

Arq. en Aguas Profundas I

Especialización en Patrimonio Cultural Sumergido
Cohorte 2019

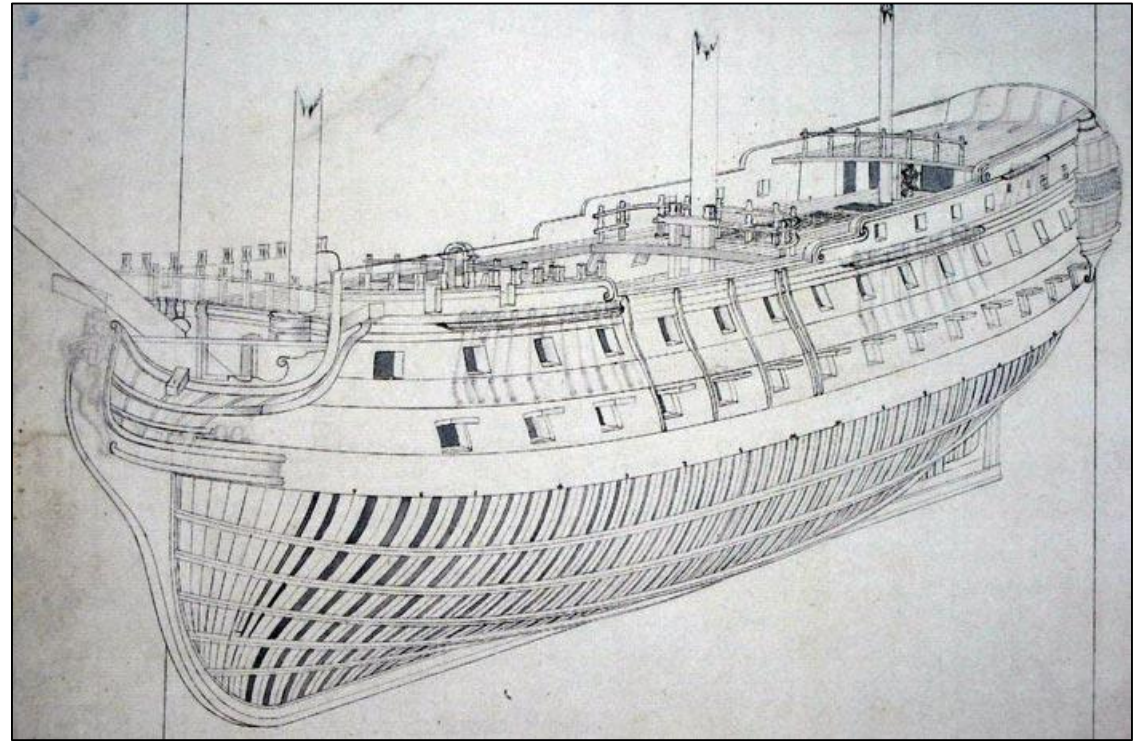
Filipe Castro
Bogotá, April 2019

Part 2

San Pedro de Alcántara, 1786

San Pedro de Alcántara was a 64-gun ship built with tropical timbers in Cuba, in the shipyards of La Habana, in 1770/71, lost on the coast of Portugal in 1786, and salvaged throughout the late 18th and 19th centuries.

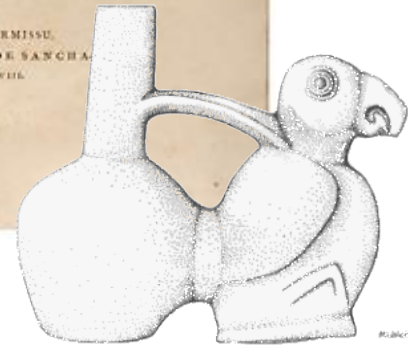
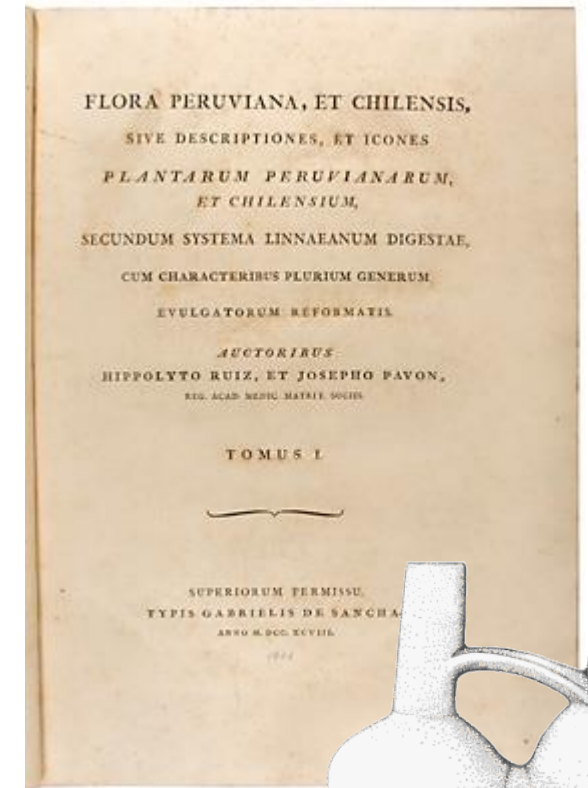
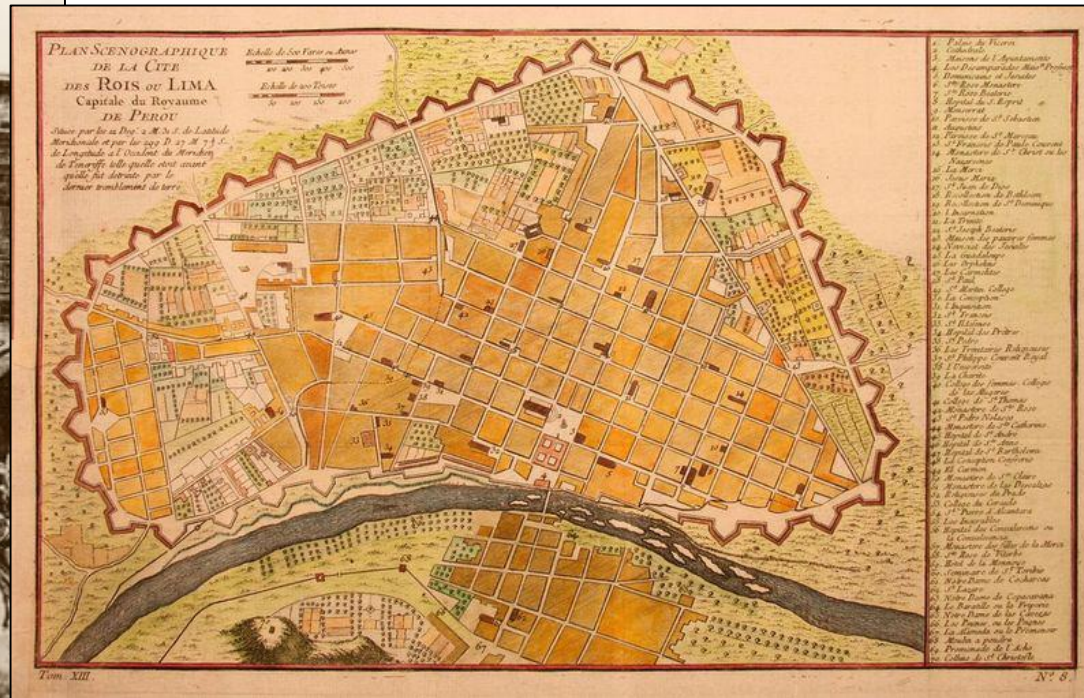
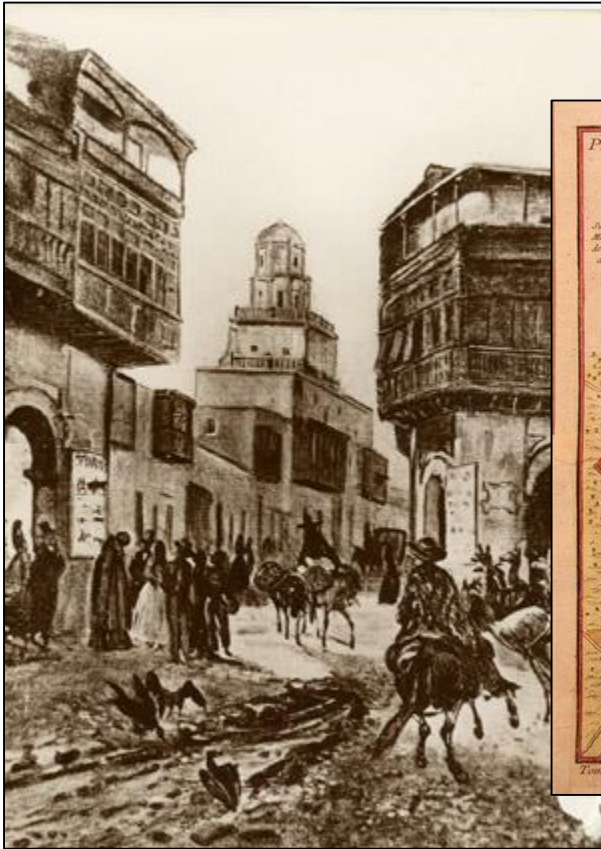
The *San Pedro* left Callao, Peru, to Cadiz, Spain, in 1784.



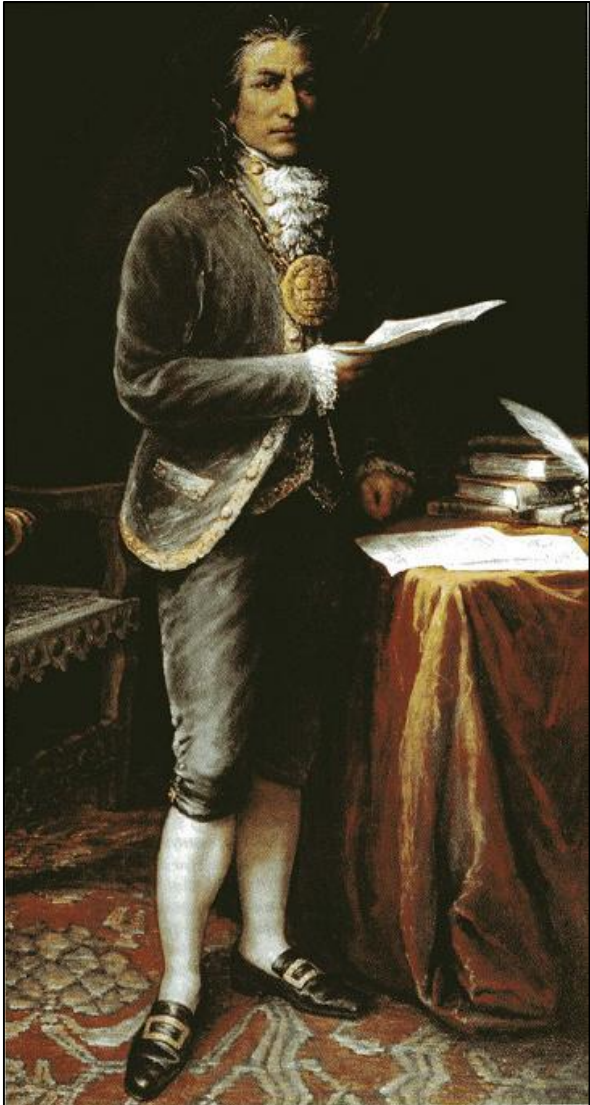
<http://nautarch.tamu.edu/shiplab/baleal-ship-sanpedro.htm>

Case Studies: *San Pedro de Alcantara*, 1786

San Pedro de Alcántara's holds were loaded with 600 tons of copper ingots, 153 tons of silver, and 4 tons of gold, together with a varied cargo, which included a collection of Chimú ceramics from the Hipólito Ruiz López and José Antonio Pavón Jiménez expedition in South America, from 1779 to 1788.



Case Studies: *San Pedro de Alcantara*, 1786



Aboard were almost 400 people, between ere also a number of prisoners in irons, on the way to prison, related to the Andean uprising of 1780-81, led by José Gabriel Condorcanqui, better know as José Gabriel Túpac Amaru.



Case Studies: *San Pedro de Alcantara*, 1786

After a long voyage, the ship hit a rocky promontory on the coast of Portugal around 22:30, in a calm and clear night, on the 2nd of February of 1786, with an extremely low tide, and was quickly destroyed.

The accounts mention 128 dead and 270 survivors.



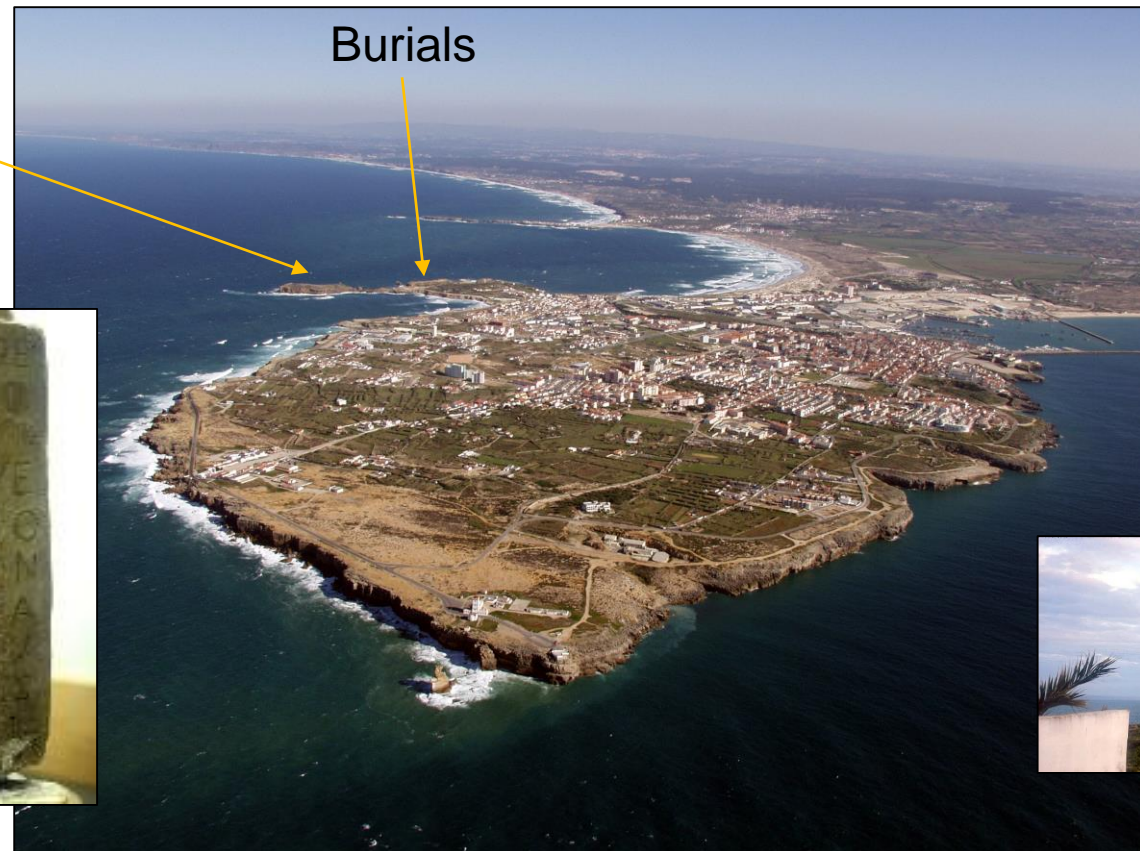
Case Studies: *San Pedro de Alcantara*, 1786

Given the value of the cargo, the Portuguese authorities assisted in the first salvage attempts, provided warehouses to keep the cargo safe, and did their best to shelter and feed the survivors.

Spain launched a major salvage operation and most of the cargo was recovered during the following 3 years.



Shipwreck



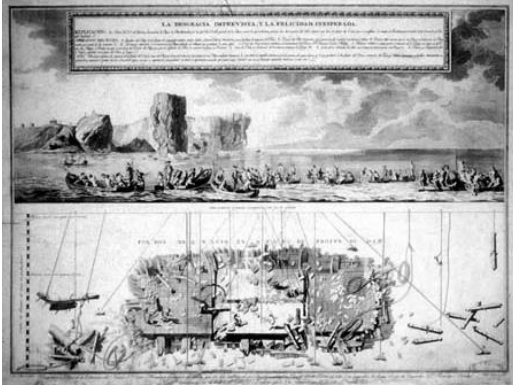
Case Studies: *San Pedro de Alcantara*, 1786



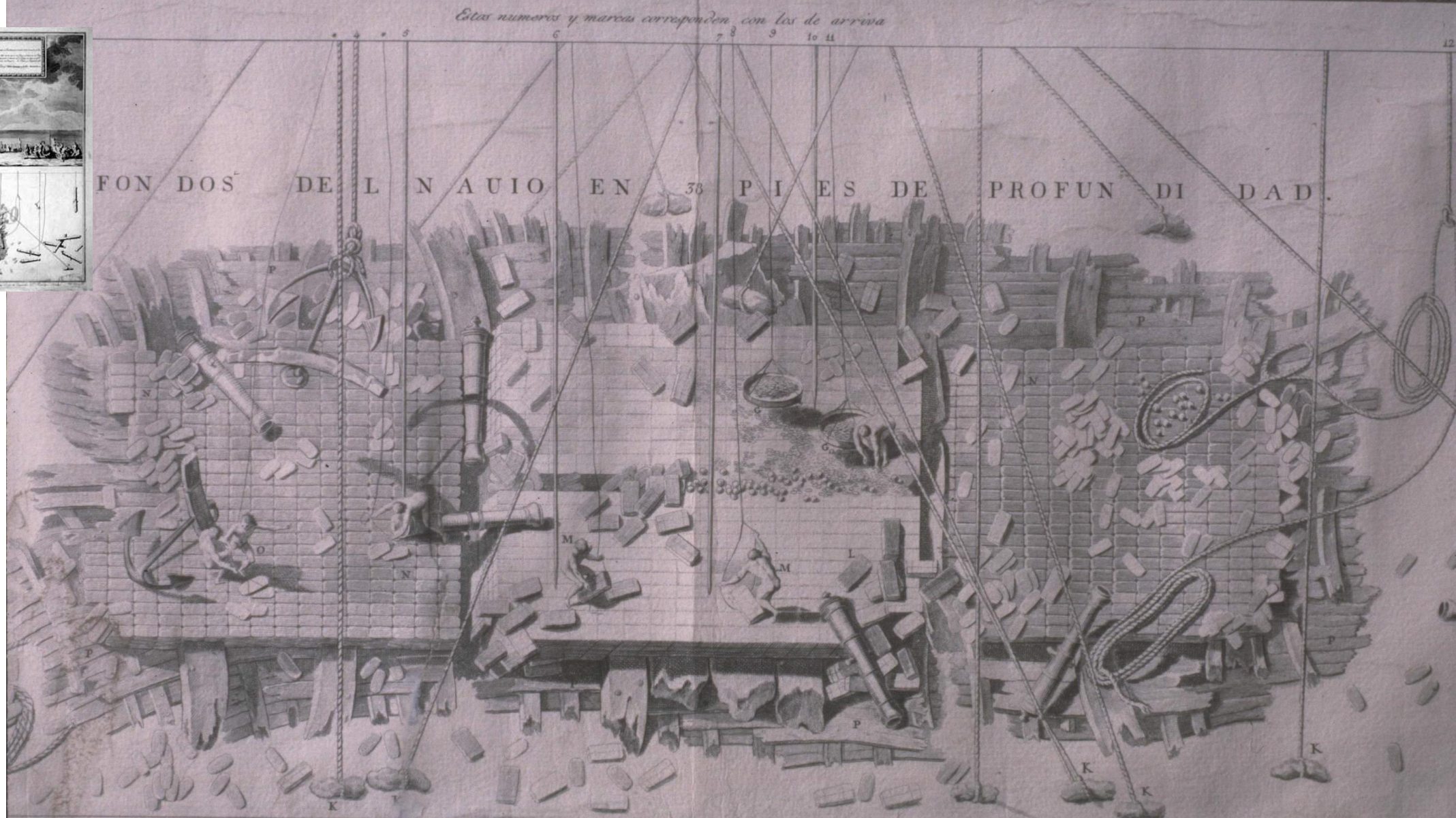
Map with the shipwreck position and view of one of the burial sites.



Case Studies: *San Pedro de Alcantara*, 1786

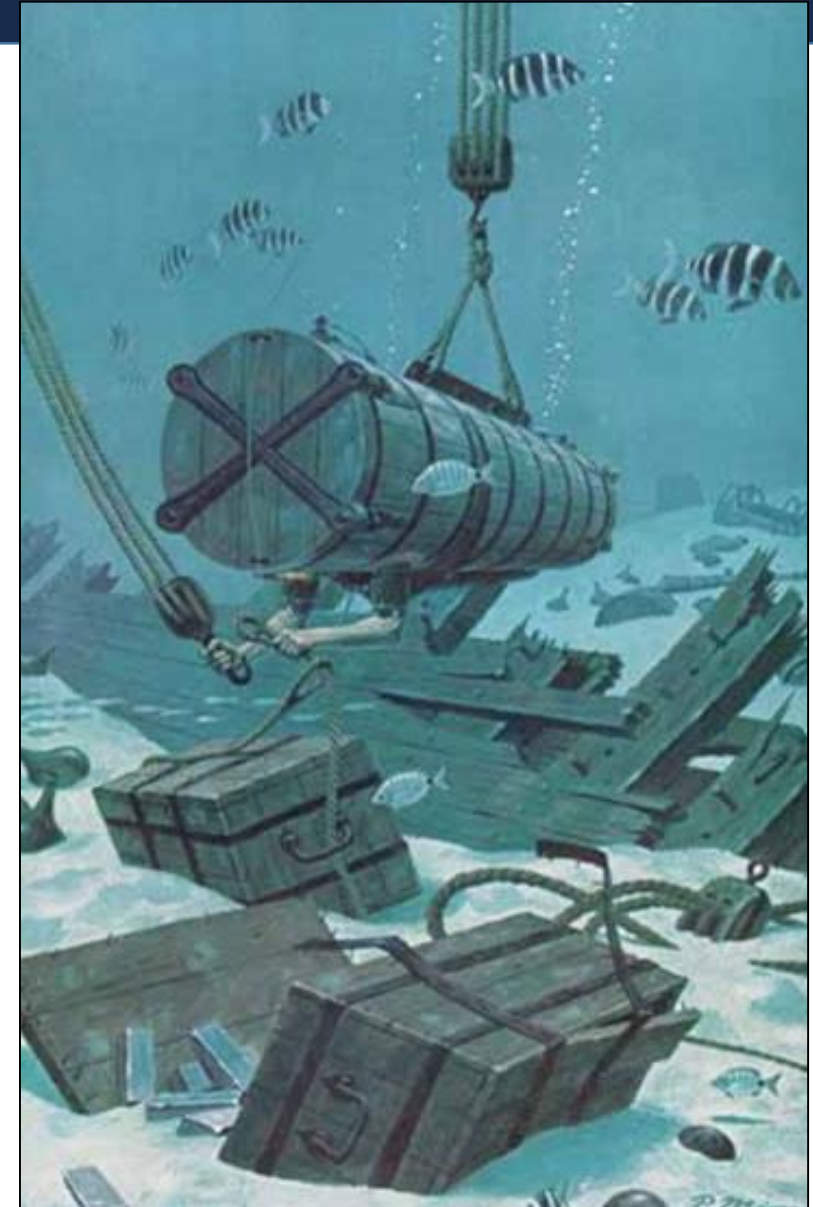
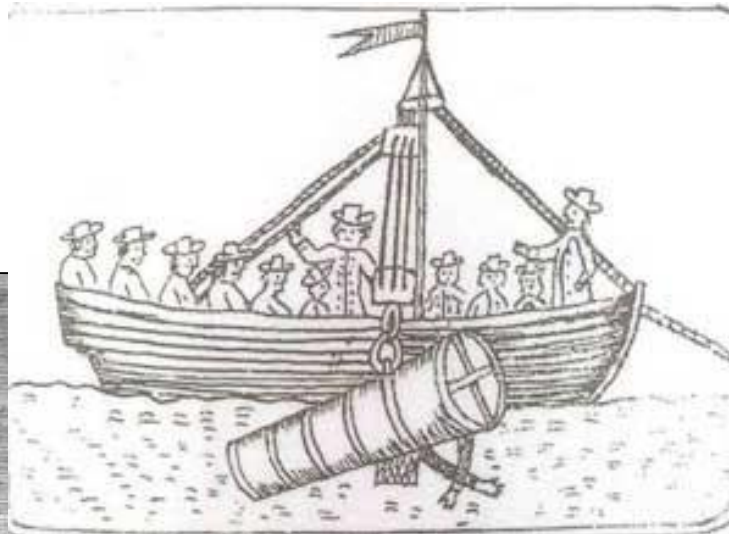
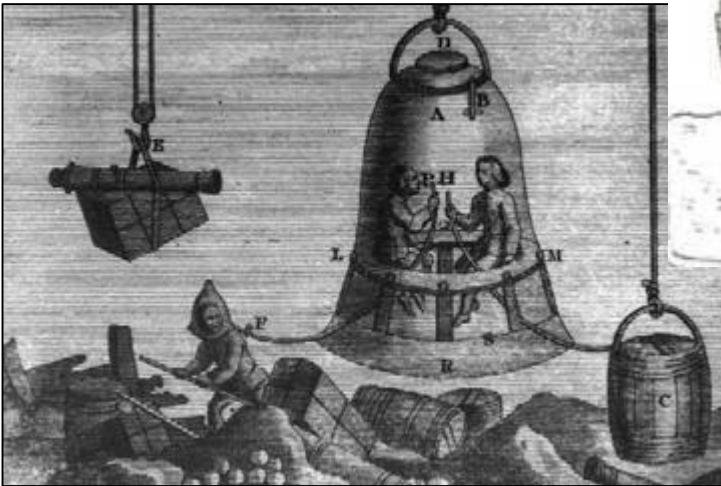


After recovering almost all its cargo the Spanish crown sold salvage permits for the best part of the following century.



