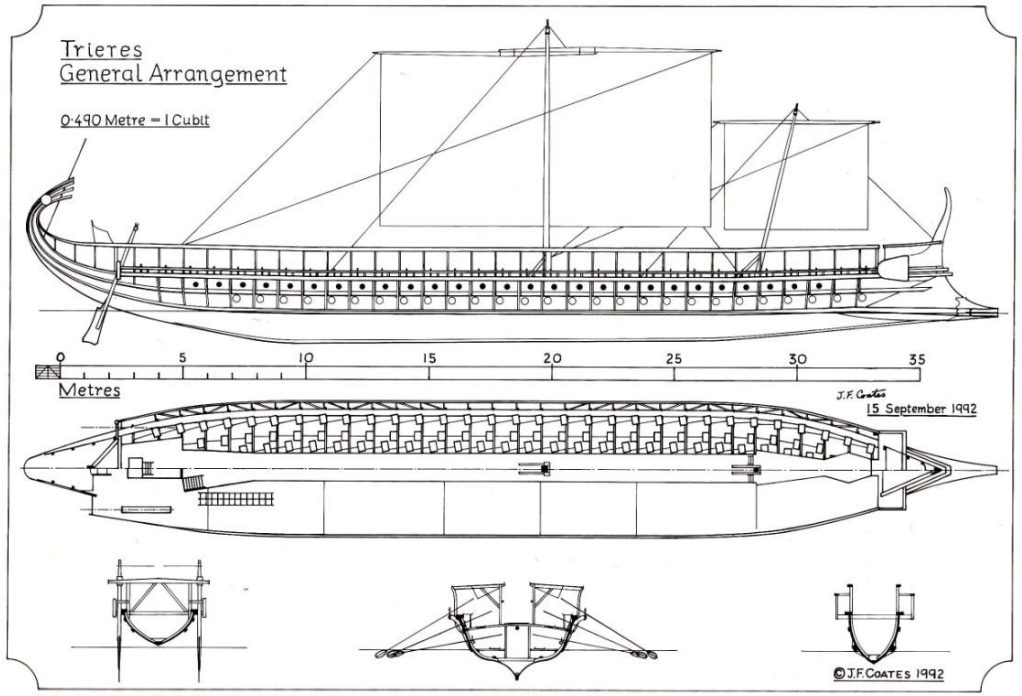
ca. 1200 BCE

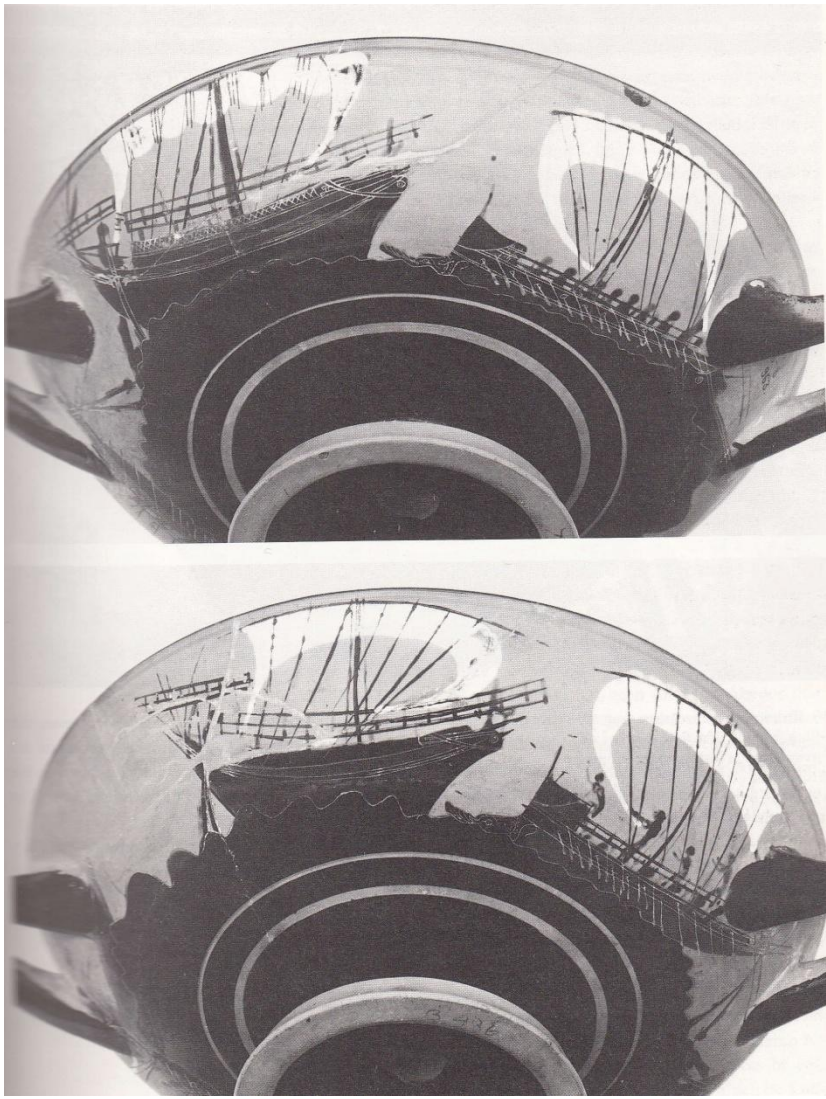


ca. 500 BCE

All ships of war in the ancient Mediterranean (and high prestige ships/barges) were rowed

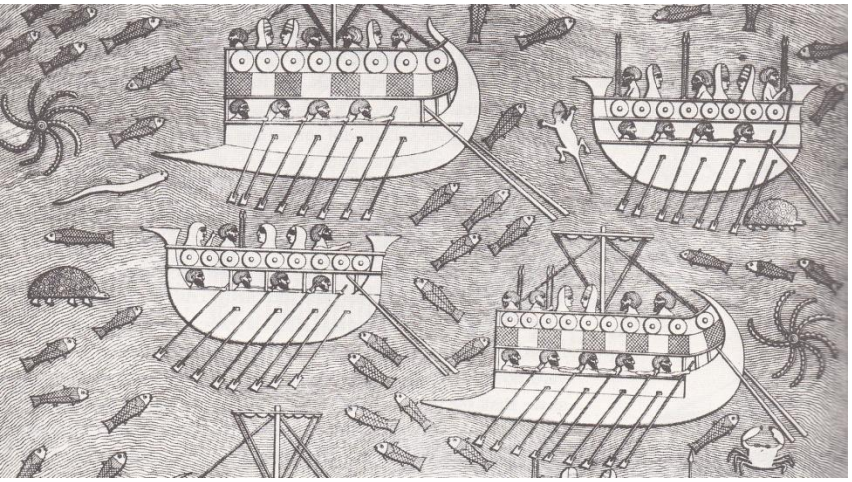




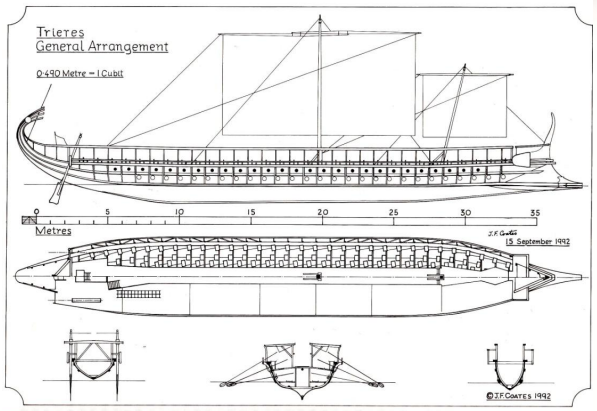


