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

Fig. 3-38. The lines of the Kyrenia ship.
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 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’

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

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

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

A chronological trend
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

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)

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.
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)