Case Studies: *San Pedro de Alcantara*, 1786

As *San Pedro de Alcántara* site was salvaged throughout the 19th century, with the Spanish government giving licenses to successive contractors, it is said that some of the early 19th century salvors used diving machines, perhaps similar to the device developed by John Lethbridge.



Among the twenty or so prisoners – mostly the family of José Condorcanqui – was Fernando Túpac Amaru, his youngest son.

The natives that drowned were buried in a trench, still with the irons on their legs.

Fernando Túpac Amaru survived and was taken to Seville where he died in prison in 1799.

Fernando had been forced to watch his father being quartered, his mother garroted, and his elder brother hanged.



Case Studies: *San Pedro de Alcantara*, 1786

The 1980s excavation of this site was carried by Jean-Yves Blot (underwater) and his wife Maria Luisa Blot (on land). Of the 100 individuals thought to have been buried in the area, slightly over 30 were found and excavated.



Case Studies: *San Pedro de Alcantara*, 1786



Some of the bodies had been covered with lime powder, which preserved their shape.

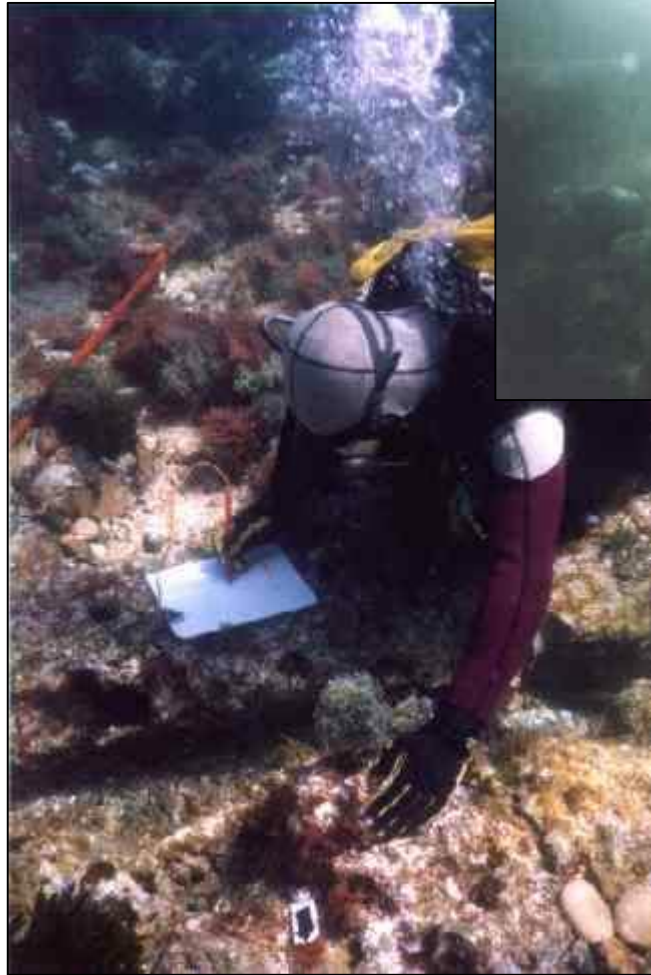


A French painter, Jean Auguste Pillement (1728-1808) painted a number of scenes representing this shipwreck.





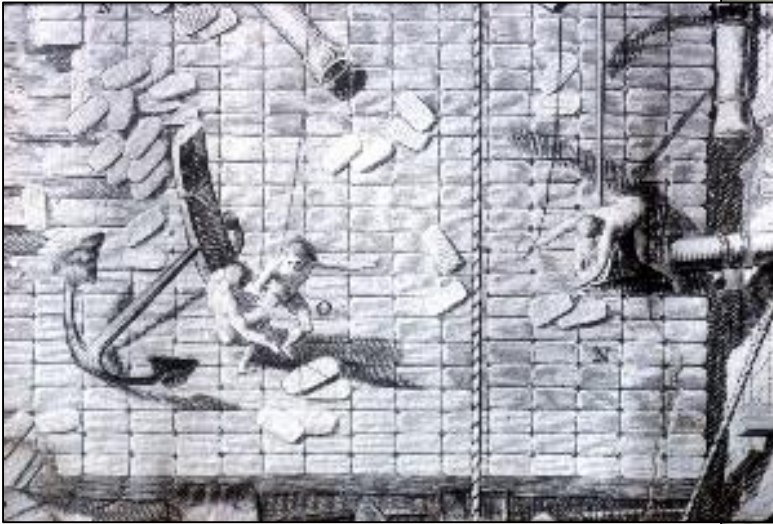
Case Studies: *San Pedro de Alcantara*, 1786



A significant number of artifacts was found on this site, in spite of the extensive salvage of the previous centuries.



Including copper ingots.



SS *Egypt*, 1922

SS *Egypt* was a British liner built in 1897 and lost in 1922 on its way to Bombay. Salvaged from 1932 to 1936.

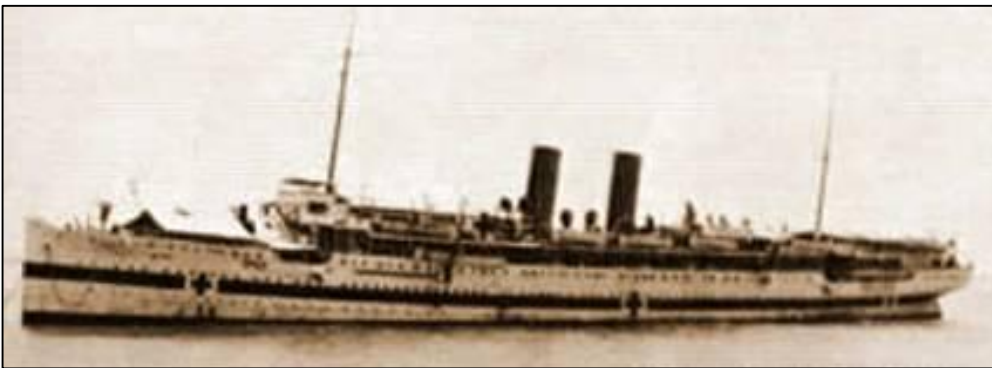
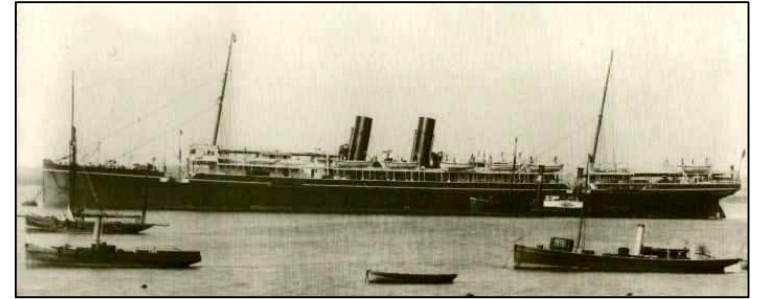
Builders: Caird & Company of Greenock, Yard No 285.

Port of Registry: London.

Engine: Steam triple expansion, 11,000 ihp. Trials Speed: 18.3 knots.

Launched: Saturday, 15th May 1897.

Tonnage: 7912 grt ~ Length: 499.8 feet ~ Breadth: 54.3 feet ~ Draught: 24.5 feet.

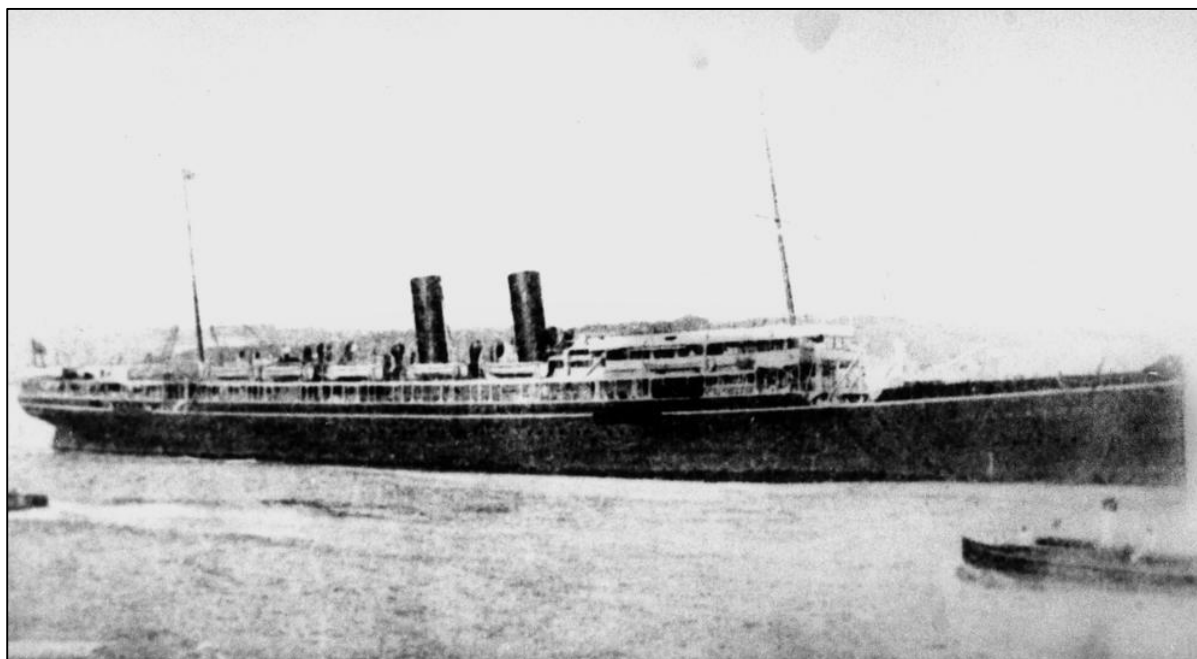


Between 1915 and 1919 it was used as a hospital ship in the Dardanelles.

https://en.wikipedia.org/wiki/SS_Egypt

SS *Egypt*, 1922

It left sunk on the north of France after colliding with the French ship *Seine* in 20 May 1922, due to fog.



https://en.wikipedia.org/wiki/SS_Egypt

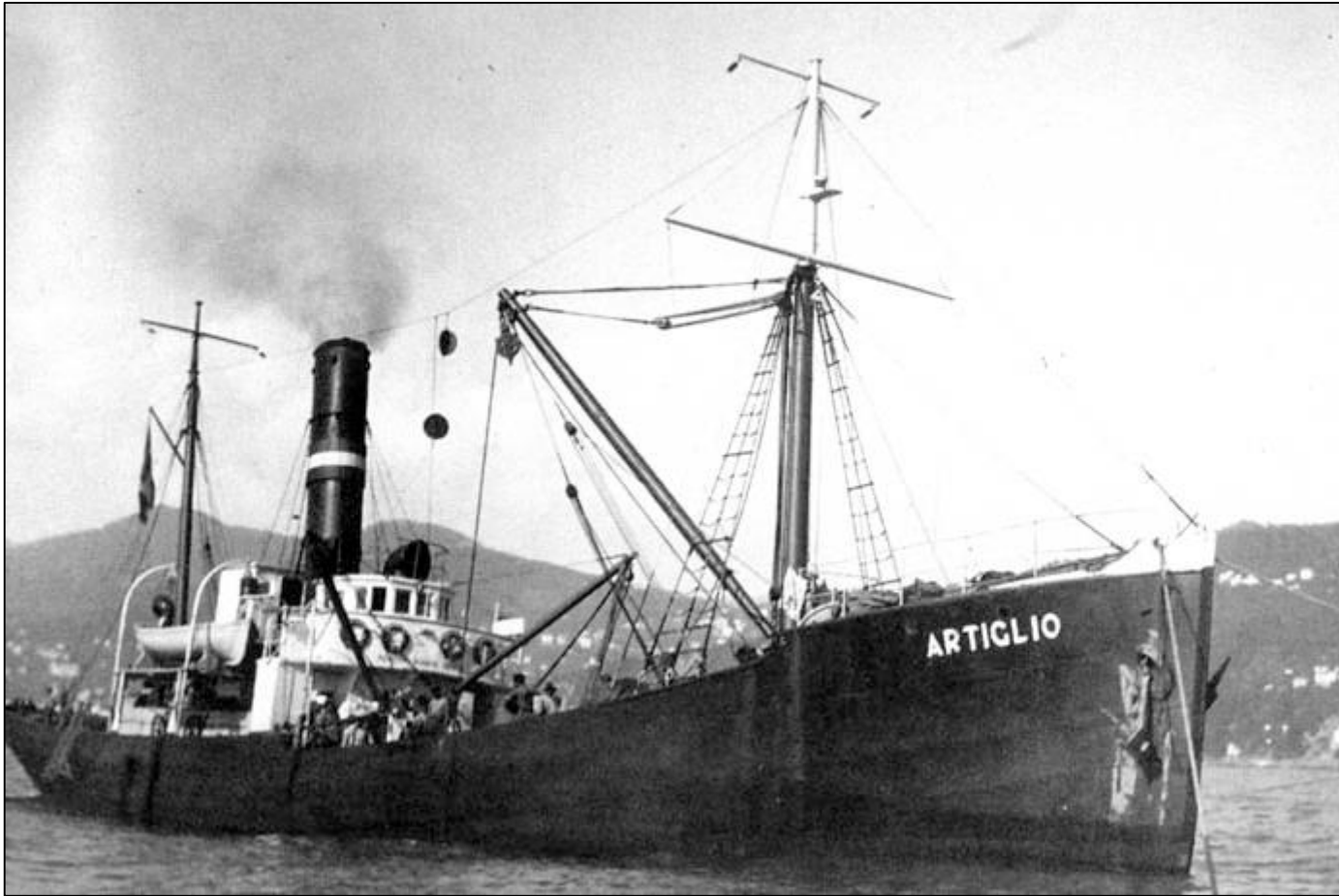


THE OBSERVATION-SHELL GOING DOWN. THE DIVER IS INSIDE IT
AND THE LID HAS BEEN SCREWED ON

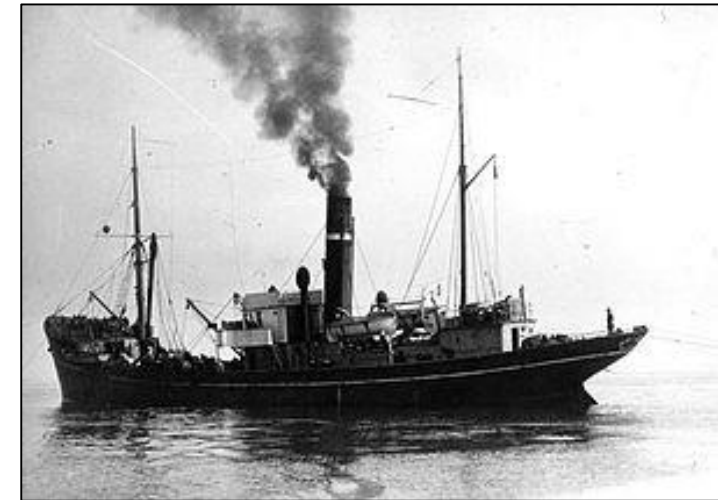
... Apart from the passengers' jewelry and valuables, they carried some 2,318 gold and silver bars and a mass of gold sovereigns together valued at over a million pounds. These, the property of the British government, were destined for India and the Far East.

<http://warataharevisited.blogspot.com/2016/06/the-case-of-ss-egypt.html>

Case Studies: SS *Egypt*, 1922



It was found in 1929, around 120 m deep and salvaged by an Italian salvage company, **Sorima**, under the direction of Giovanni Quaglia. It is said that the salvage work (six years) cost \$1,000,000. The value of the gold and silver recovered was estimated at \$5,000,000.



Artiglio I

Case Studies: SS *Egypt*, 1922

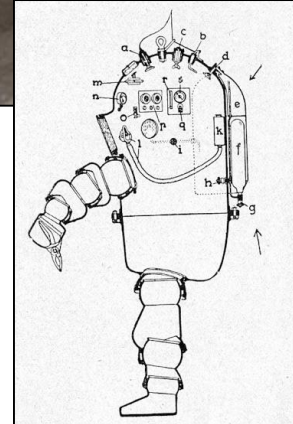


THE IDENTIFICATION OF THE 'EGYPT'. FRANCESCHI, JUST UP FROM THE WRECK,
 DESCRIBING WHAT HE HAS SEEN

Sorima (Società Ricuperi Marittimi) found the shipwreck in 1930 and used an armored suit to direct the salvage operations in situ.



Case Studies: SS *Egypt*, 1922

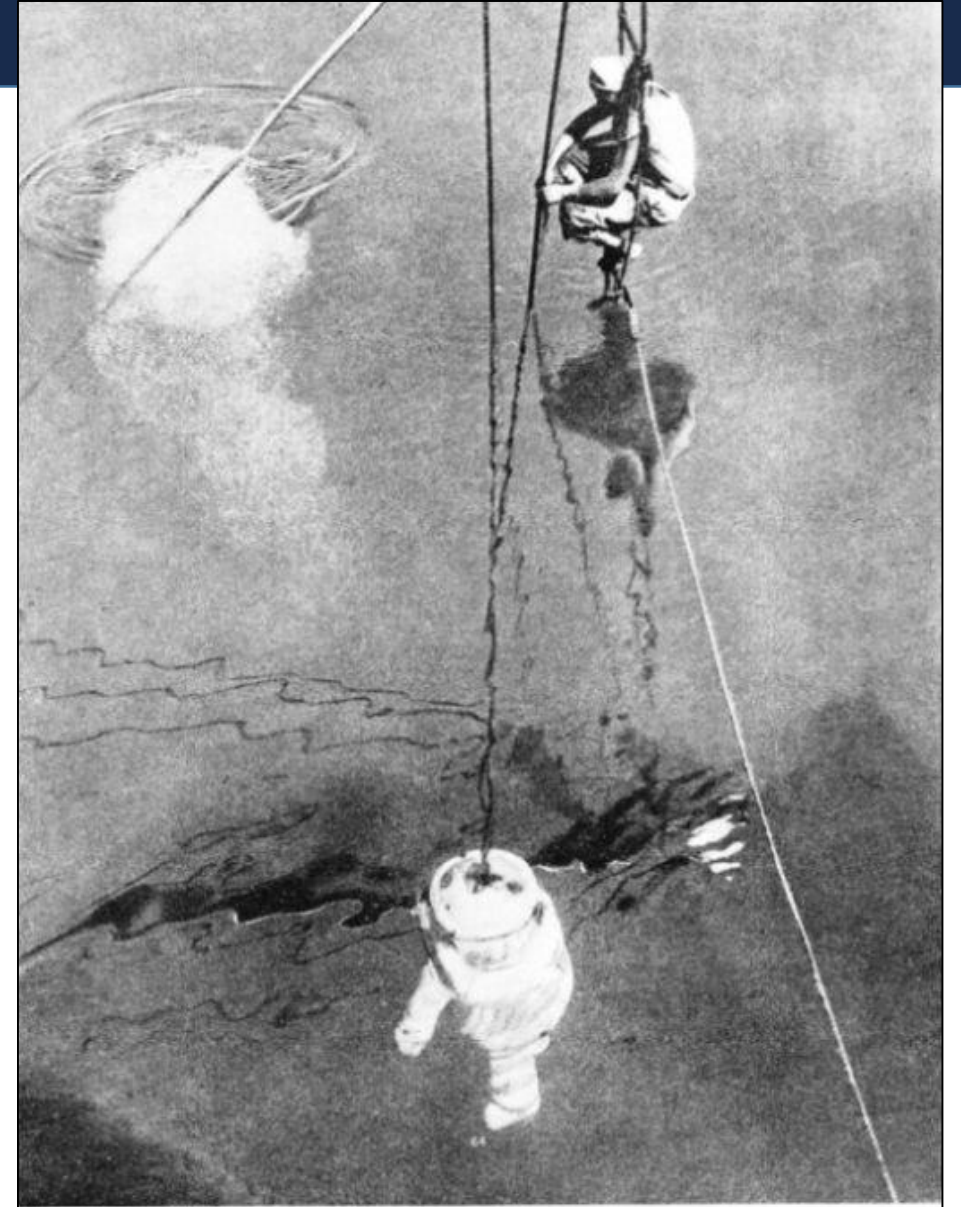
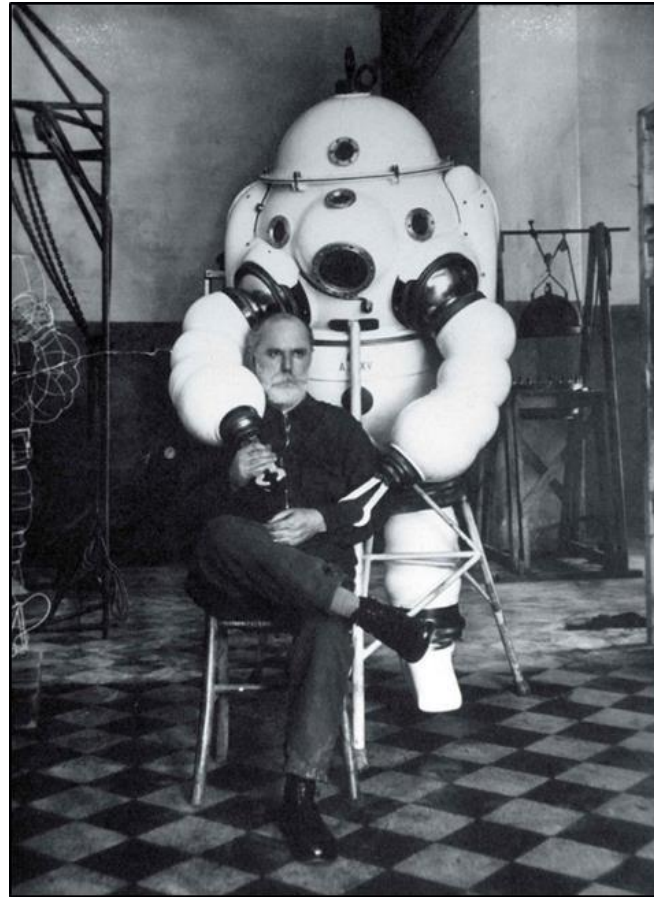


Neufeldt & Kuhnke 1916 suit

The suit was made by Neufeldt & Kuhnke, from Kiel, Germany, a company started in 1911.

Case Studies: SS *Egypt*, 1922

Salvage operations started in 1930 and lasted until 1936.



Case Studies: SS *Egypt*, 1922



Giovanni Quaglia and Peter Sandberg had found the site dragging, in 1929. Before going back, in 1930, the *Artiglio* had to go clear a warship from the harbor of St. Nazaire. An explosion of the ship's magazine sunk the *Artiglio*. Only seven of its crew members survived.