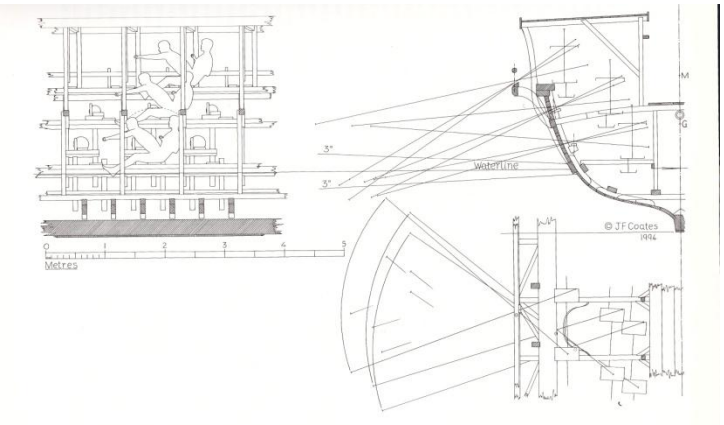
Another chronological development (or evolution in naval warfare)

Mycenaean (single bank of rowers—ca. 1200 BCE)



Phoenician biremes (two banks of rowers—ca. 700 BCE)





Classical Greek trireme (three banks of rowers ca. 450 BCE)