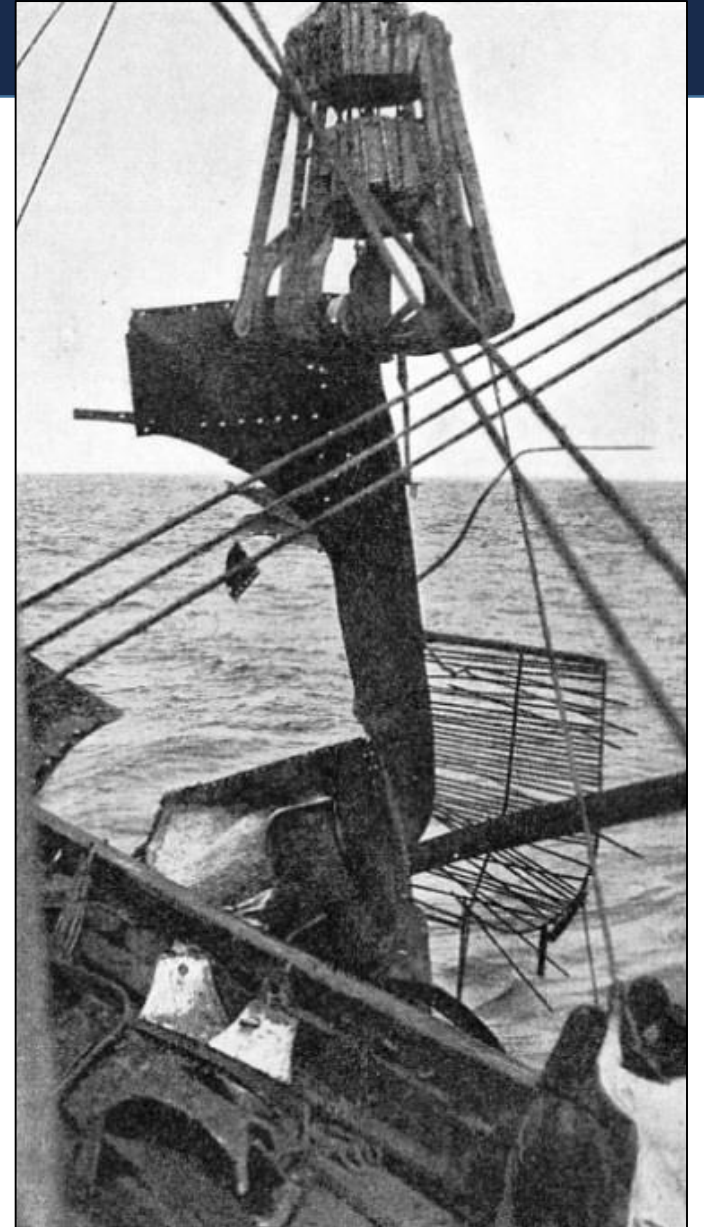
For three months, the crew of the “Artiglio” worked upon her, section by section, until, as Christmas approached, they tried to speed up the operation.

The divers laid the charges and the ship, instead of standing off safely two miles, retreated only 300 yards. And instead of the usual muffled underwater explosion, there was a tremendous noise. The charge had exploded all the munitions on the sunken ship. A huge column of water shot into the air. This and the shock waves forced the “Artiglio” under water. At one moment she had been supervising a successful salvage operation. At the next, only a mushroom shaped cloud of smoke and spray marked where she had been.

<http://waratahrevisited.blogspot.com/2016/06/the-case-of-ss-egypt.html>

Case Studies: SS *Egypt*, 1922

On the bottom for only a decade the ship was in very good condition and the salvors had to dynamite their way down the decks.



Case Studies: SS *Egypt*, 1922



THE CAPTAIN'S SAFE FROM THE 'EGYPT' COMING ABOARD THE
'ARTIGLIO'. NOTE HOW NEATLY THE GRAB IS HOLDING IT

Recoveries were done with a series of grabs, designed for different tasks. The work of the grabs was directed by phone from the armored suit.

Case Studies: SS *Egypt*, 1922



Giovanni Quaglia reached the level of the safe in 1932 and salvaged almost the entire treasure.



Case Studies: SS *Egypt*, 1922

During the salvage works Quaglia had to fight in court over the rights of the treasure.



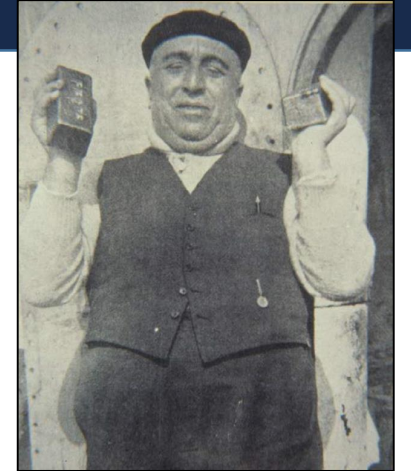
Stenuit's check list for salvage works.

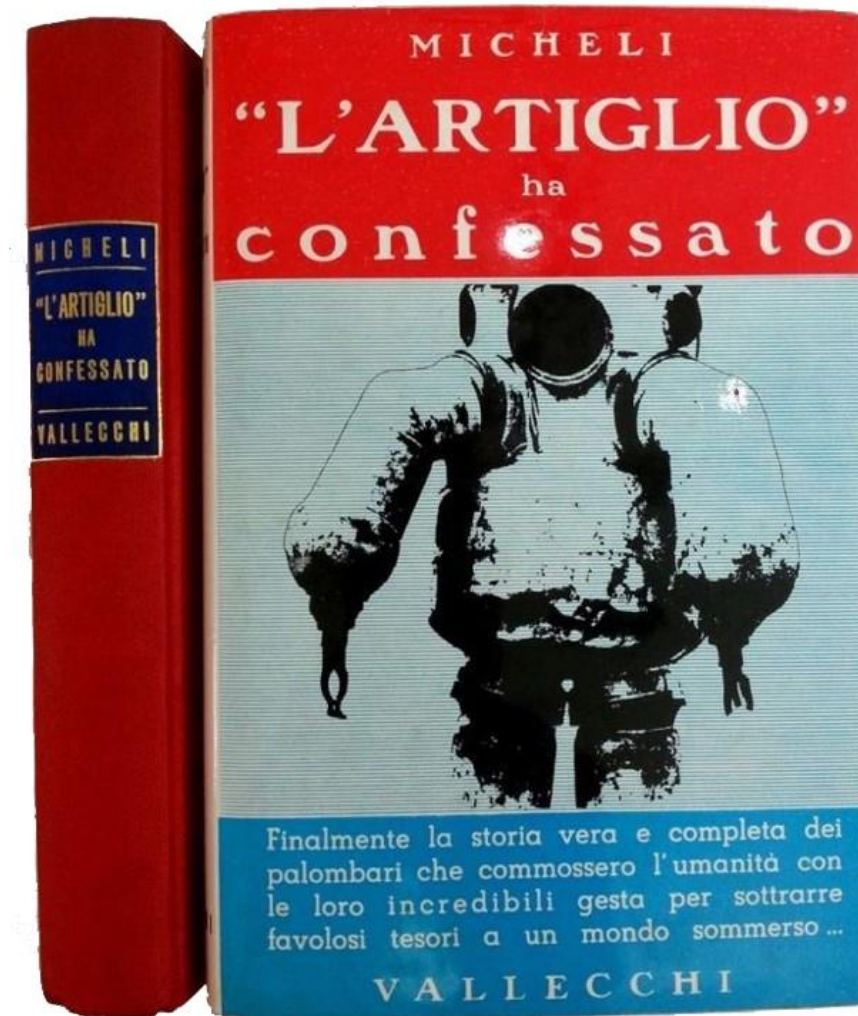
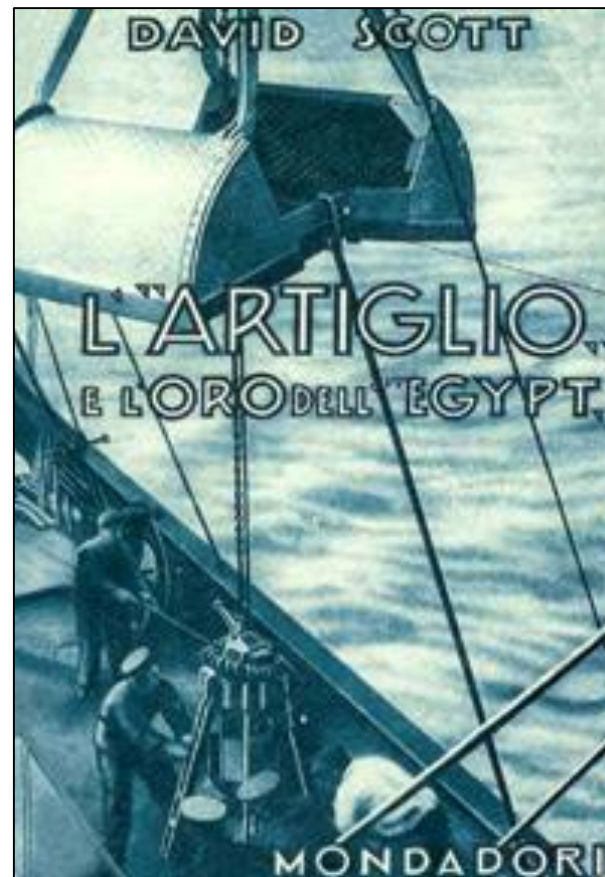
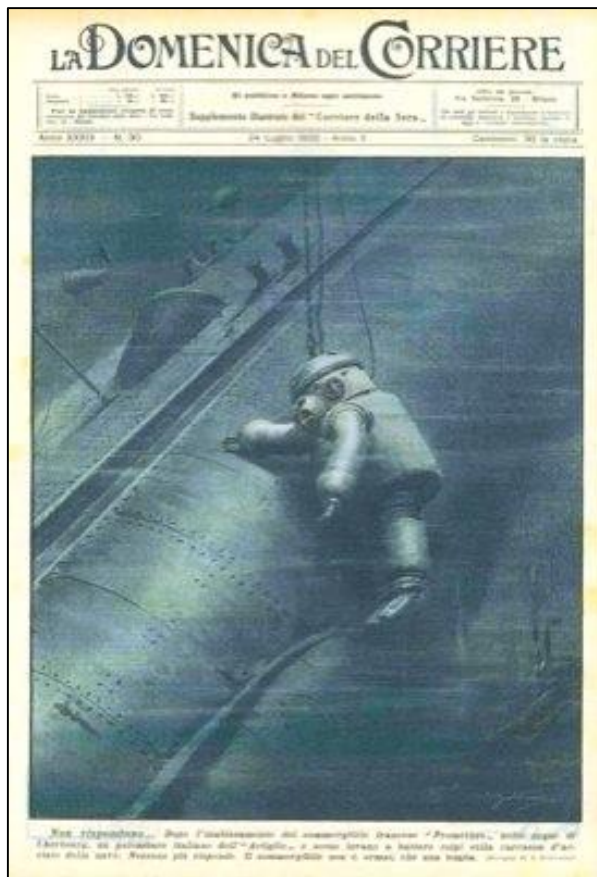
1. Find reliable information about a valuable cargo shipped in a particular vessel that sunk;
2. Make sure that the cargo was actually loaded on that particular vessel;
3. Make sure that the ship did sink (beached ships were invariably salvaged);
4. Make sure that the cargo was not unloaded on a port before the shipwreck took place;
5. Make sure that the cargo was not saved (transshipped) right before the shipwreck;
6. Make sure that the cargo was not jettisoned right before the shipwreck;
7. Make sure that the cargo was not salvaged immediately after the shipwreck;
8. Make sure that the cargo was not salvaged at a later date;
9. Make sure that time did not damage the cargo;
10. Make sure there are no claims on the shipwreck or its cargo;



Stenuit's check list for salvage works.

11. Make sure he has precise data to narrow the place where the shipwreck occurred;
12. Find the shipwreck (often the most difficult part);
13. Make sure that he actually found that particular shipwreck;
14. If he ever finds anything, make sure that the cargo is not spilled over too large an area;
15. Make sure that treasure hunting is legal, or at least that the local authorities are cooperative;
16. Make sure the country in whose waters the shipwreck lays is politically stable;
17. Make sure he has all the necessary means to salvage a substantial part of the cargo;
18. Make sure he gets away with destroying, or abandoning all non valuable items, which consume time and money, and are not accepted for sale by most auction houses;
19. Make sure he has safe port to disembark the cargo;
20. Make sure he has a good lawyer;
21. Make sure he has not spent by now much more money than he can make with the sale of valuable artifacts.





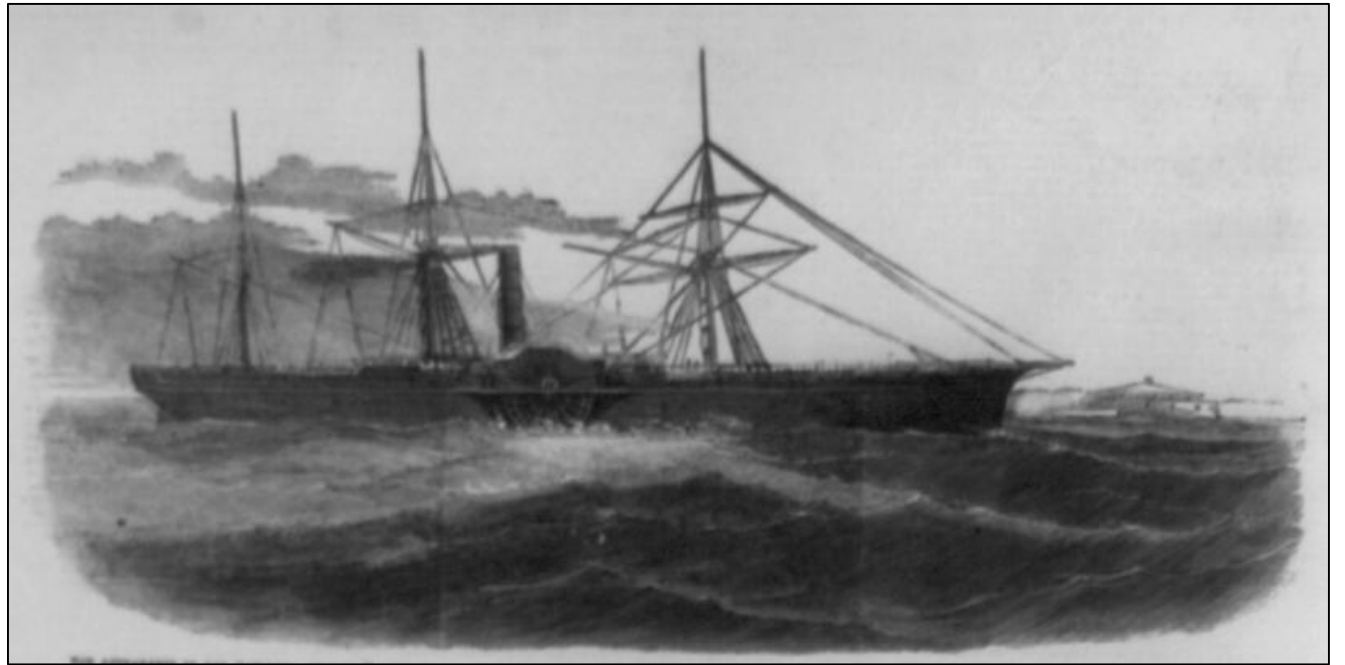
References

Ellsberg, Edward, 1981. *Men Under the Sea*. New York: Open Road.

Stenuit, Robert, 1990. *L'Or a la tonne*. Grenoble: Glenat.

Case Studies: SS *Central America*, 1857

SS *Central America*, 1857, was a 85-meter (280-foot) wooden-hulled, copper-sheathed, three-masted side-wheel steamship launched in 1853 as the SS *George Law*. Operating during the California Gold Rush era, the ship was in continuous service on the Atlantic leg of the Panama Route between New York and San Francisco, making 43 round trips between New York and Panama. The *Central America* was caught in a hurricane and sank 160 miles off the coast of South Carolina on September 12, 1857. When she was lost, the SS *Central America* was carrying a large consignment of gold for commercial parties, mainly in the form of ingots and freshly minted U.S. \$20 Double Eagle coins.



<https://www.maritime-executive.com/article/Odyssey-Recovers-SS-Central-America-Shipwreck-Treasures-2014-07-18>

In 1988, Thompson convinced dozens of investors to fund an expedition to recover the gold. It was considered the richest treasure find in U.S. history: valued at \$150,000,000.

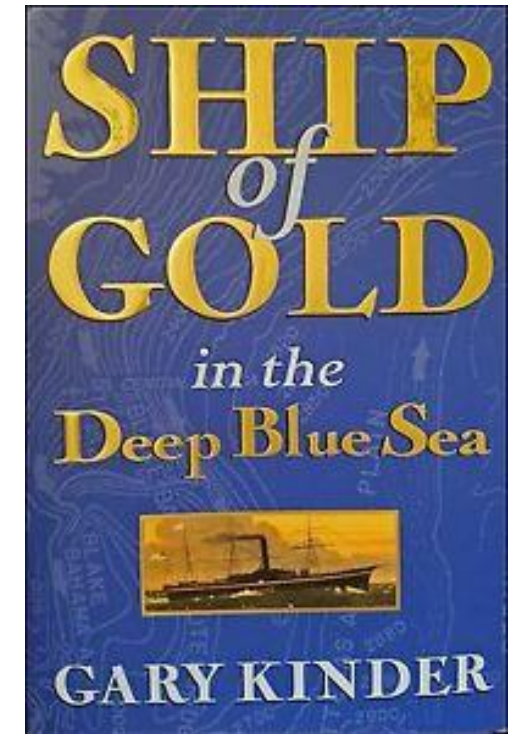
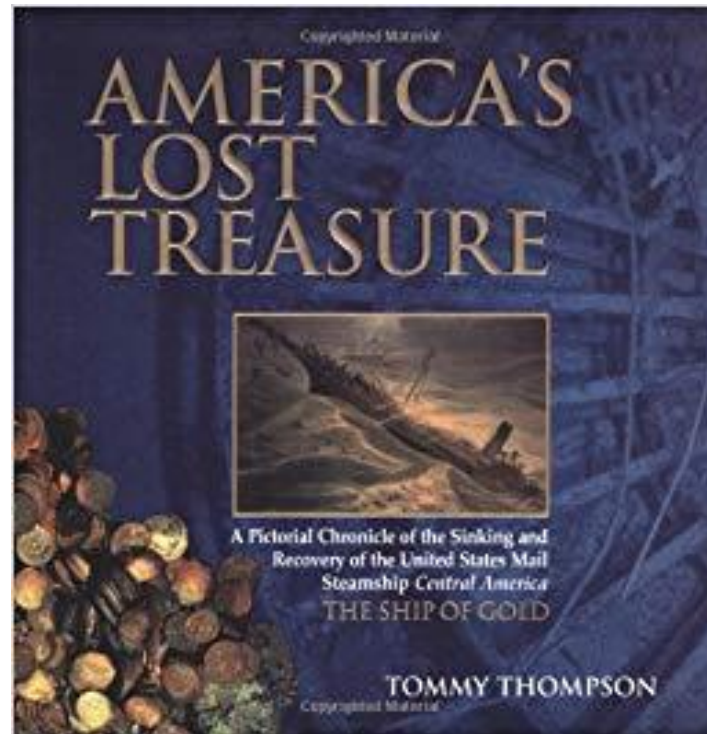
Local investors, who put up more than \$12 million, grew frustrated when they did not receive any of the proceeds. They filed a lawsuit in 2005.



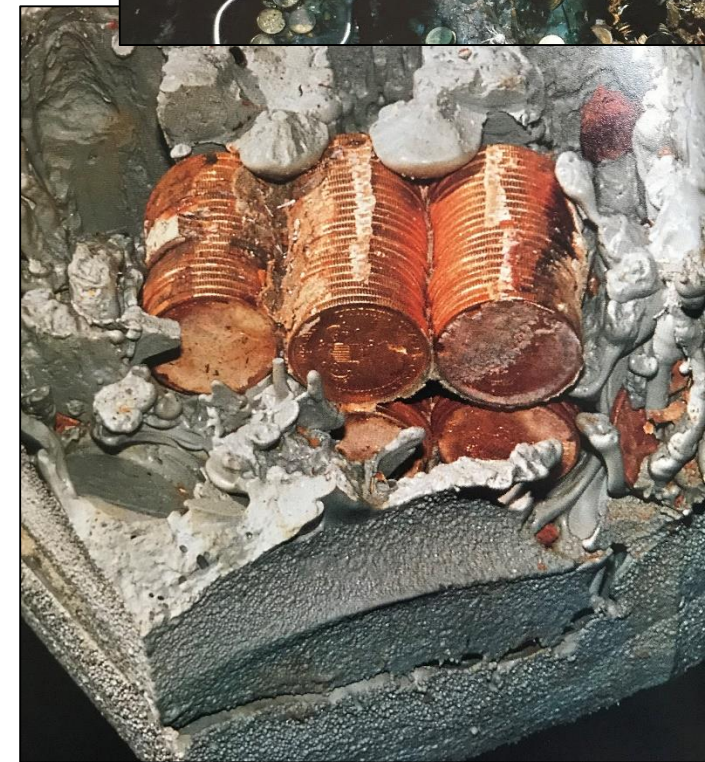
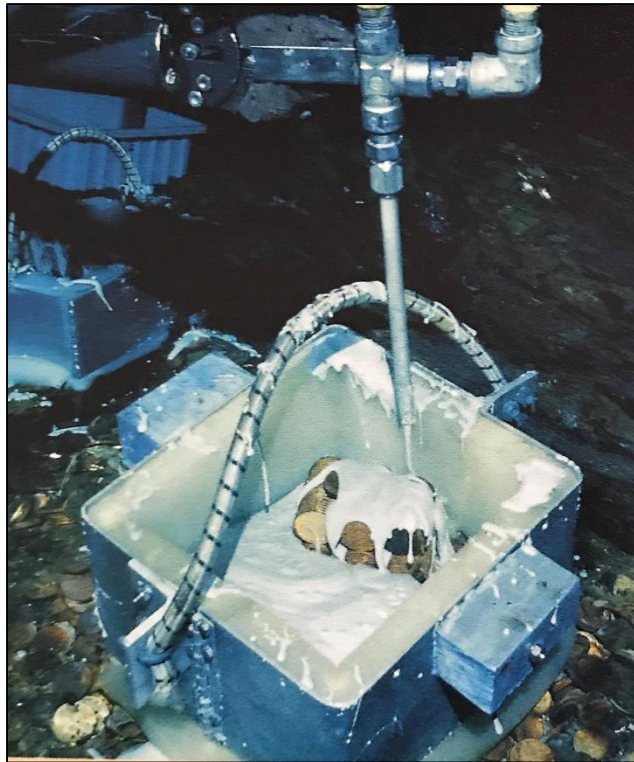
SS *Central America* was found and salvaged in 1988 by treasure hunter Tommy Thompson at a depth of 2,200 m.

Thompson organized the salvage of the site, designed an ROV and invited a large team of specialists. The artifacts raised were conserved and he published a book about the salvage operations and results.

Then he sold the treasure and disappeared with his girlfriend.



It's all about the coins.



Thompson was arrested with his girlfriend in 2015 but as we speak he has not told his investors what he did with the money.



https://en.wikipedia.org/wiki/SS_Central_America

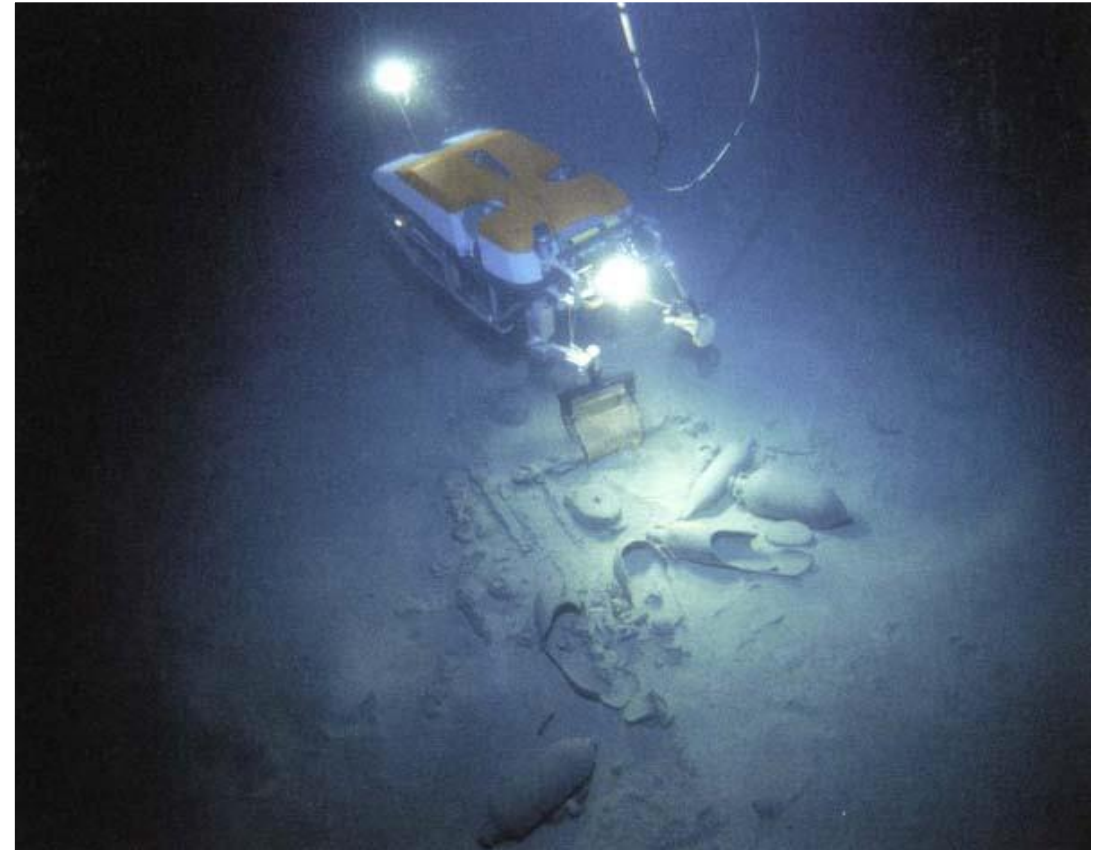
Case Studies: SS *Central America*, 1857

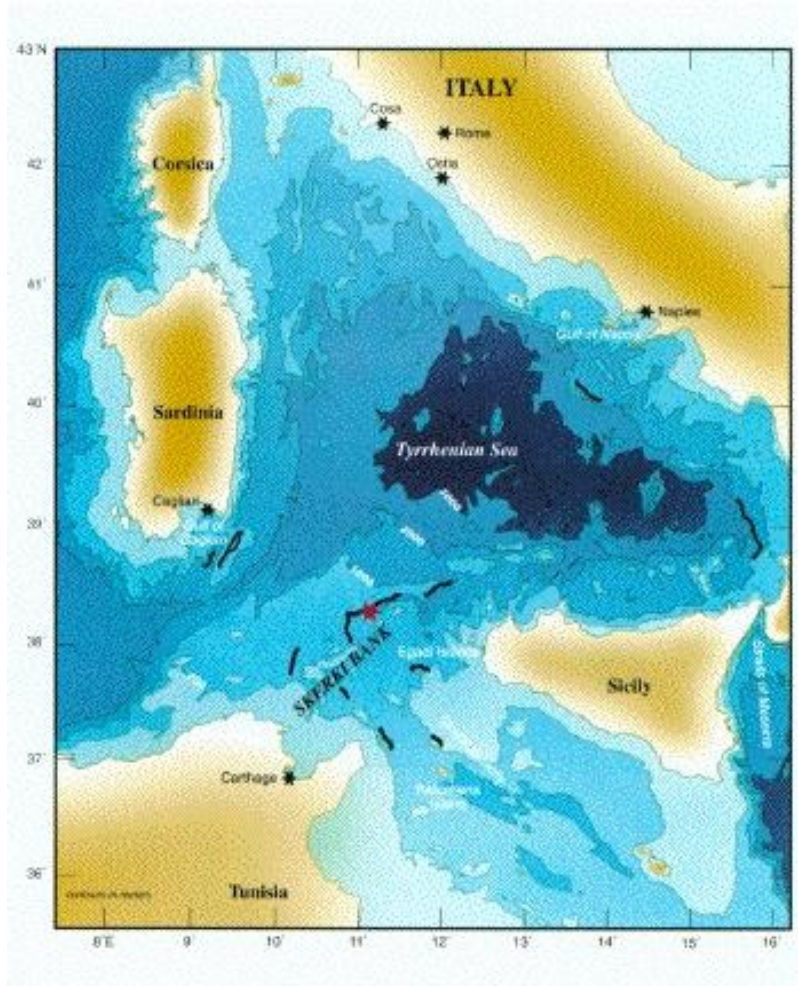
Odyssey Marine resumed the salvage in 2014. Reports have been filed the court but not much information has transpired.



<https://www.maritime-executive.com/article/Odyssey-Recovers-SS-Central-America-Shipwreck-Treasures-2014-07-18>

Late Roman Shipwrecks at Skerki Bank





Between 1988 and 2003 Dr. Robert D. Ballard and the Institute for Exploration surveyed the Skerki Bank, located between Carthage, Sardinia, and Sicily, in the Tyrrhenian Sea, and found **eight shipwrecks** about 800 m deep. Five were dated to between 100 BC and AD 400.

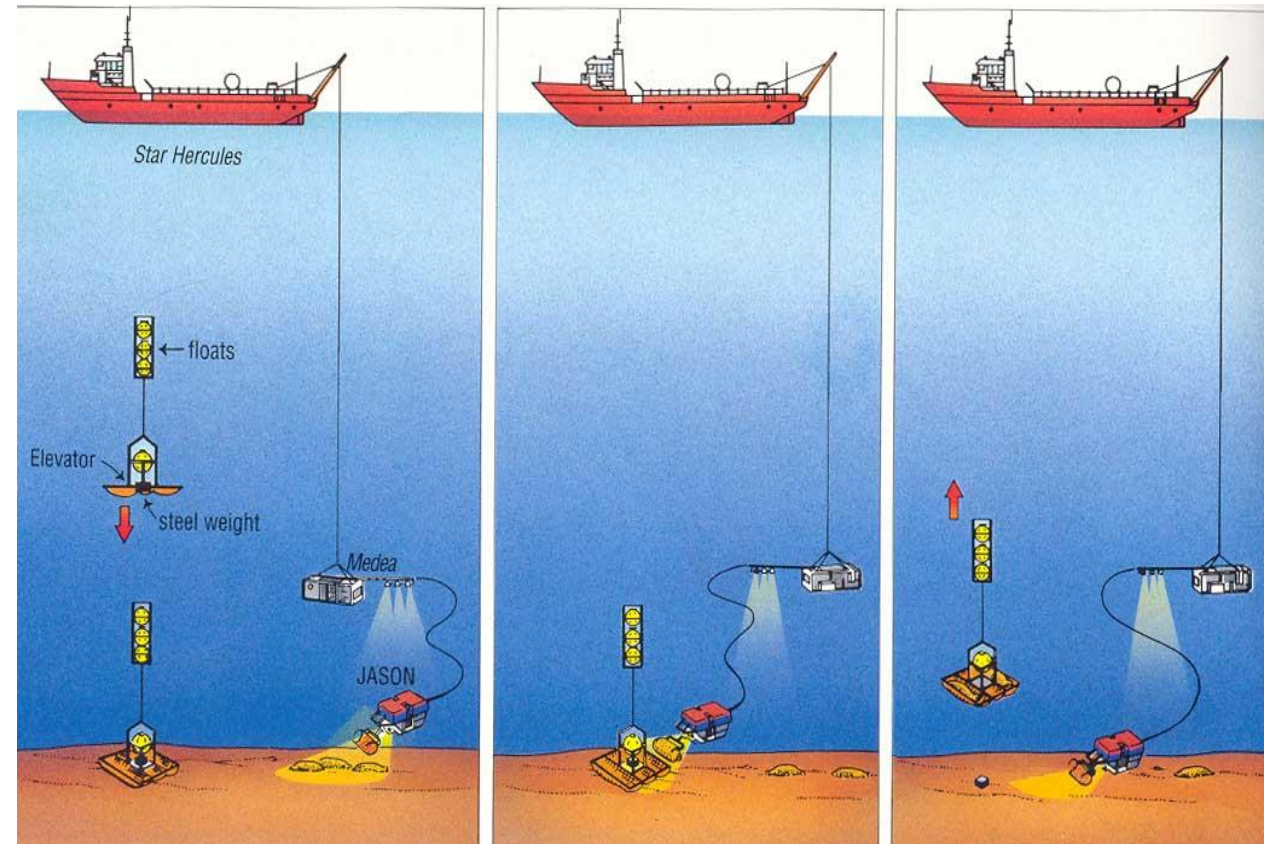
Dr. Ballard chose this area for a number of reasons. The entirety of Skerki Bank is in international waters, making it easier to conduct scientific research.

Case Studies: Skerki Bank

The area is known to sailors and fishermen as very dangerous during storms. Dr. Ballard also picked it because of its location between **Carthage** and **Rome**. He wanted to know if there was evidence for deep sea trade routes. So many authors supported the theory that ships sailed mainly along the coasts. About 95% of all excavated shipwrecks were found within 10 miles of land.

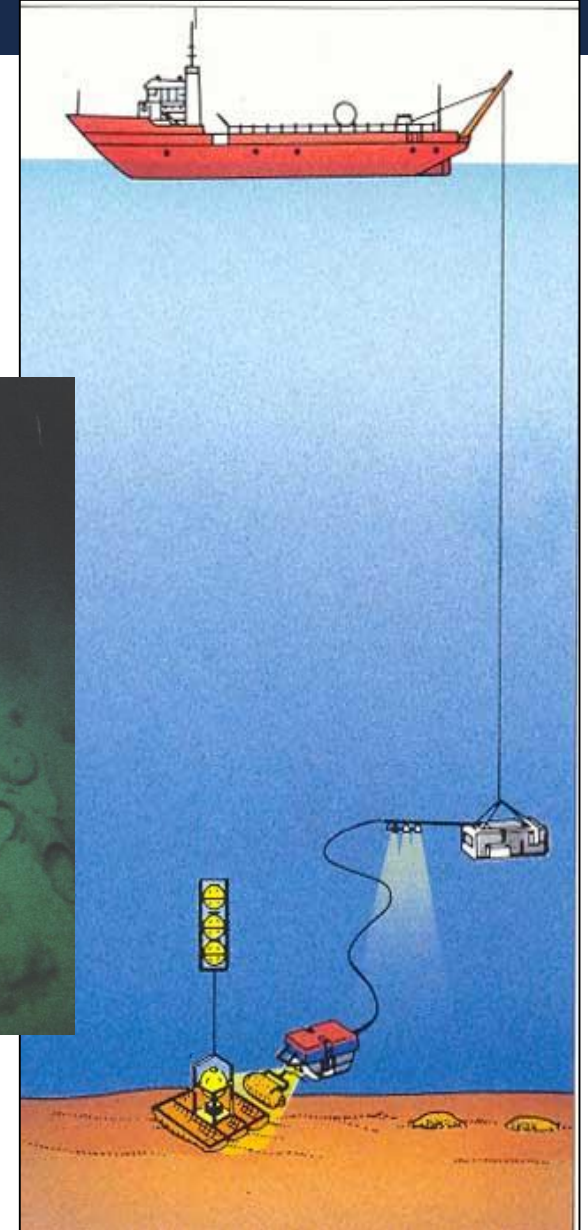
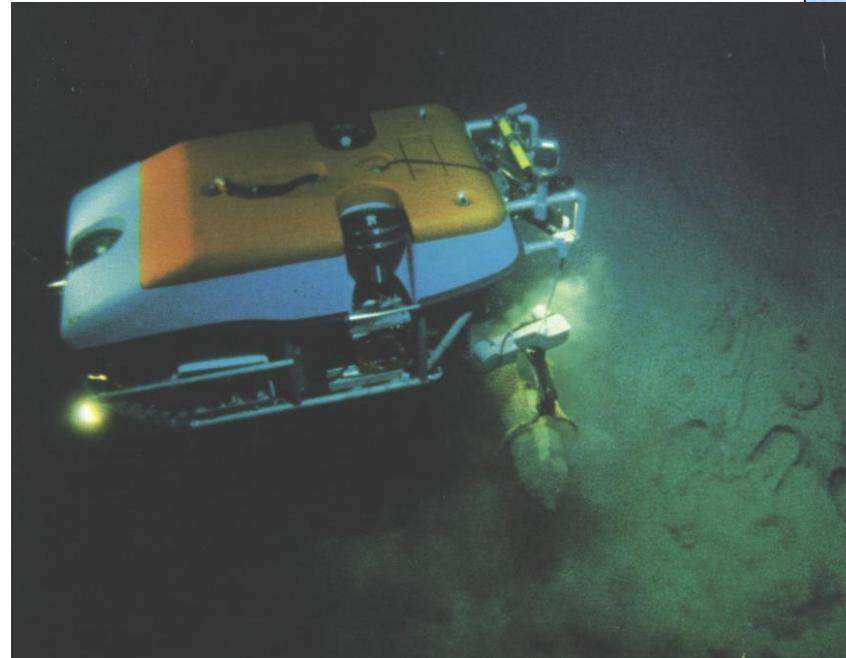


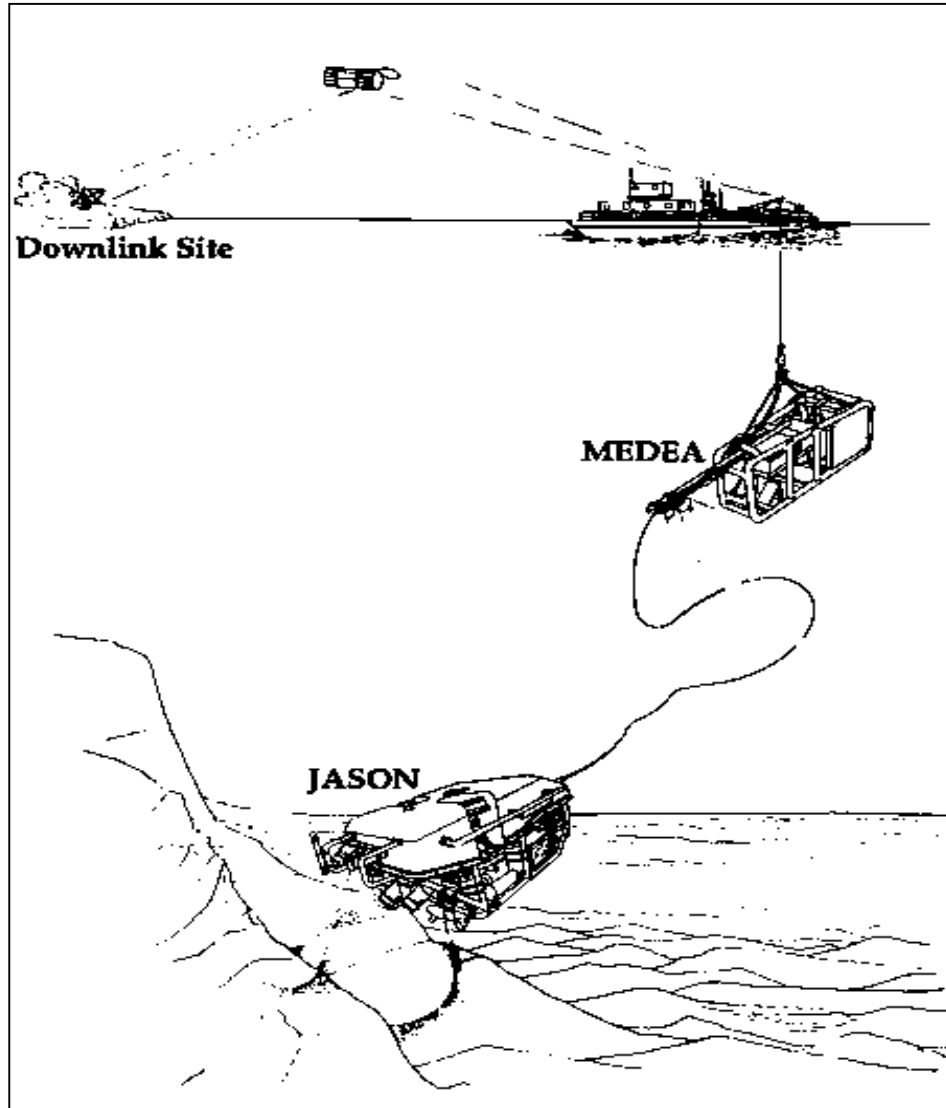
He also wanted to know if archaeologists could use oceanographic and engineering technology to carry out deep water survey and limited excavation at professional levels.



Technology

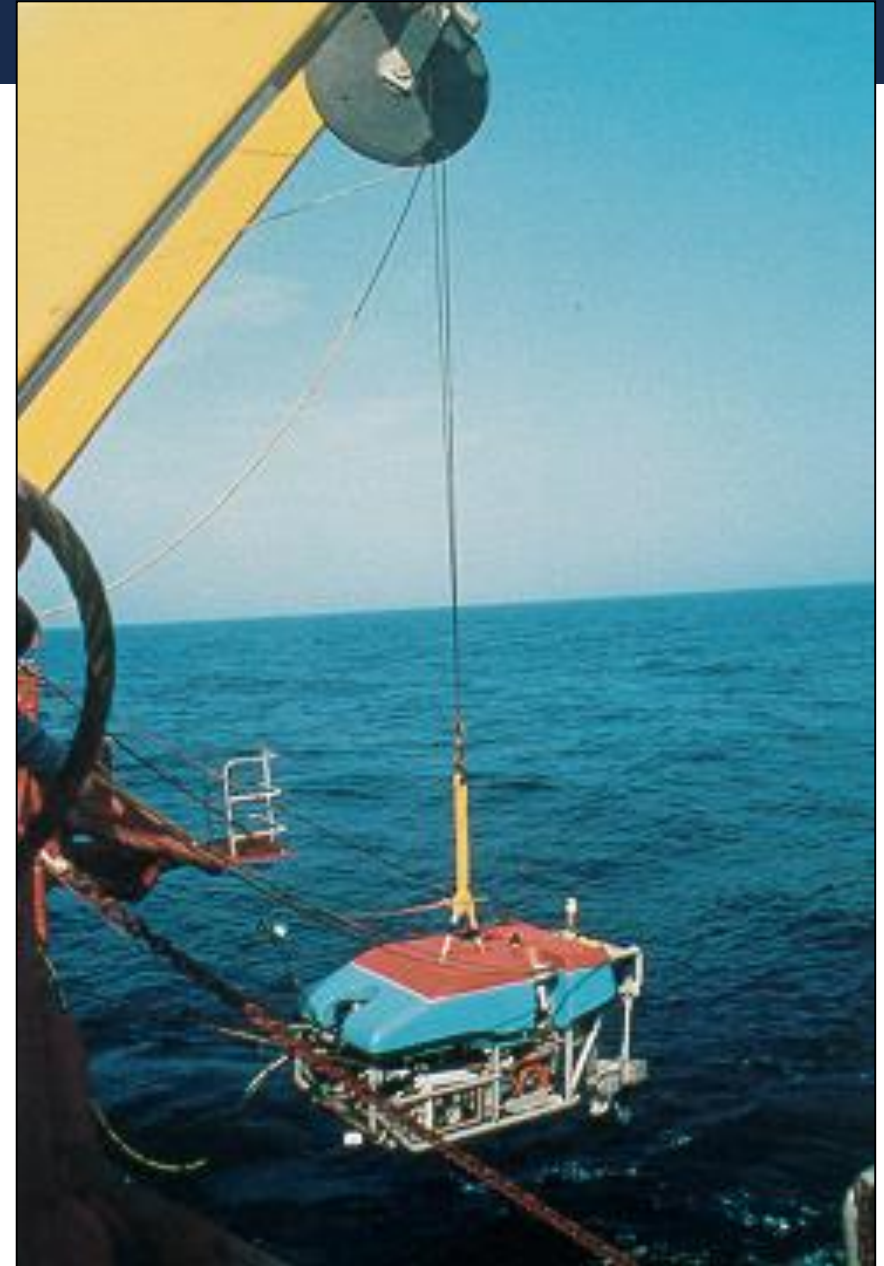
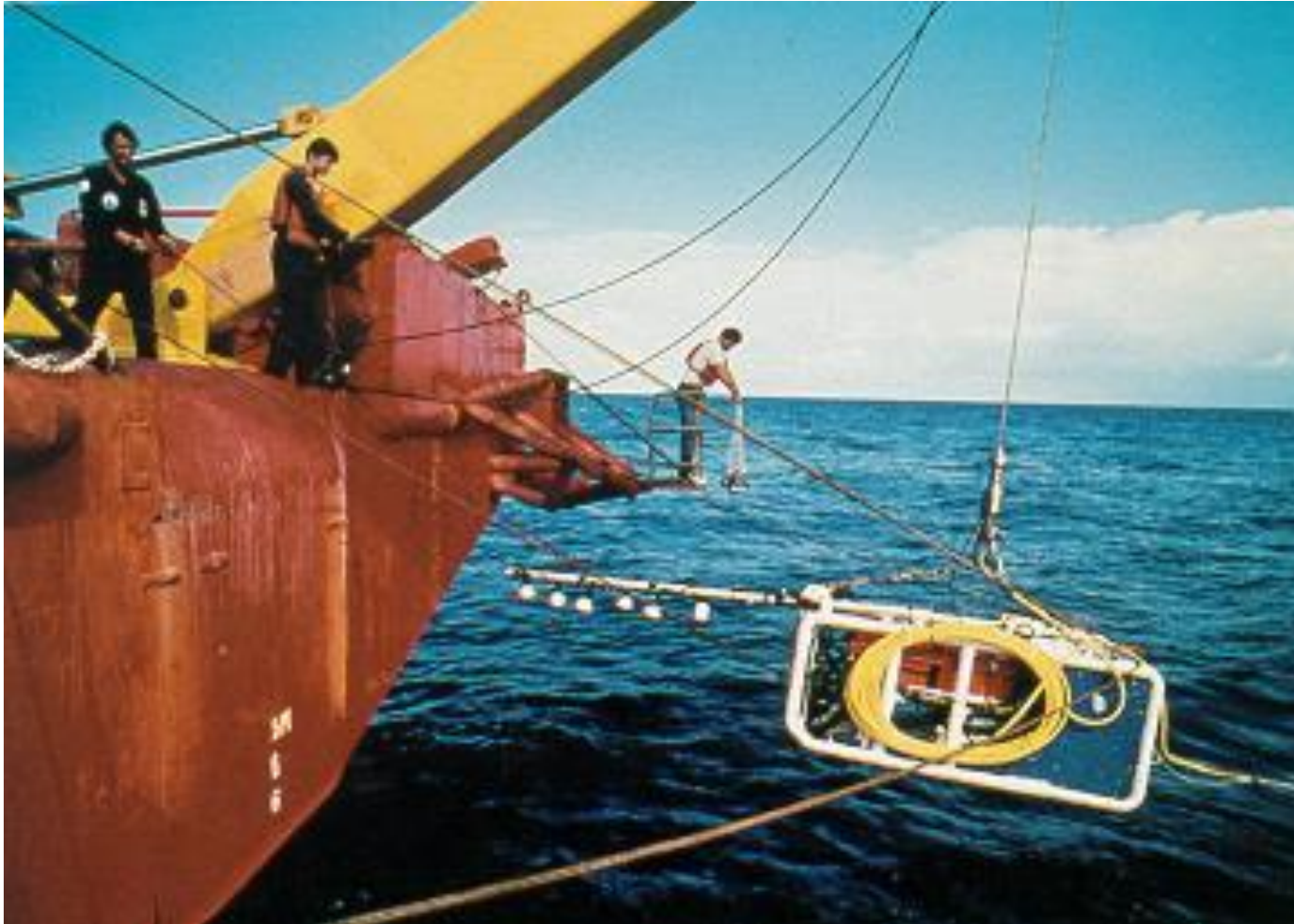
- ARGO (Camera sled);
- JASON and MEDEA (ROVs);
- Hercules and Little Hercules (ROVs);
- NR-1 (submarine).





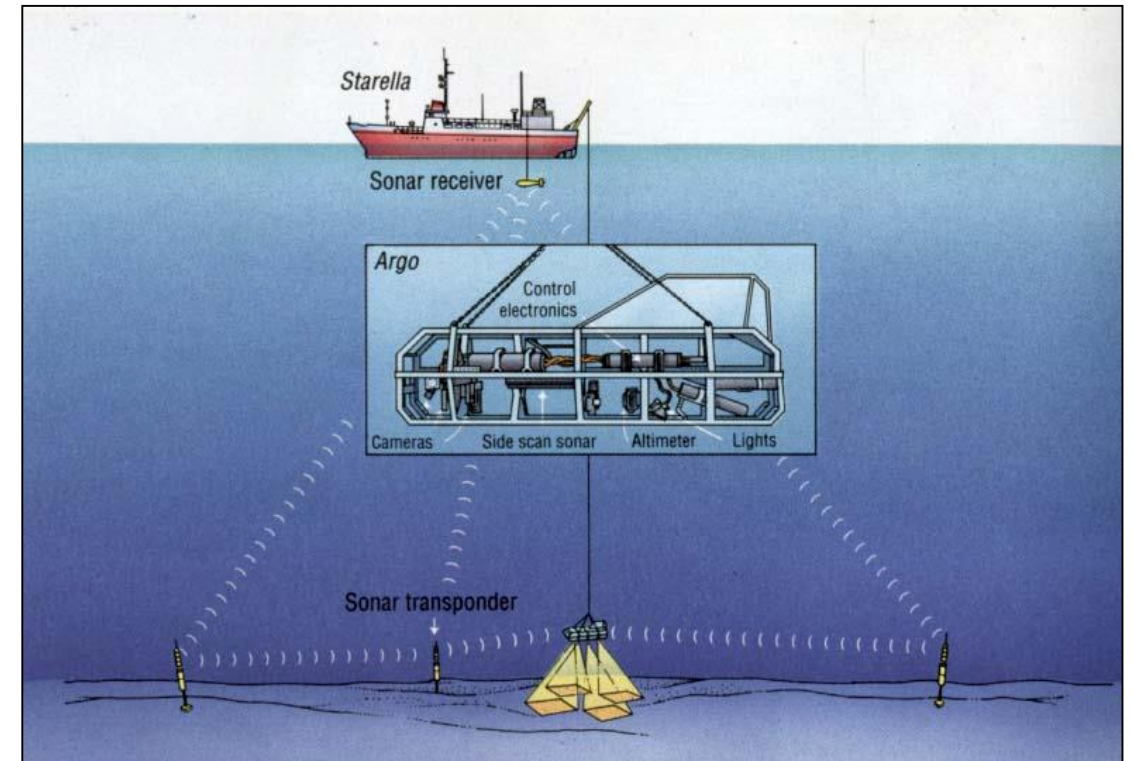
Below a certain level, the tether becomes heavy is pulled by currents, and the ROV is difficult to maneuver from the surface.

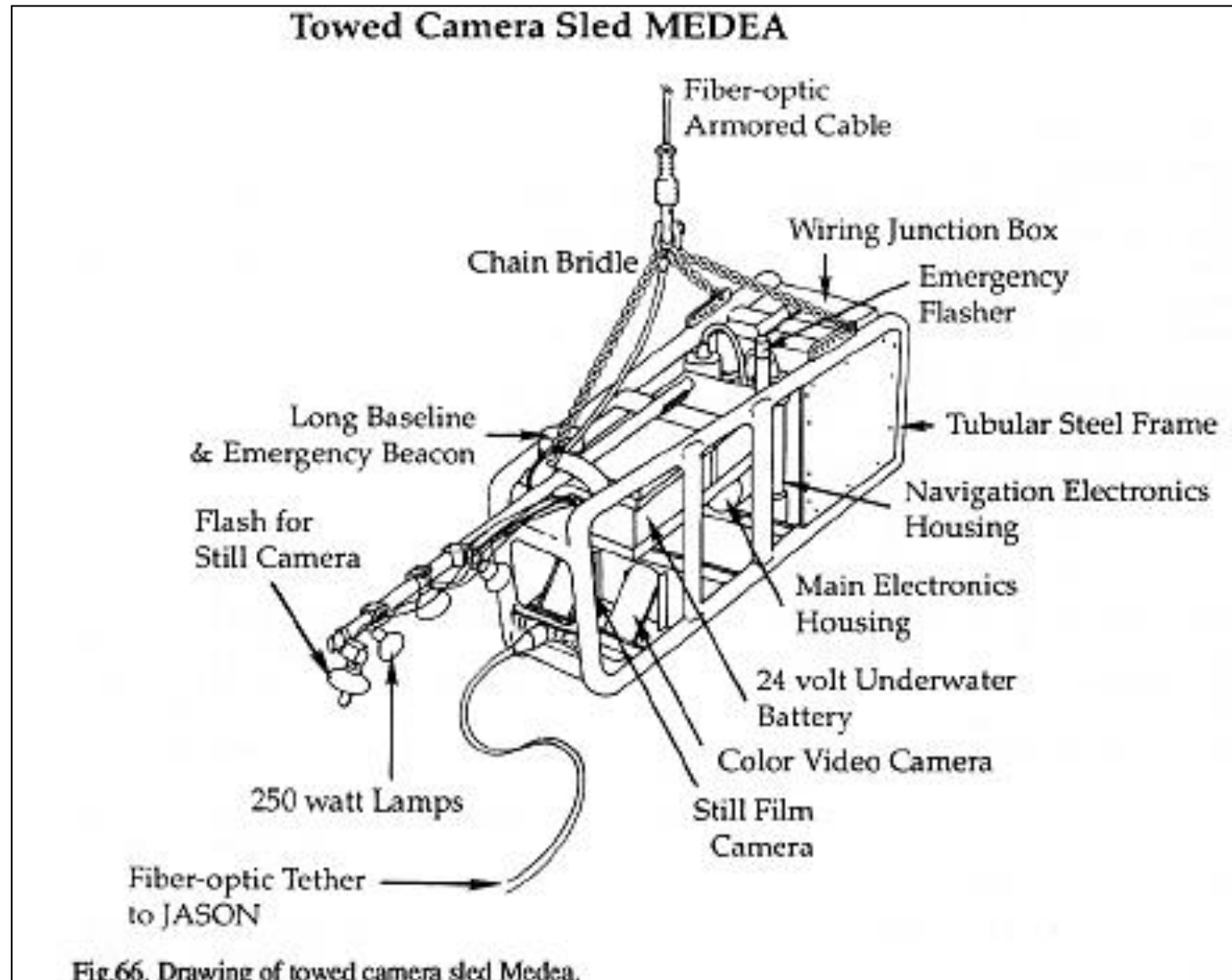
That is why sometimes a smaller ROV is used linked to a larger vehicle.



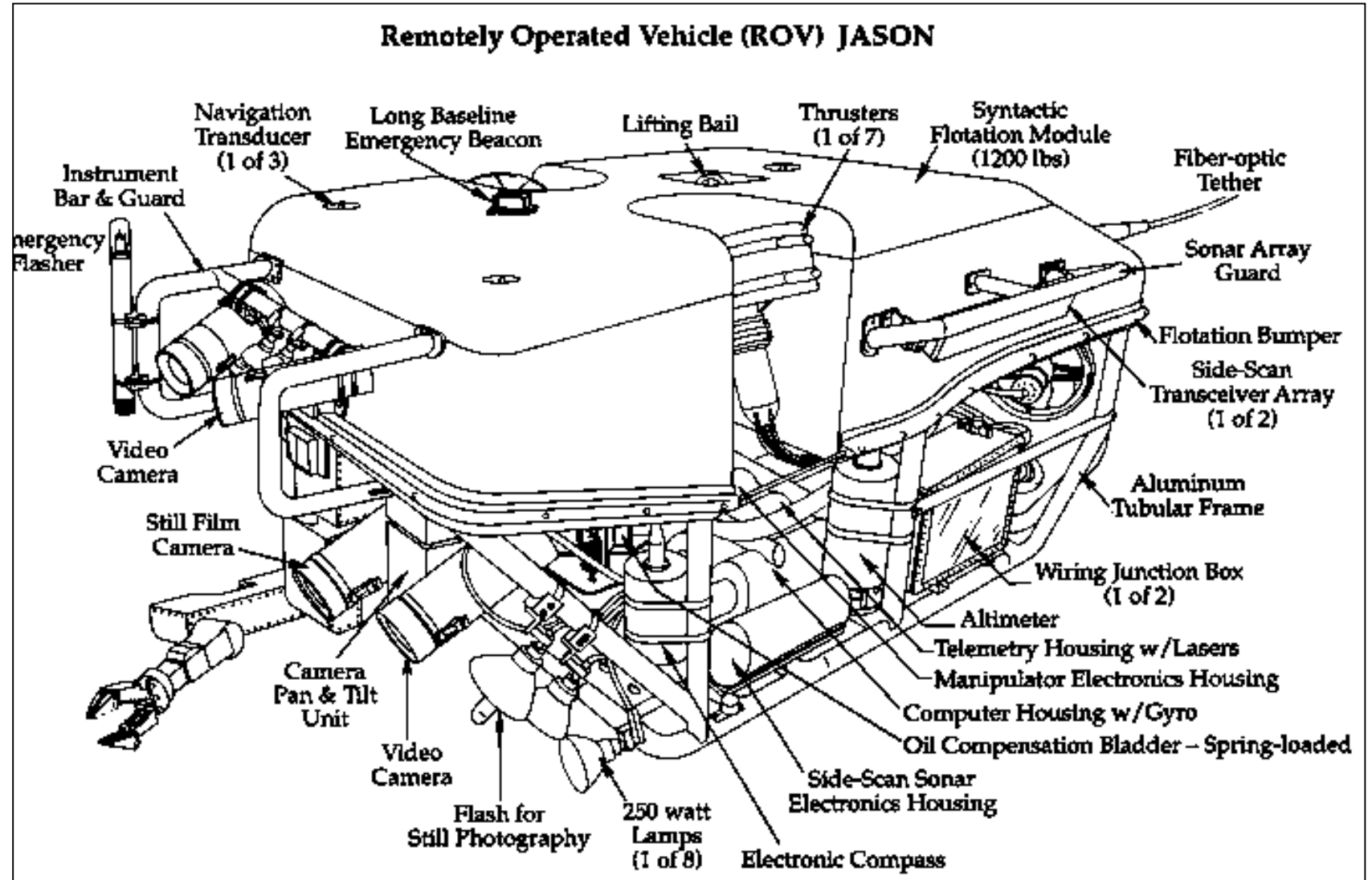
ARGO

- Heavy-duty frame;
- 3 low-light level, black and white video cameras with running lights;
- 35 mm color film camera and strobes;
- Echo-sounder;
- 100 kHz side-scan sonar system, flown at an average altitude of 15 m above the sea floor.

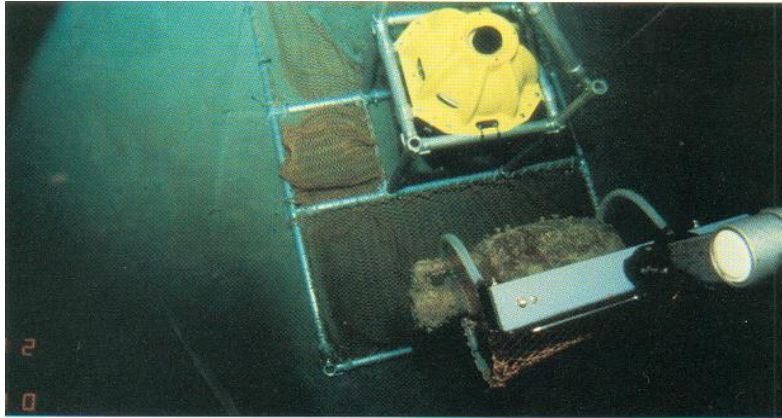




JASON



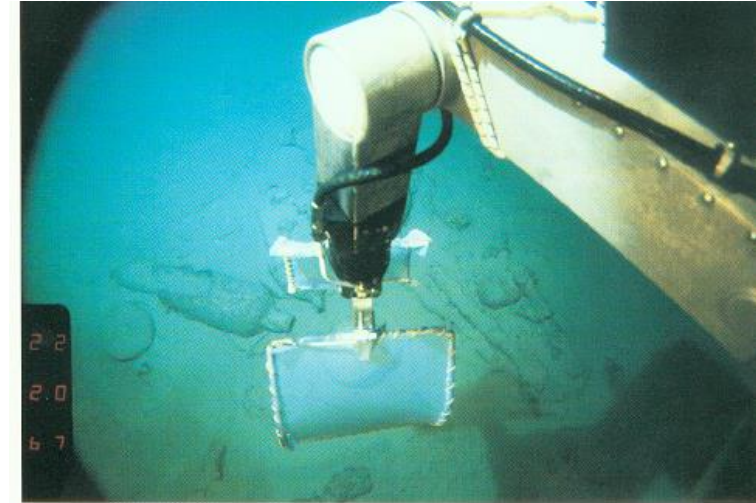
Case Studies: Skerki Bank



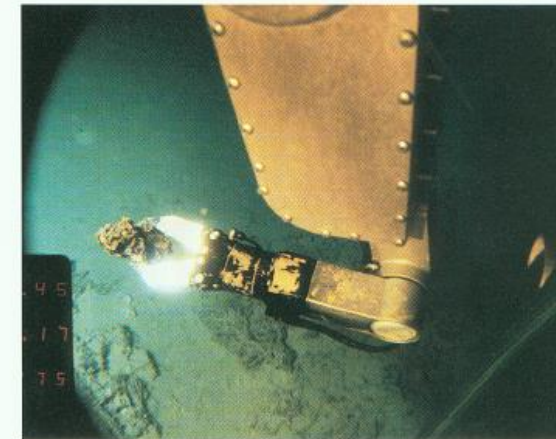
Color fig.27. Elevator on sea floor with ROV Jason's robotic arm bringing an amphora for deposit. Photo: Quest Group, Ltd.



Color fig.28. Elevator on surface with amphoras in netted compartments. Photo: A. M. McCann.

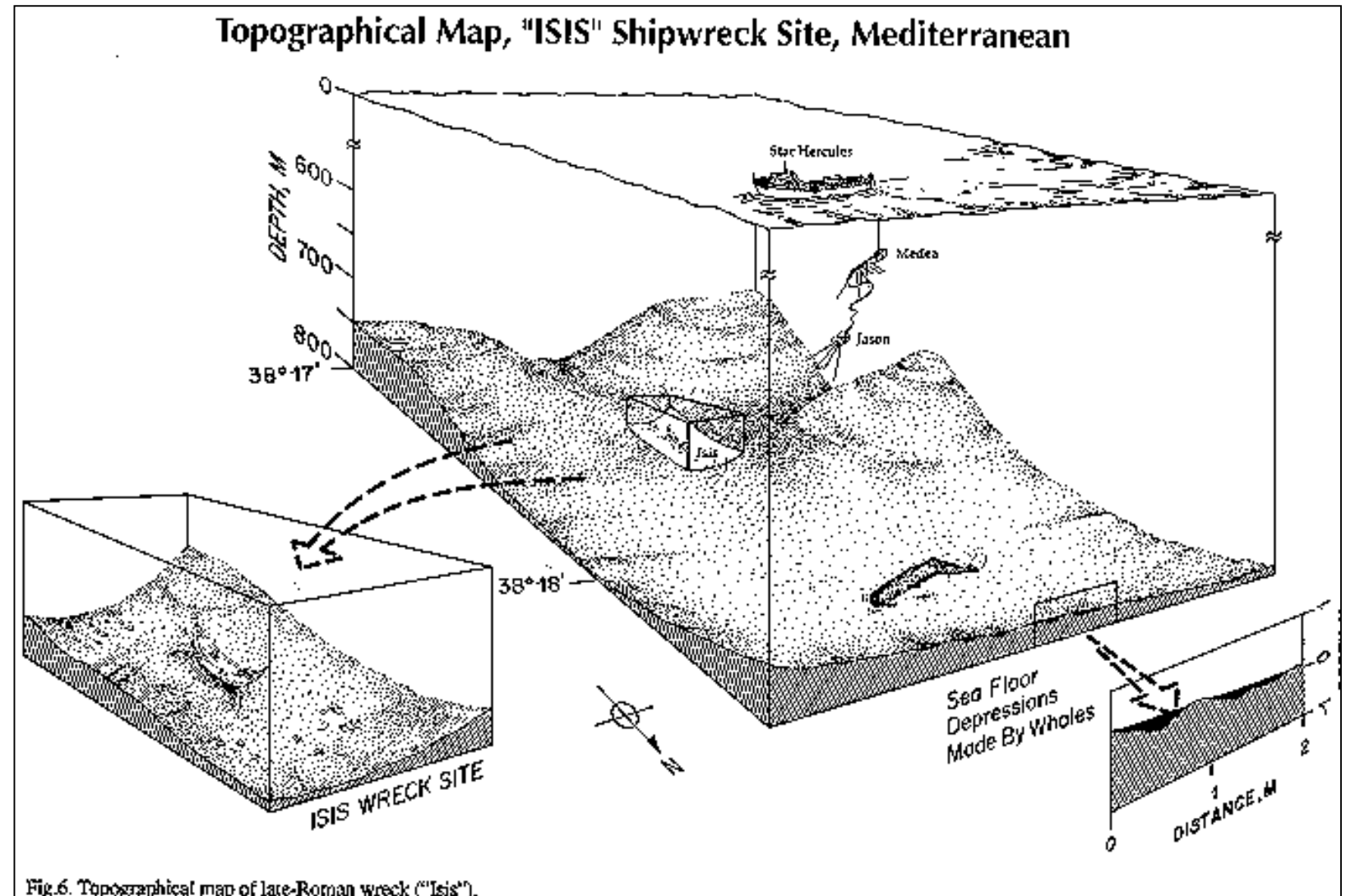


Color fig.24. ROV Jason's robotic arm with netting, going in to pick up amphora. Photo: Quest Group, Ltd.



Color fig.25. ROV Jason's robotic claw with small sample in its grasp. Photo: Quest Group, Ltd.

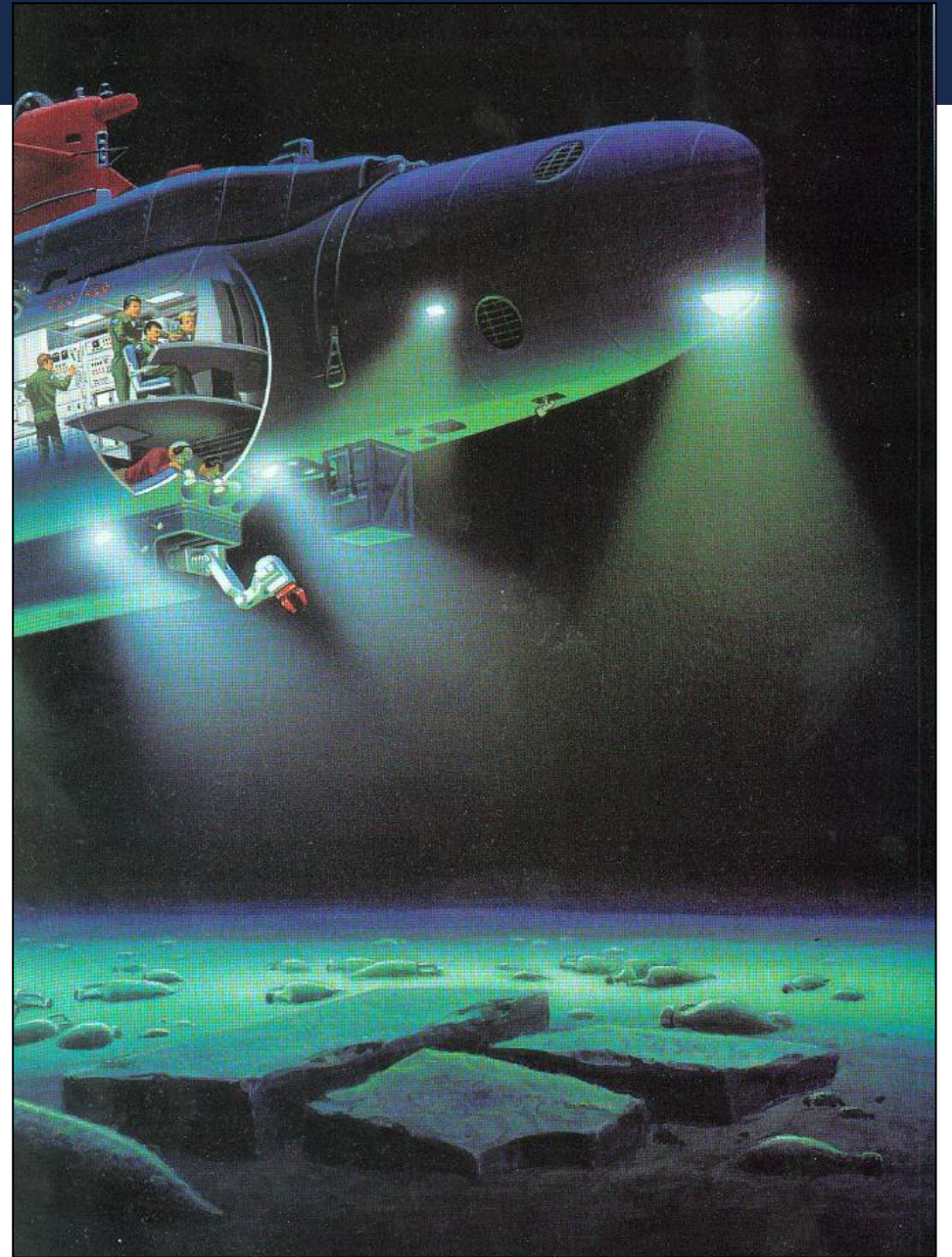




NR-1

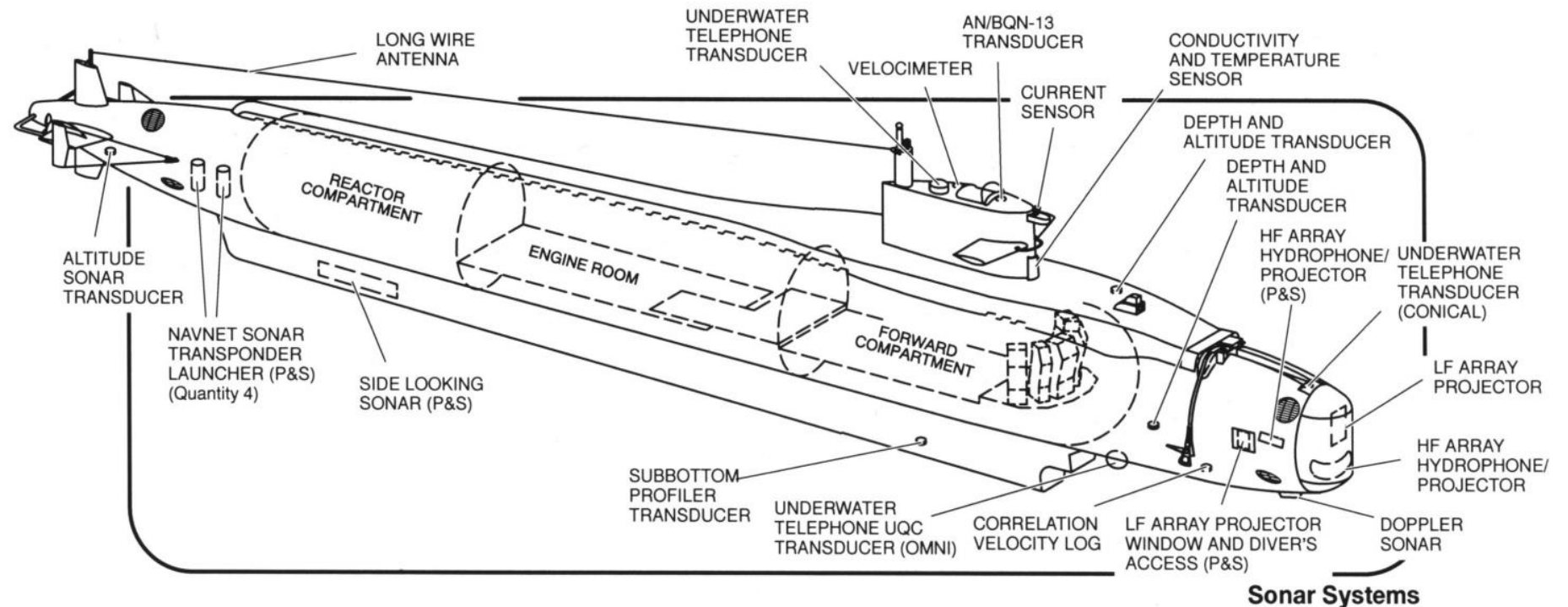


- The NR-1 was the first deep submergence vessel that used nuclear power, launched on January 25, 1969;
- The NR 1 is used for underwater search and recovery, oceanographic research missions and installation and maintenance of underwater equipment, to a depth of almost half a mile;

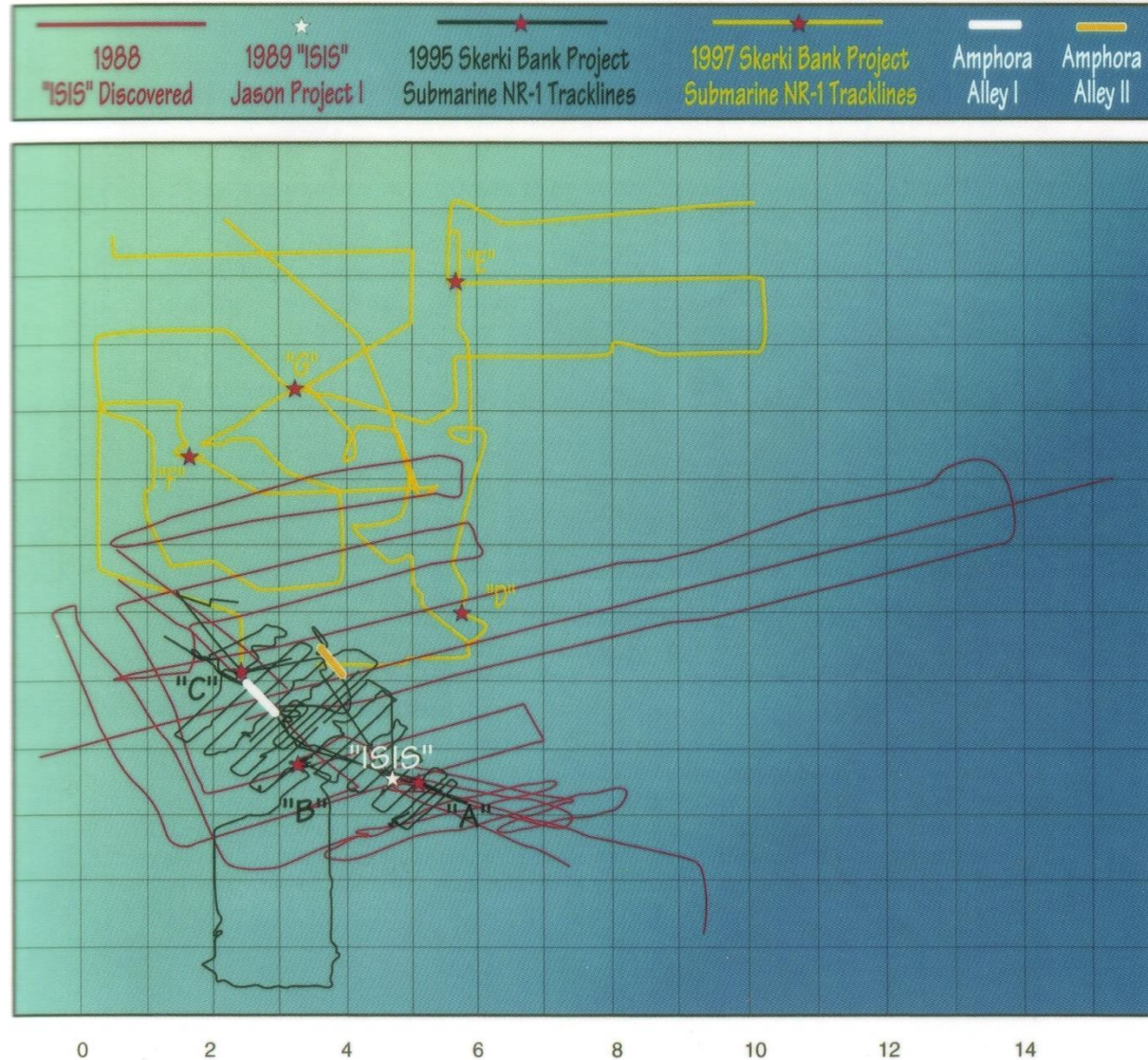


- Features include extendable bottoming wheels, three viewing ports, exterior lighting, television, and still cameras for color photography;
- It has an object recovery claw, a manipulator that can be fitted with various gripping and cutting tools and a work basket that can be used in conjunction with the manipulator to deposit or recover items in the sea.

NR-1



Case Studies: Skerki Bank



1988 & 1989

“Isis,”

“Amphora Alley I”

1995

“Amphora Alley II”

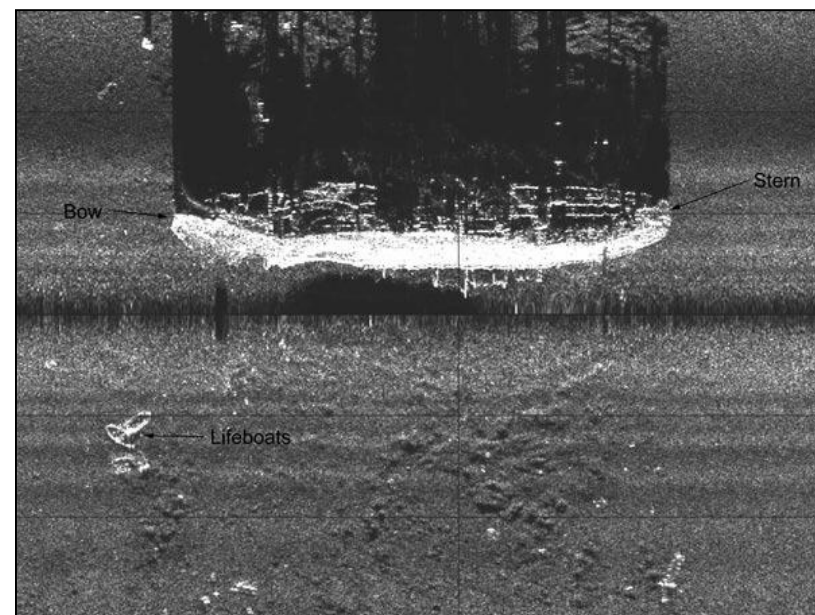
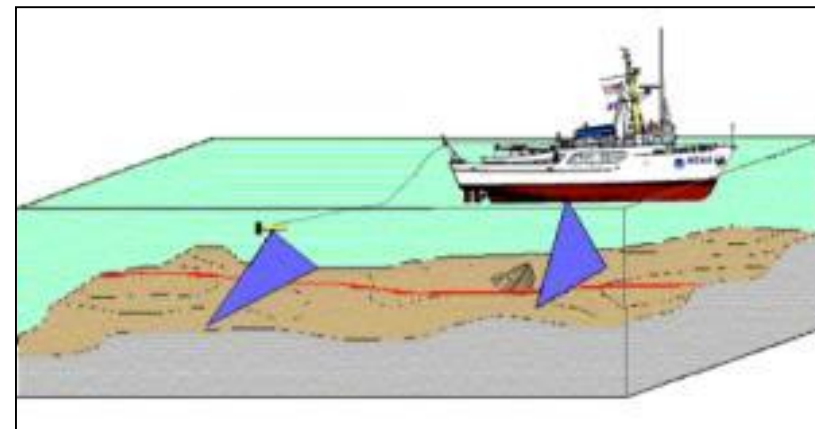
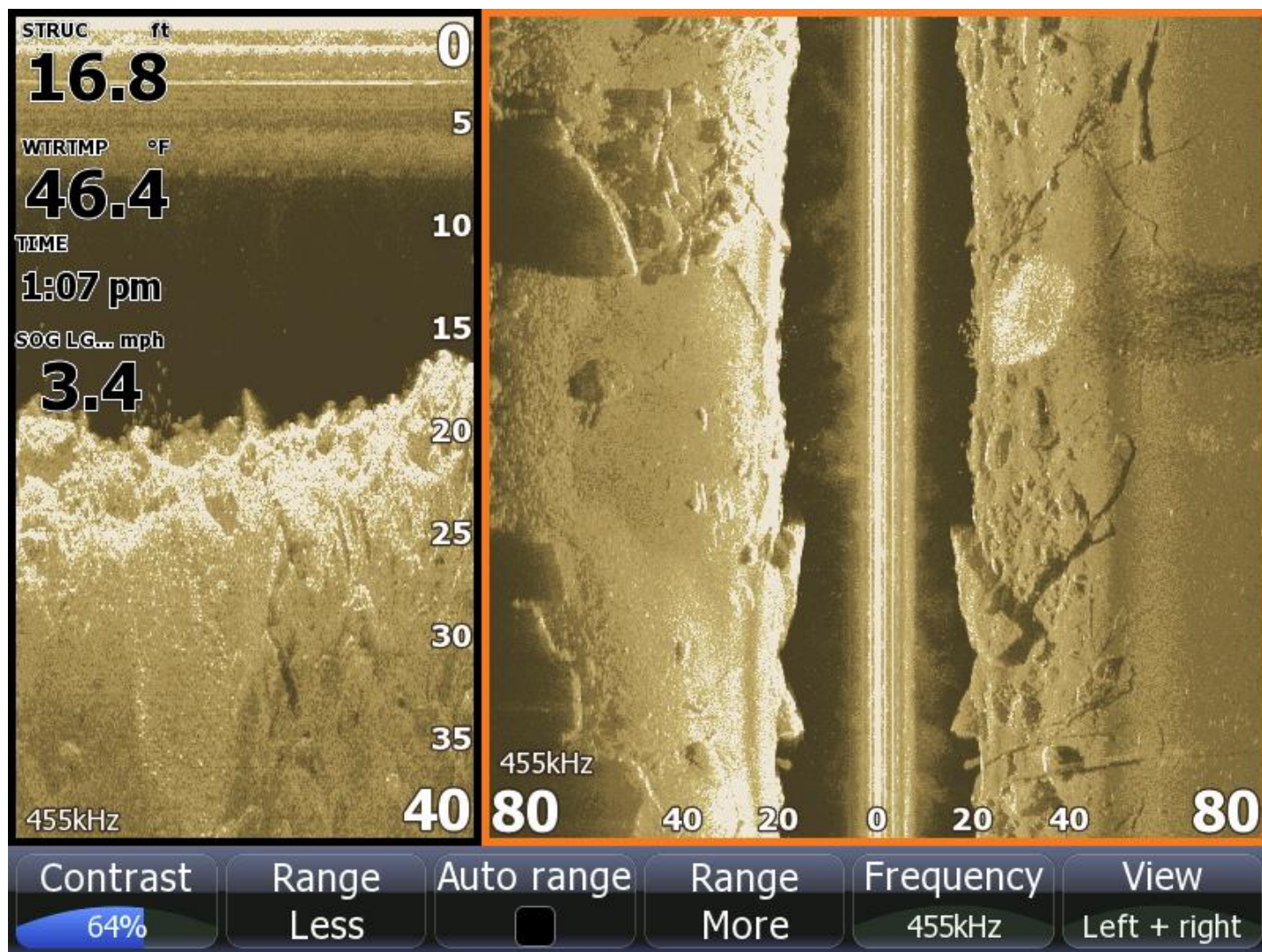
Wrecks A, B, C

1997

Wrecks D, E, F, G

2003

No new data...



Skerki Bank Shipwrecks

- Wreck D - 80-60 BC
- Wreck G - AD 50
- Wreck F - Mid 1st c. AD
- Wreck B – Late 1st c. AD
- *ISIS* - Late 4th c. AD

-
- Wreck A – Early 19th century
 - Wreck E - 19th c. wooden sailing ship
 - Wreck C – Late 19th c. wooden sailing ship

Map of the Roman Empire showing trade routes and ports. The map includes the British Isles, Gaul, Hispania, Italy, North Africa, and the Eastern Mediterranean. Trade routes are indicated by arrows, and ports are marked with numbers 1 through 8. A star marks the location of SKERKI/ISIS. The map also shows major rivers like the Rhine, Danube, and Nile, and the Black Sea and Red Sea.

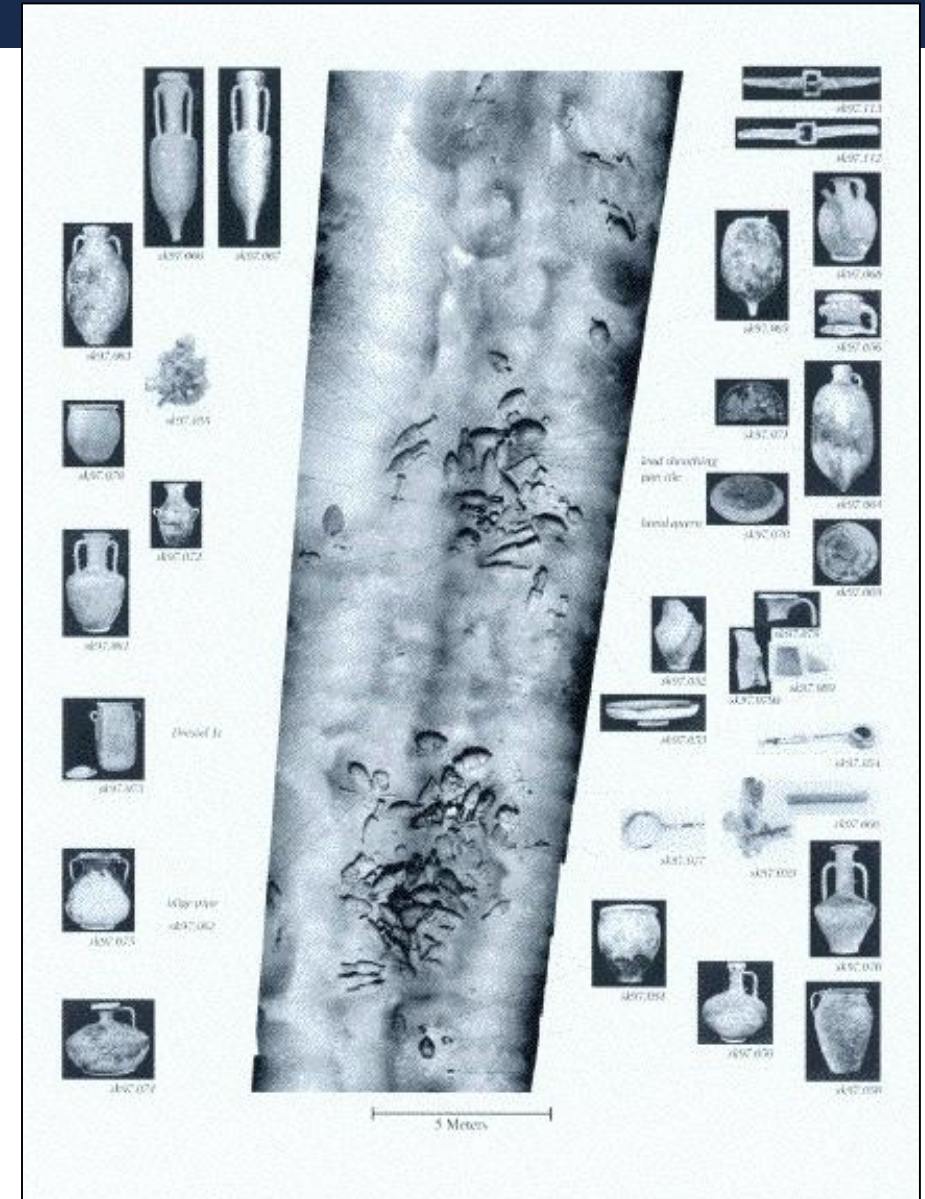
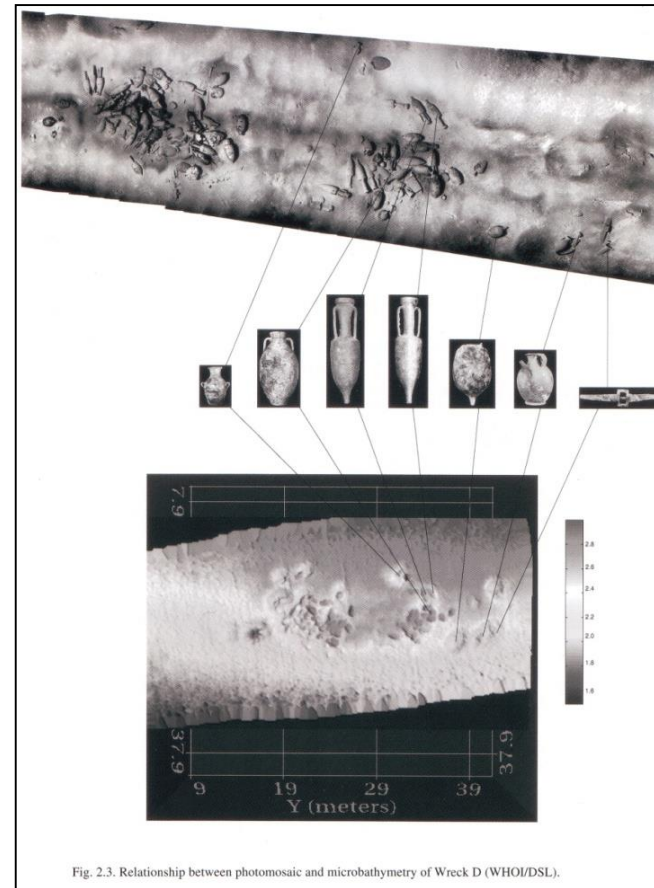
Legend:

- ★ SKERKI/ISIS
- ① Cosa
- ② Ostia
- ③ Puteoli
- ④ Lilybaeum
- ⑤ Luna
- ⑥ Rhodes
- ⑦ Londinium
- ⑧ Gades

Skerki D Shipwreck

- Earliest (80 – 60 B.C.) and probably the largest of the Roman shipwrecks;
- Dated by amphorae, kitchen and common ware, fine pottery, bronze table ware, and two lead anchor stocks with one lead anchor strap;
- 35 artifacts total were lifted from the shipwreck;
- At least **10 different forms of amphora** are documented (Italy, Gaul, N. Africa and Greece);
- A lot of the cargo is missing, probably floated away or chemically degraded.

Skerki D Shipwreck



Skerki D Shipwreck



Skerki D Shipwreck

- This was a large ship, probably 40 m long, as large as the Madrague de Giens;
- Its cargo was varied and probably heading south, to the rich colonies of the North of Africa.



Wreck G

- Dated to about AD 50;
- Artifacts scattered, perhaps during the sinking process;
- Small vessel, the site is around 15 m in length;
- The cargo of Amphorae suggests that carried wine and *garum* from the Tarraconensis province
- Common ware cargo
- Galleyware from Gaul
- Western Mediterranean
- Origin and Trade Route



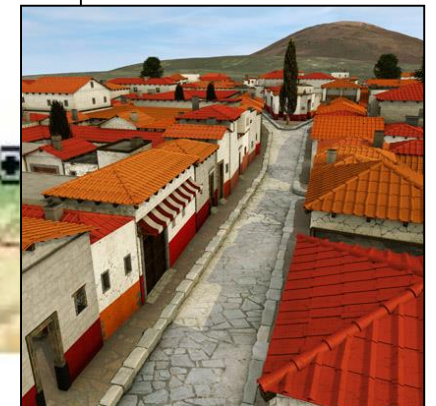
GARUM



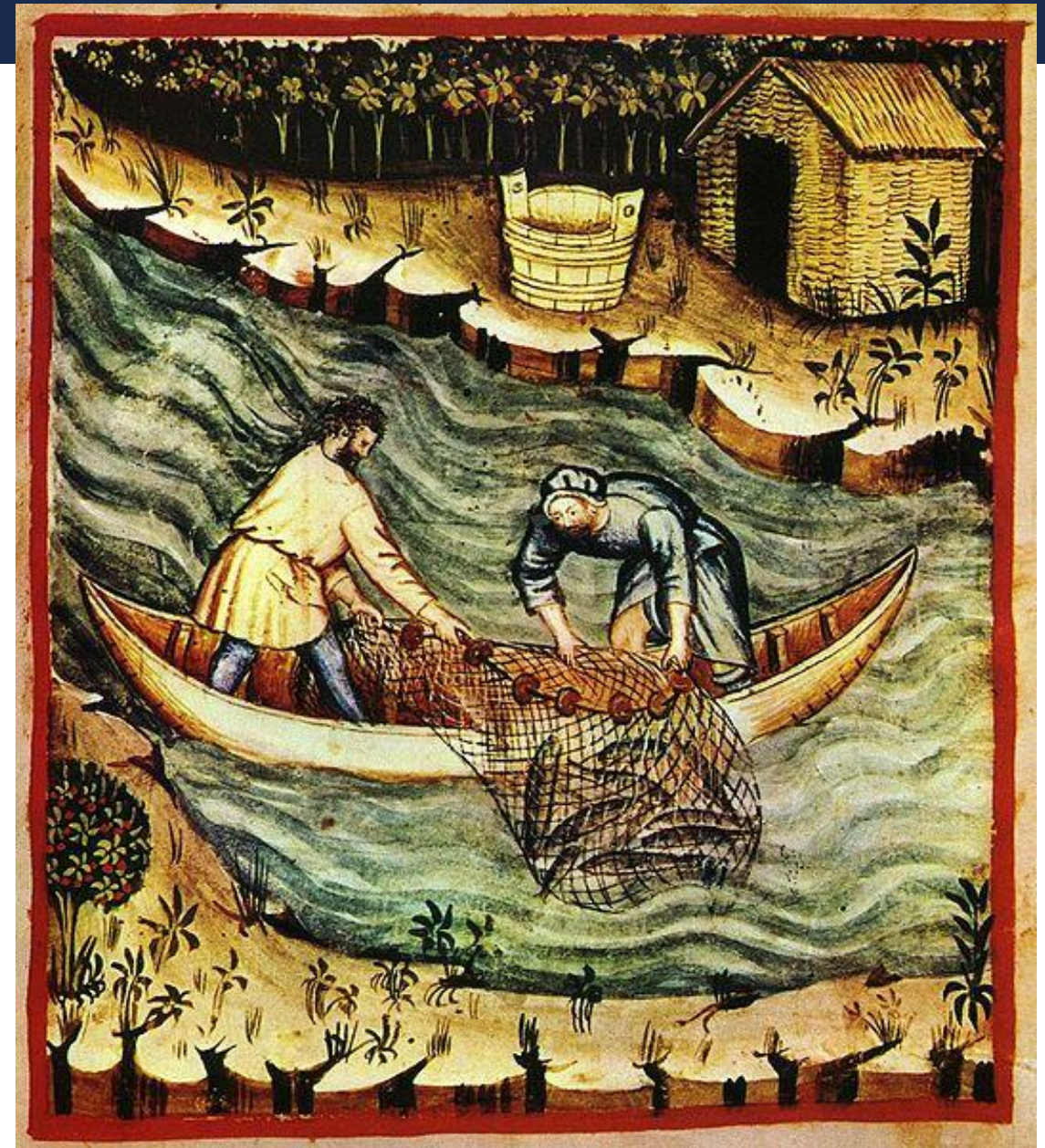
Tróia, Portugal



Fig. 29, Impianti di salagione posti sulle coste a cui si accostano i tonni durante il periodo della riproduzione. (dal lavoro di Ponsich e Tarradell).

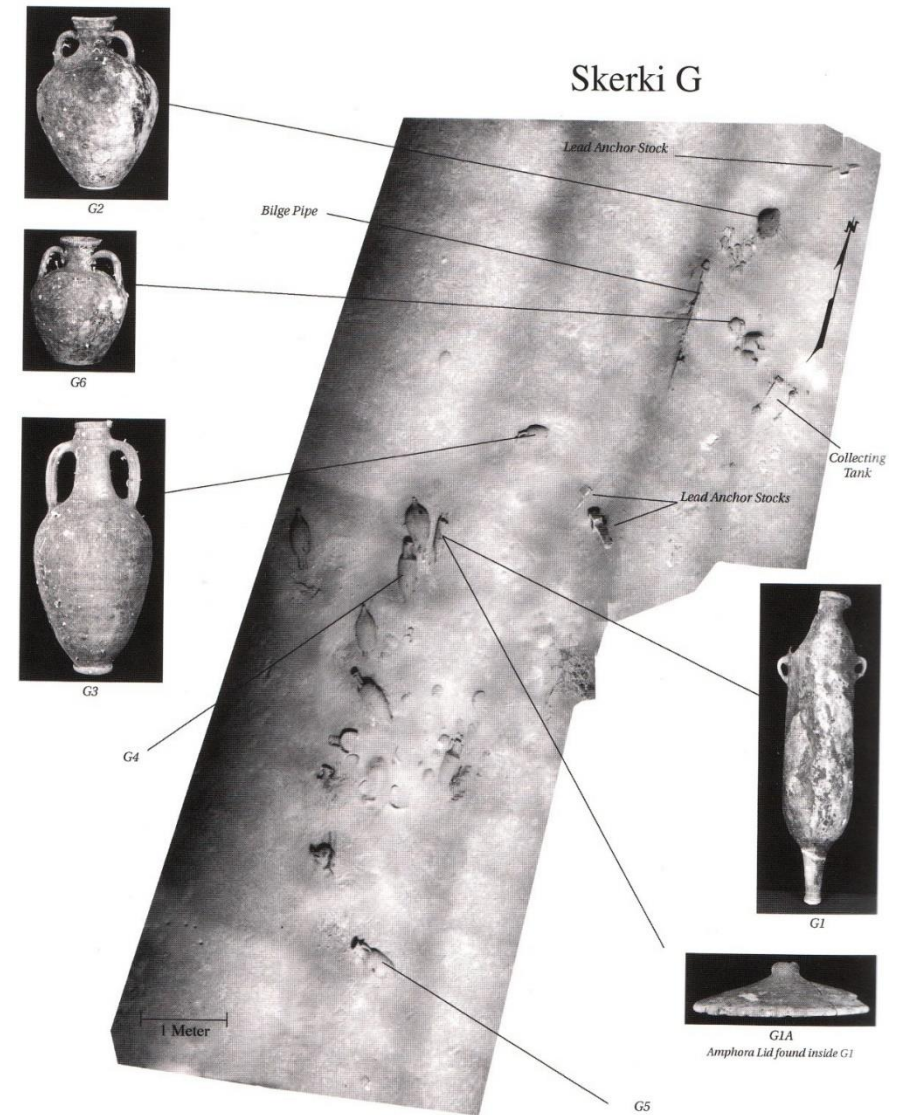


Fishing remains an important economic activity.



Wreck G

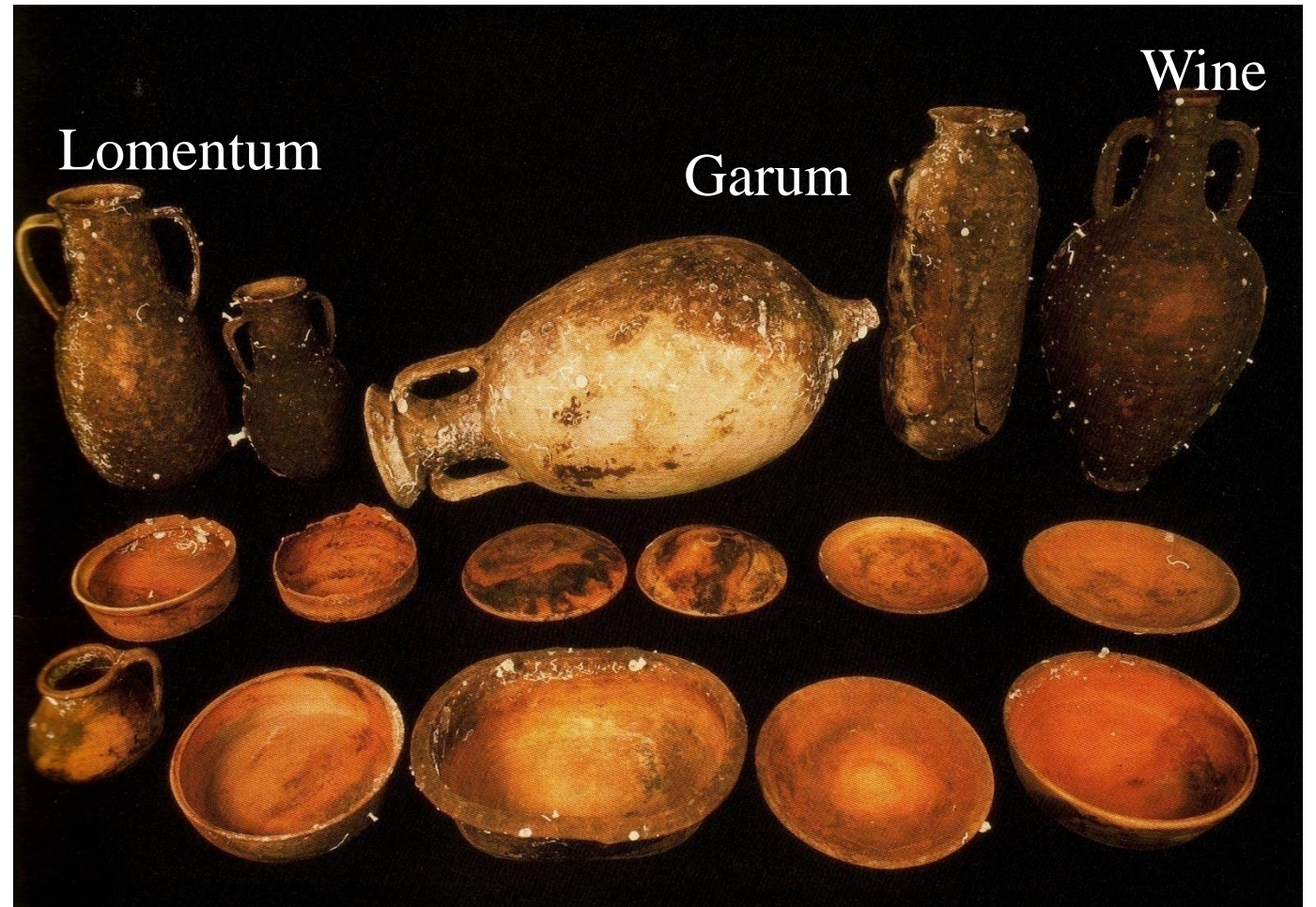
- Other artifacts were spotted, namely common ware cargo, galley ware from Gaul;
- It is believed that this vessel had a **Western Mediterranean Origin**.



- Was dated to the late 1st century AD;
- When it sunk it was carrying **high quality building stones**, amphorae for wine and oil, numerous sets of cooking and coarse ware;
- The site is only about 20 m long, but the cargo seems quite heavy, perhaps as much as 250 tons;
- It was possibly sailing from the North of Africa to Italy.



Wreck F - Artifacts



Wreck F Artifacts

Amphorae for wine, oil, and *garum*;

Petrologic analysis suggests origins in [Spain](#) and [Italy](#) for the wine, and [Spain](#) for the *garum*;

Flat bottomed amphorae probably carried *lomomentum* – a blue pigment and powder made from soya bean and used as a detergent, cosmetic, and medicine; similar amphorae have been found at Pompeii;

Sets of coarse ware; well defined as cargo and packed separately, probably loaded at Carthage based on petrologic analysis.



Wreck F - Artifacts

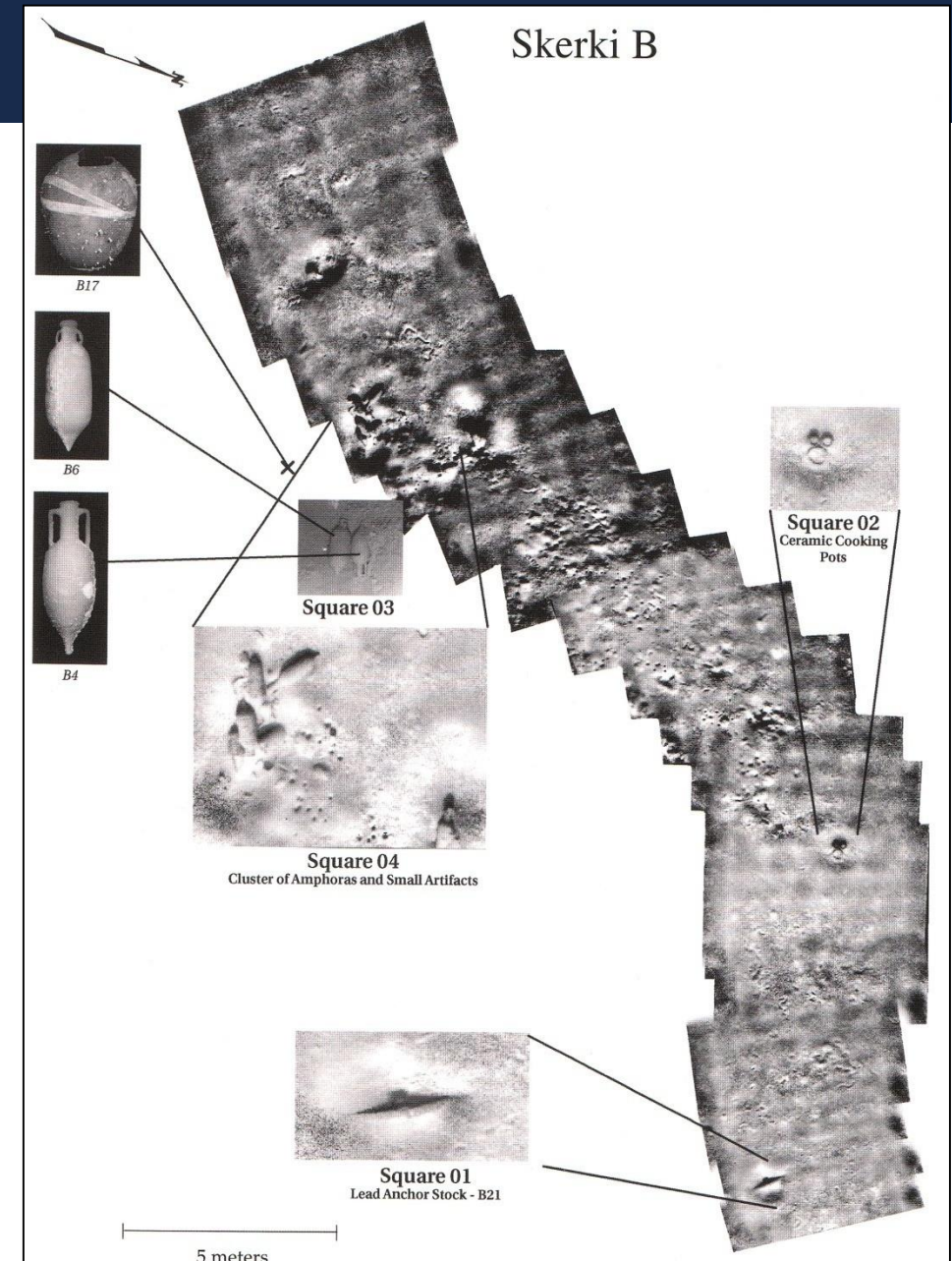


Wreck F - Artifacts

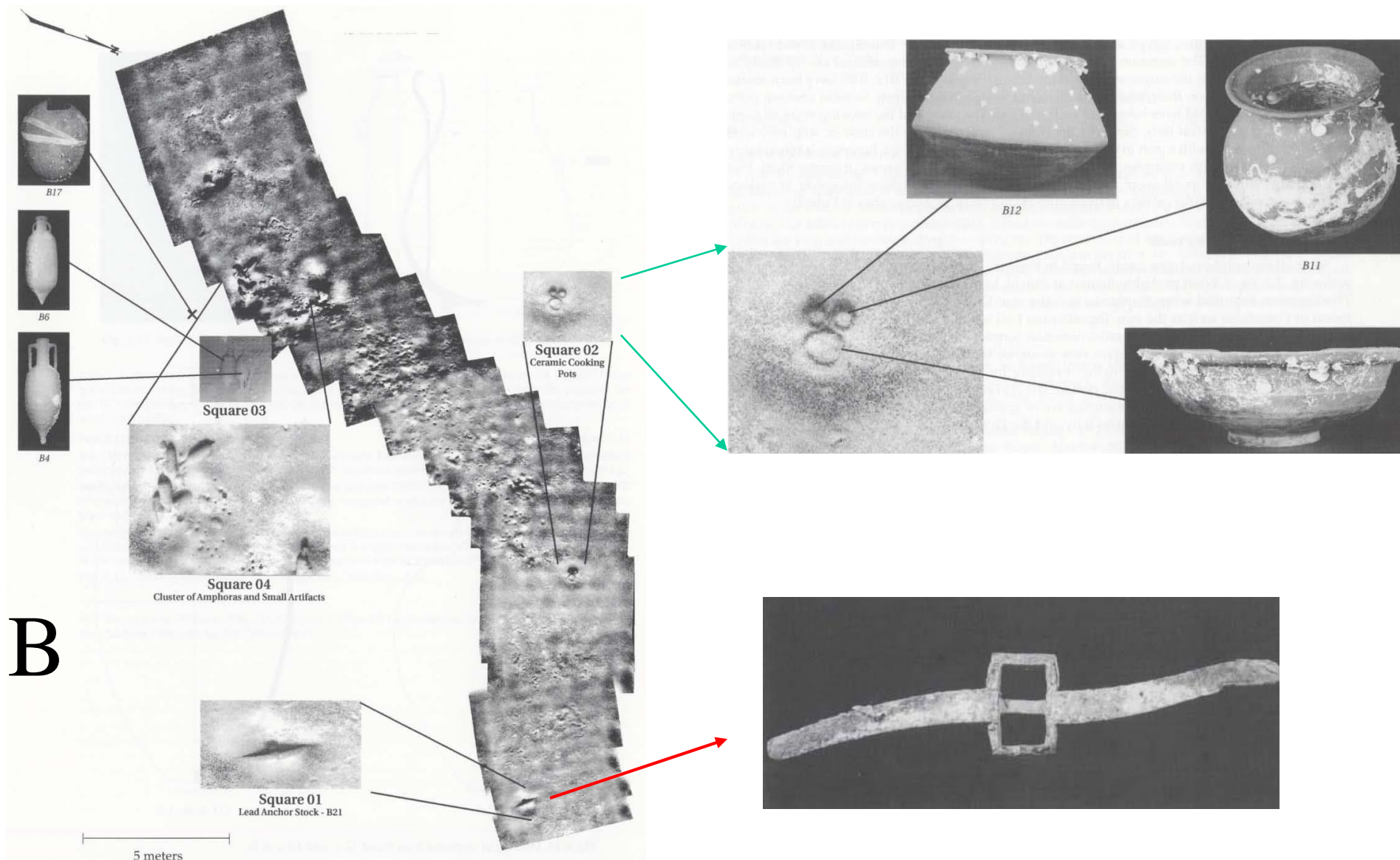
- Main cargo was high quality building stone roughed out for columns;
- Loaded before rest of cargo;
- Probably from the Aswan quarries and loaded in Alexandria;
- Then engaged in cabotage while it hugged the N. African coast and West Med.

Wreck B

- Dated to the last quarter of the 1st century AD;
- The site is 40 m long;
- Scattered artifacts;
- Fragments of hull planking found;
- Lead anchor stock.



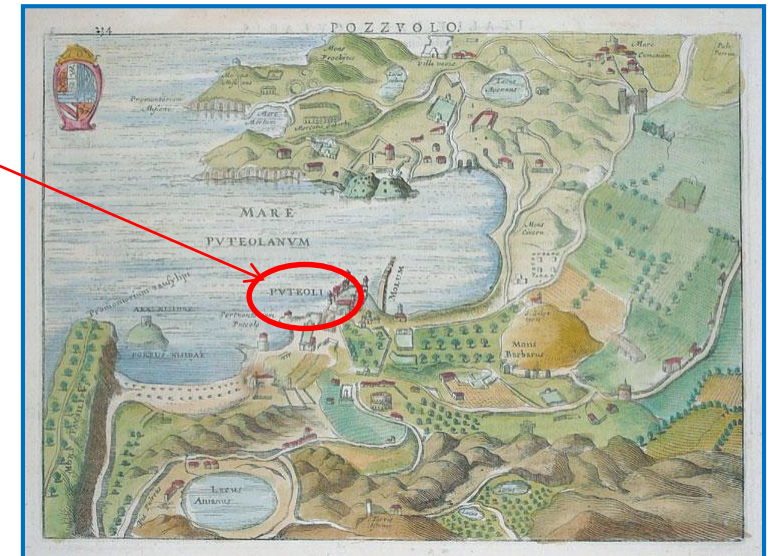
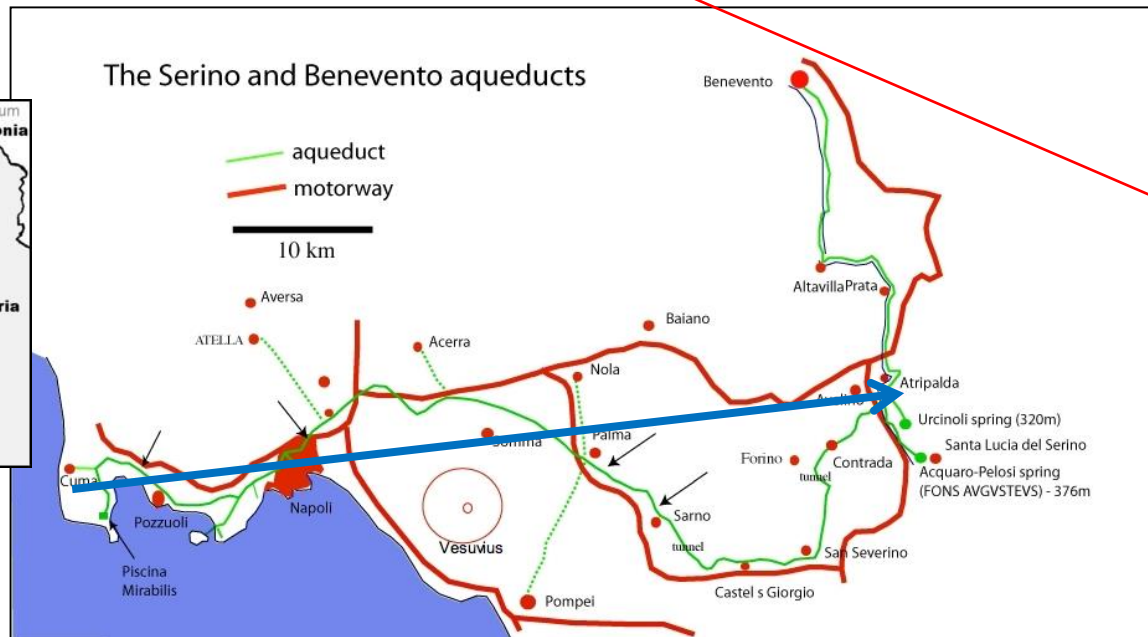
Wreck B



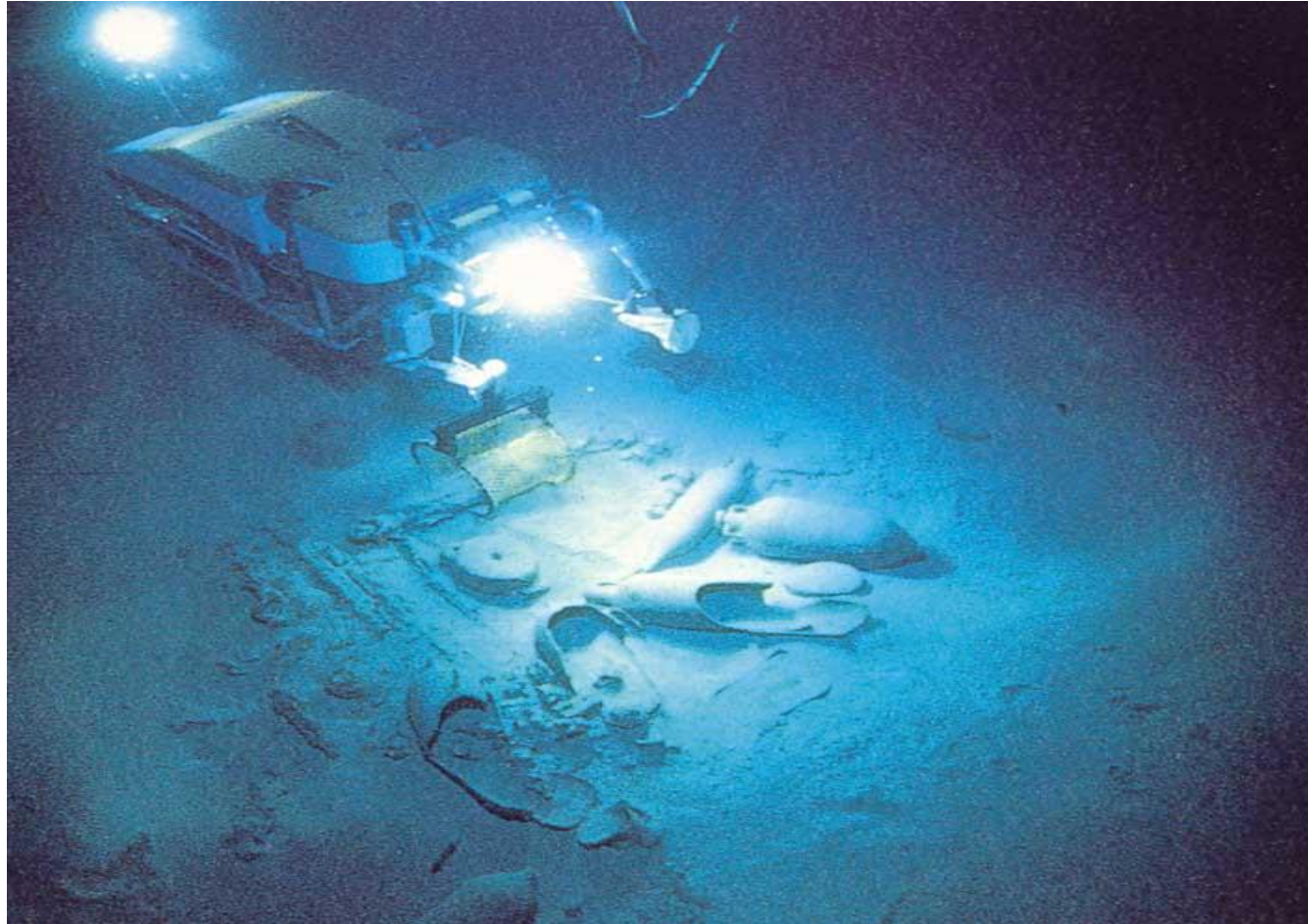
Wreck B Artifacts



- Primary cargo seems to have been **wine amphorae from Campania, Egypt, and Crete**;
- It carried also oil from Tripolitania;
- A lamp and common ware used by crew come from central Italy;
- It probably set sail from Puteoli (Naples) and was doing cabotage trade in the western Mediterranean.



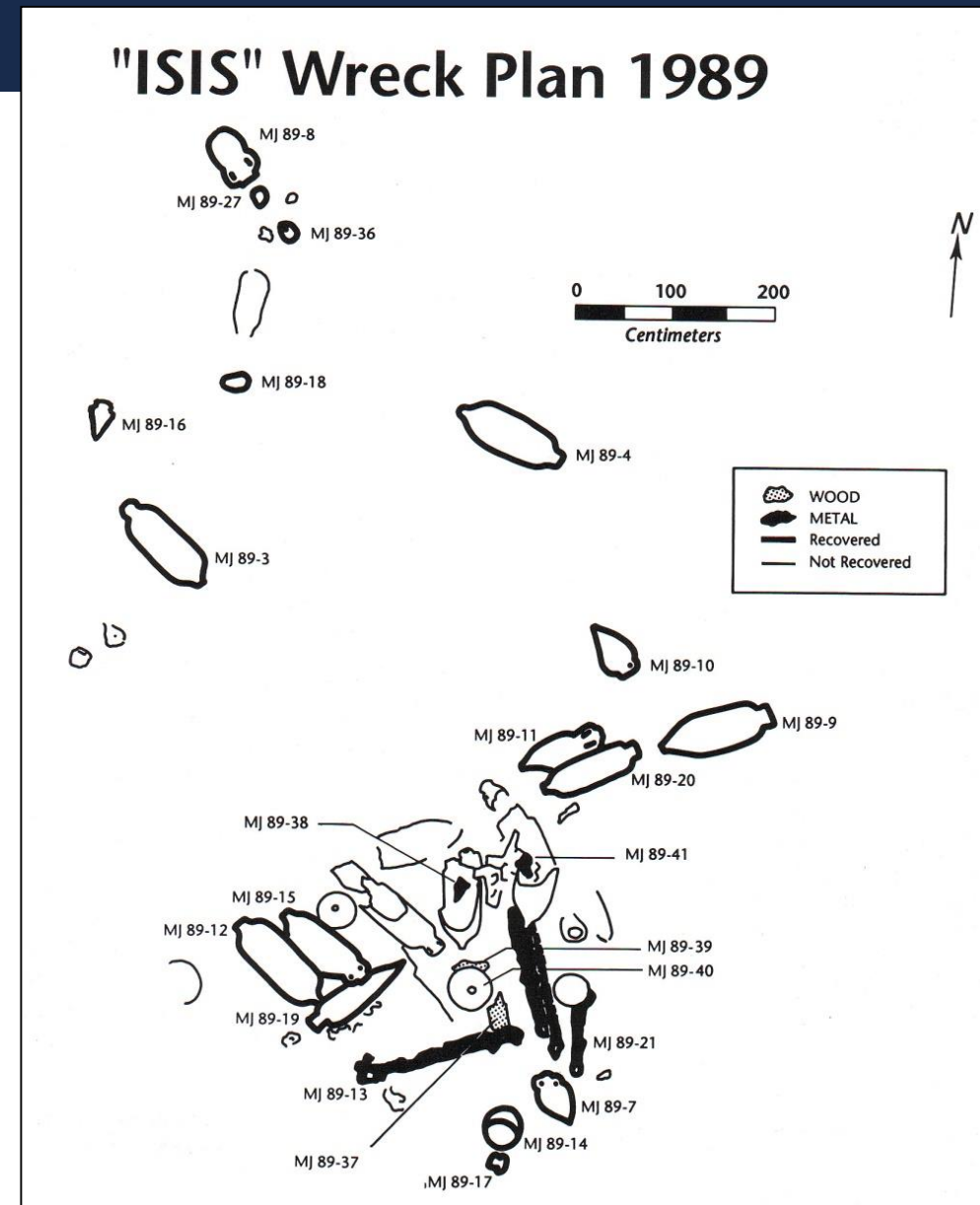
Isis Shipwreck



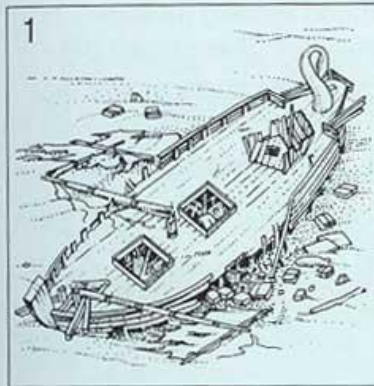
Isis (4th century AD)

- Discovered in 1988, nicknamed *Isis* after the Egyptian goddess;
- Artifacts scattered;
- Possibly 12 to 15 m long, with a cargo capacity of 30 to 35 tons;
- Had 3 or 4 iron anchors;
- In an iron anchor concretion were found grains of wheat and barley;
- It was possibly a small merchantman, managed by an independent entrepreneur...





Case Studies: Skerki Bank

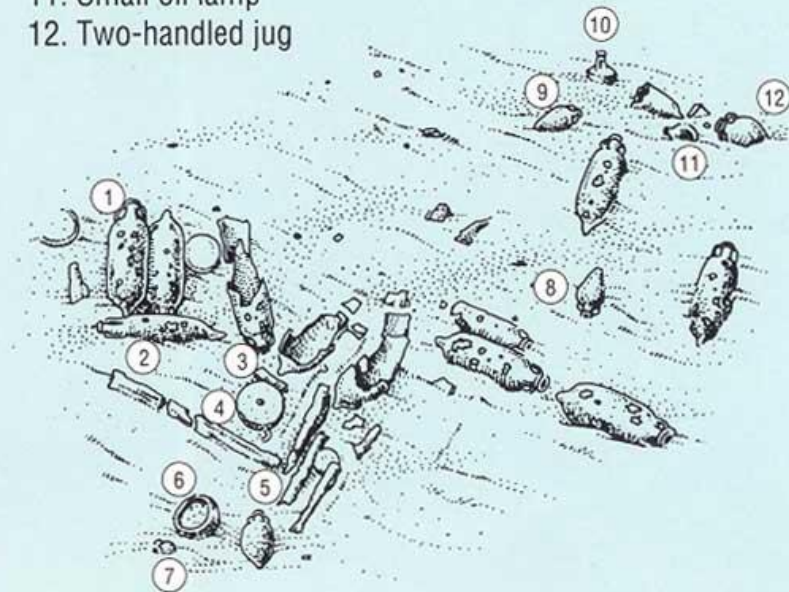


What happens to a ship after it sinks?

1. This picture shows the remains of the *Isis* and its cargo right after sinking.
2. One thousand years later, the leopard, the sails, ropes, cloth goods, sacks of grain, and much of the wood of the ship have disappeared, devoured by marine organisms. Other substances have decomposed more slowly.
3. More than 1,600 years later, very little wood remains, although much more may lie buried beneath the sediment where there are fewer wood-eating marine organisms. Possibly large slabs of marble, ivory and ebony lie beneath the sediment too. The grindstone has survived. Many amphoras and some of the everyday pottery are still intact, although some pieces have been broken by the movement of the seawater or sediment. Corals and other sea life have found a home by clinging to the surface of the pottery.

3 The *Isis* wreck site

1. Amphora—Africana Grande
2. Amphora—Africana Piccolo
3. Remains of metal with wood from ship.
4. Grindstone
5. Metal remains—possibly part of an iron cage, a grill from a stove or an iron anchor.
6. Pot
7. Cup
8. Flat-bottomed amphora
9. Small amphora—may have stood in a tripod and held wine.
10. Jug—possibly for garum.
11. Small oil lamp
12. Two-handed jug



Isis - Artifacts

- Possible cargo of [grain](#);
- 10 amphorae: from Tunisia and Calabria.



Case Studies: Skerki Bank



Isis - Artifacts

- Cooking pot filled with pine tar; different from other pine tars in Roman world - used for caulking.



Isis - Artifacts



Coin found inside cooking pot (from Constantinus II) provides *terminus post quem* of 355-361. Coin on the left is an equivalent, but in better condition.

Isis - Ship Remains

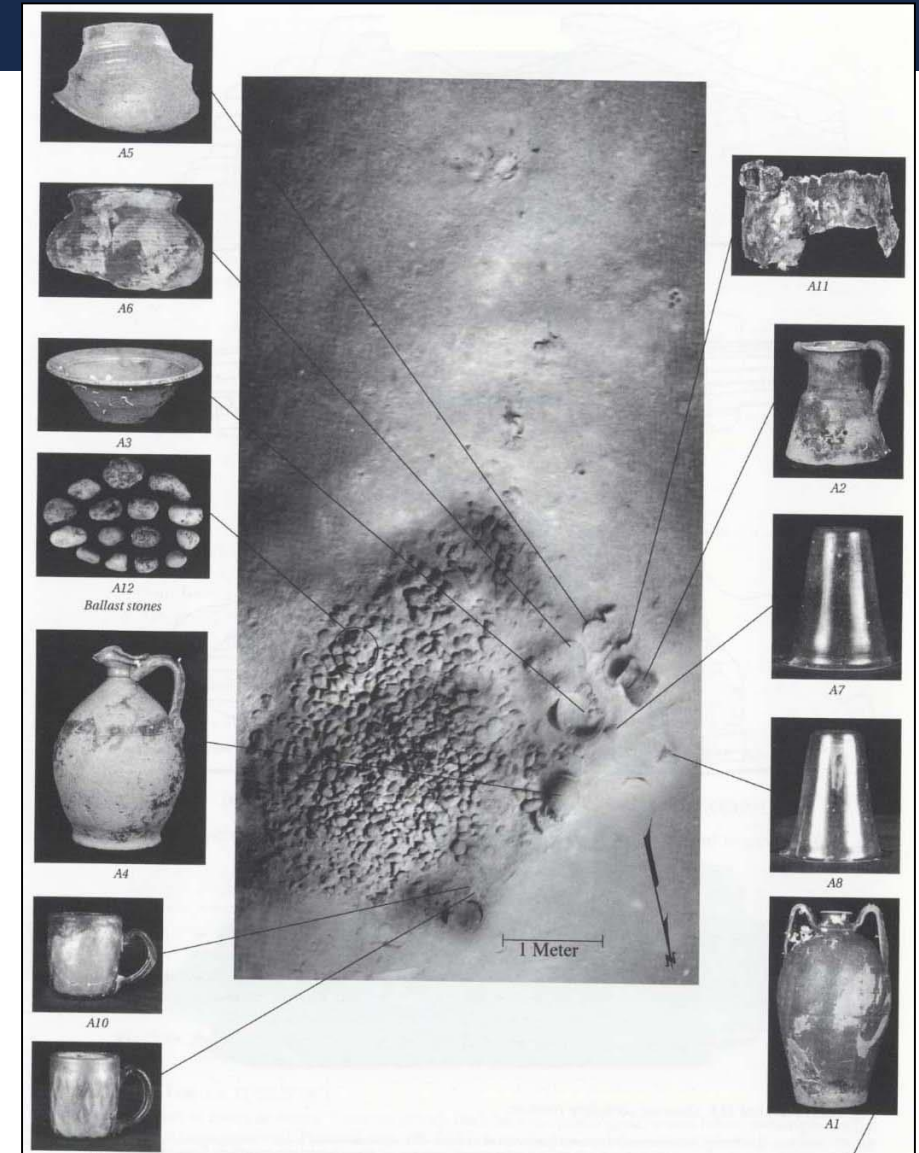
- Cedar - Deck Plank;
- White Oak - Deck Beam and Tenons;
- Pine - Strake or Plank;
- Pear - Frame or Futtock piece;
- Mortise and tenon construction;
- Iron nails;
- Lead patches;

So, what did these ships look like?



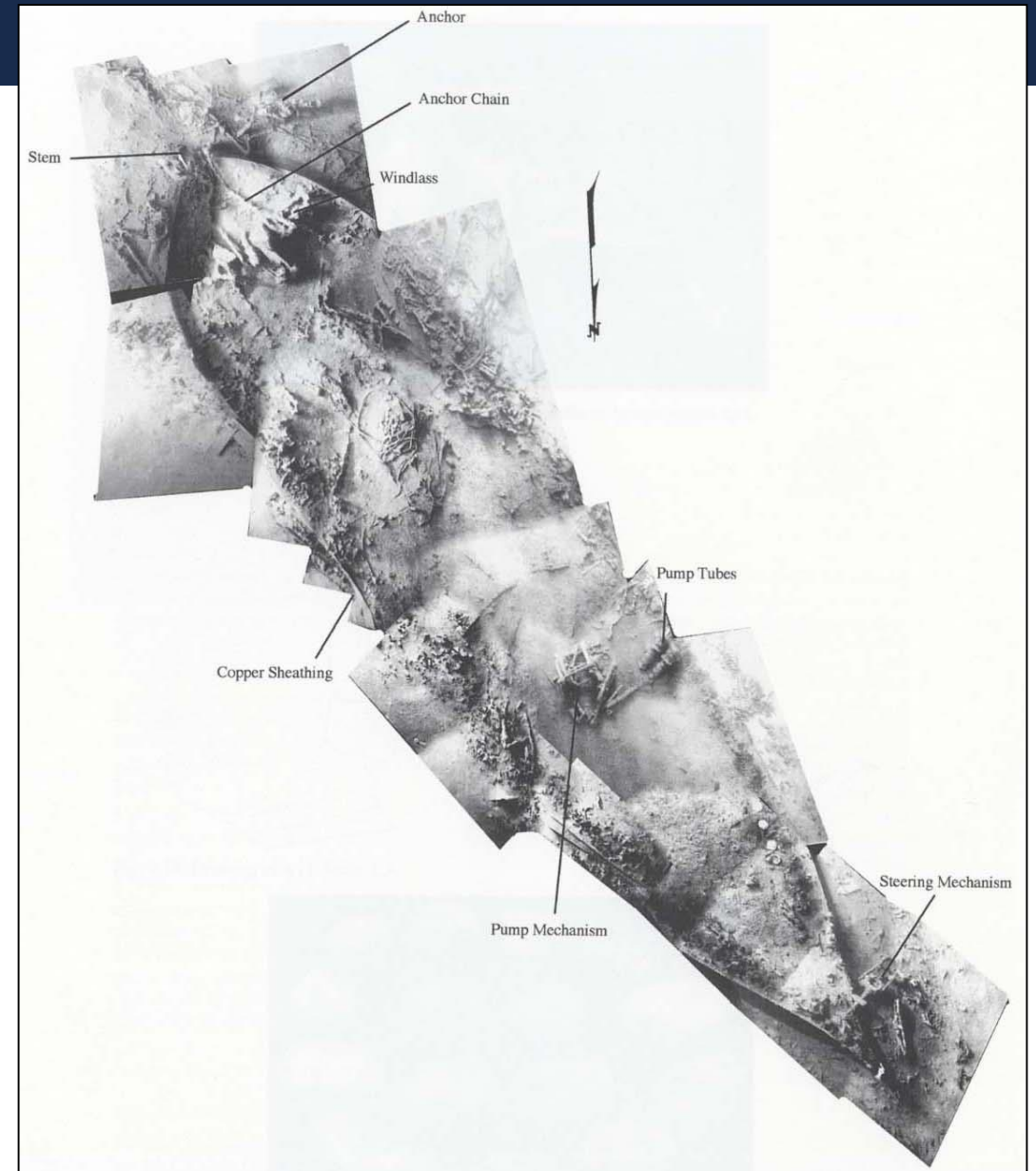
Wreck A

- Islamic, dated to c. 1800;
- Probably a relatively small vessel;
- Not much has been published about it.



Wreck C

- Dated to c. 1900;
- Wooden sailing vessel;
- Not much has been published about it.

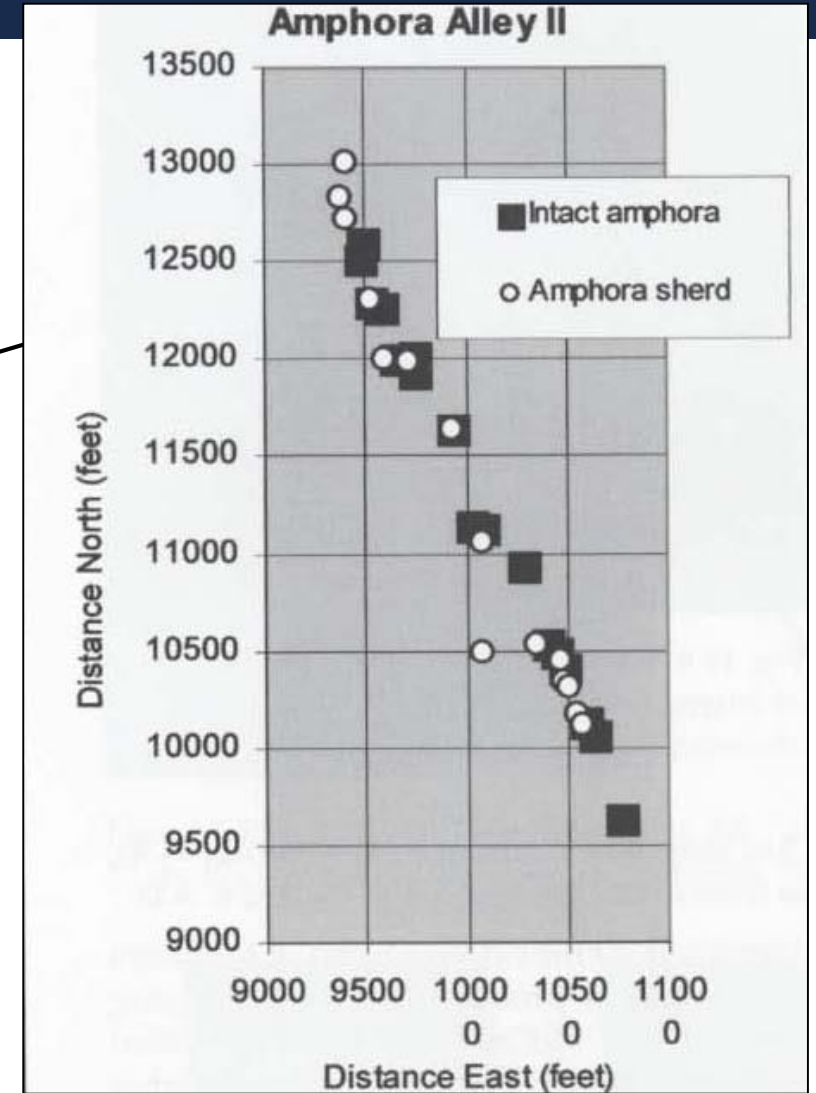


Wreck E

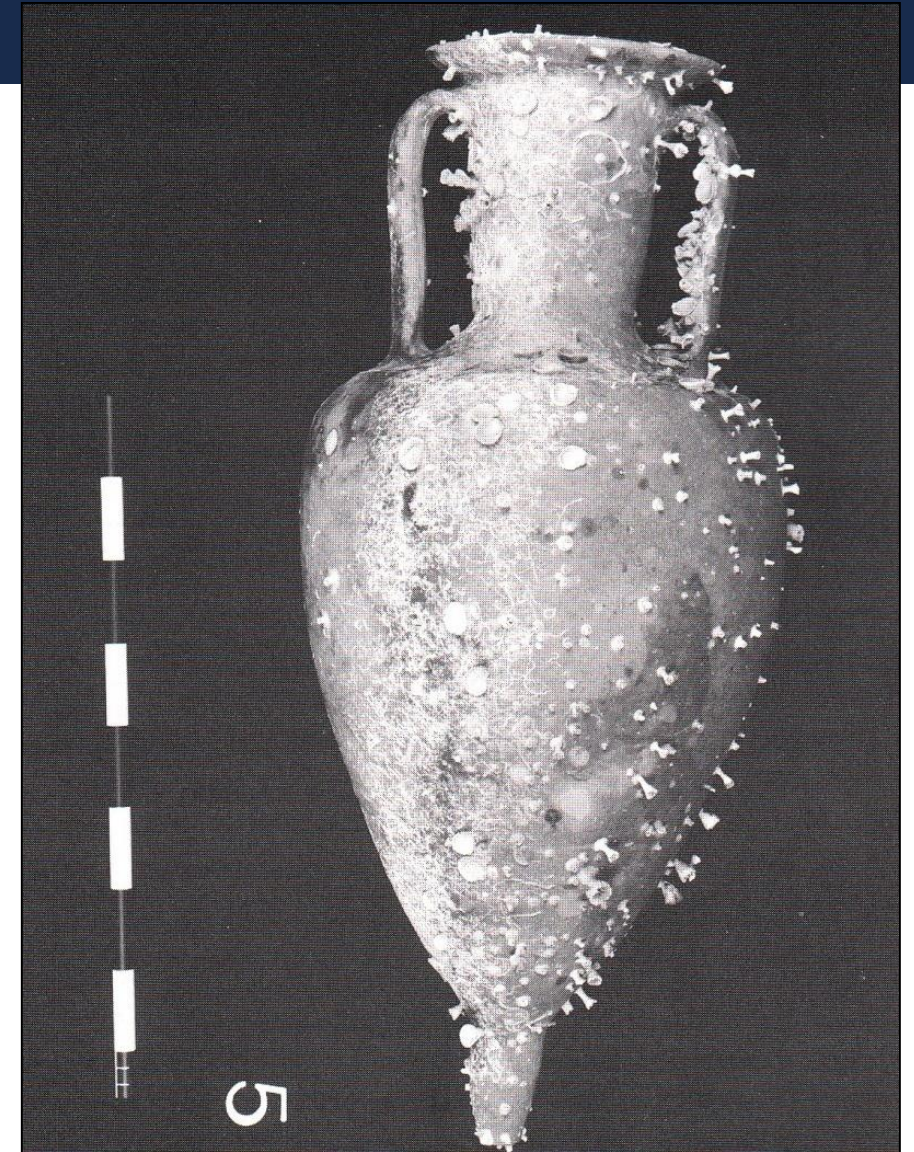
- Dated to c. 1900;
- Wooden sailing vessel;
- Not much has been published about it.

“Amphora Alleys I and II”

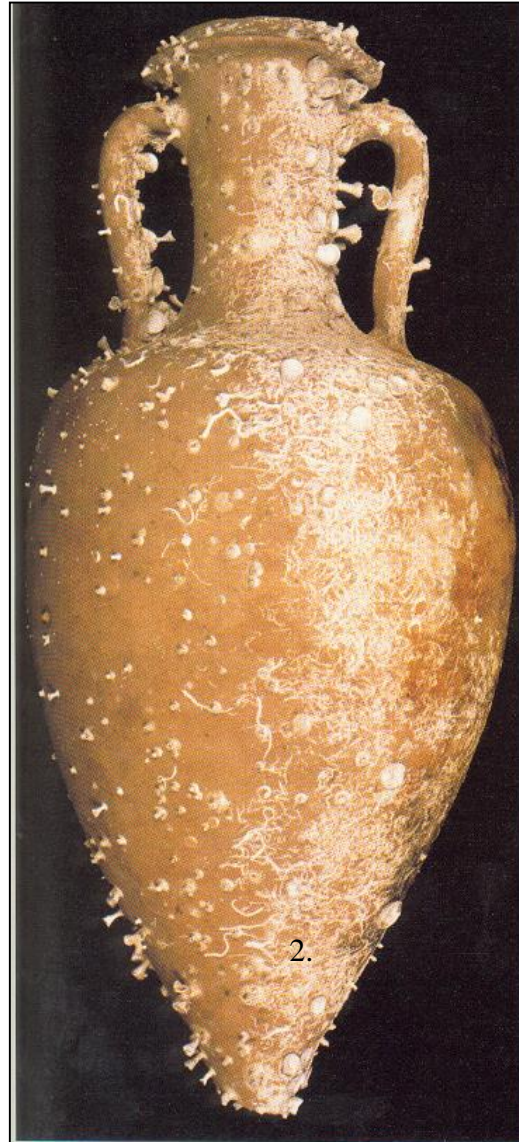
Amphora Alley I



3rd century BC Amphorae



Isolated Amphora Finds



1.

1. “Graeco-Italic” amphora from Cosa, Probably contained wine. Late third century B.C.
2. Medieval Islamic amphora from northern Palestine, c. A.D. 850-1115.

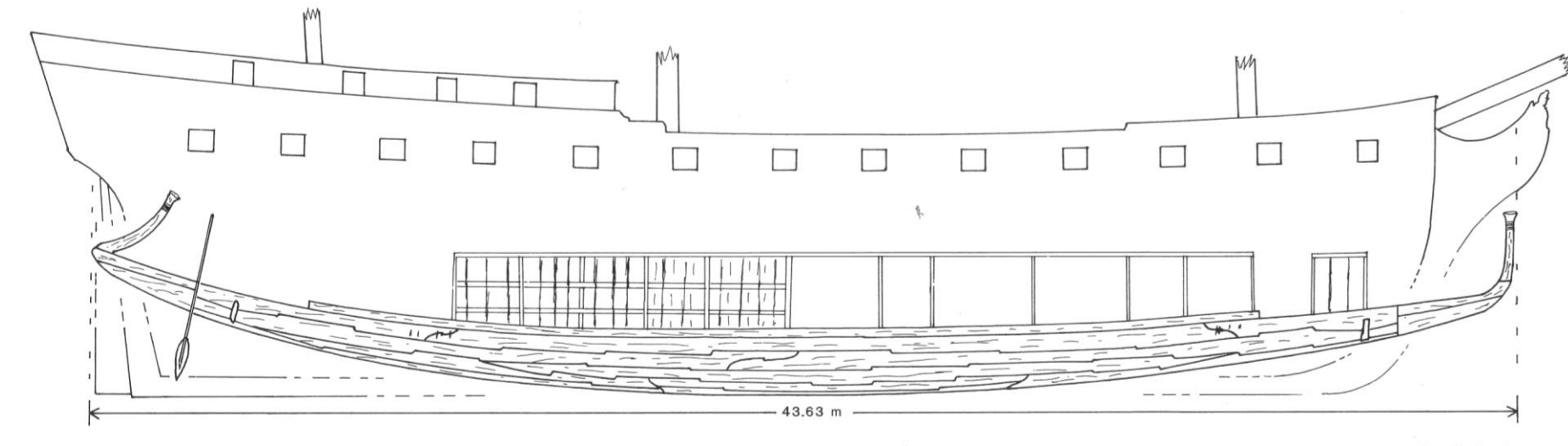
In Sum

- Only the six oldest of the eight shipwrecks were surveyed with greater detail;
- ISIS and Skerki A, B, D, F and G;
- JASON and MEDEA were used on these shipwrecks to recover artifacts and map the wreck sites.

In Sum

- Carthage-Rome trade route located;
- Possible evidence for an east-west route;
- Small merchantmen with varied cargoes engaged in cabotage;
- Interdisciplinary approach proved valuable;
- Technology used achieved incredible levels in oceanographic mapping and precision survey, but as far as archaeology goes...

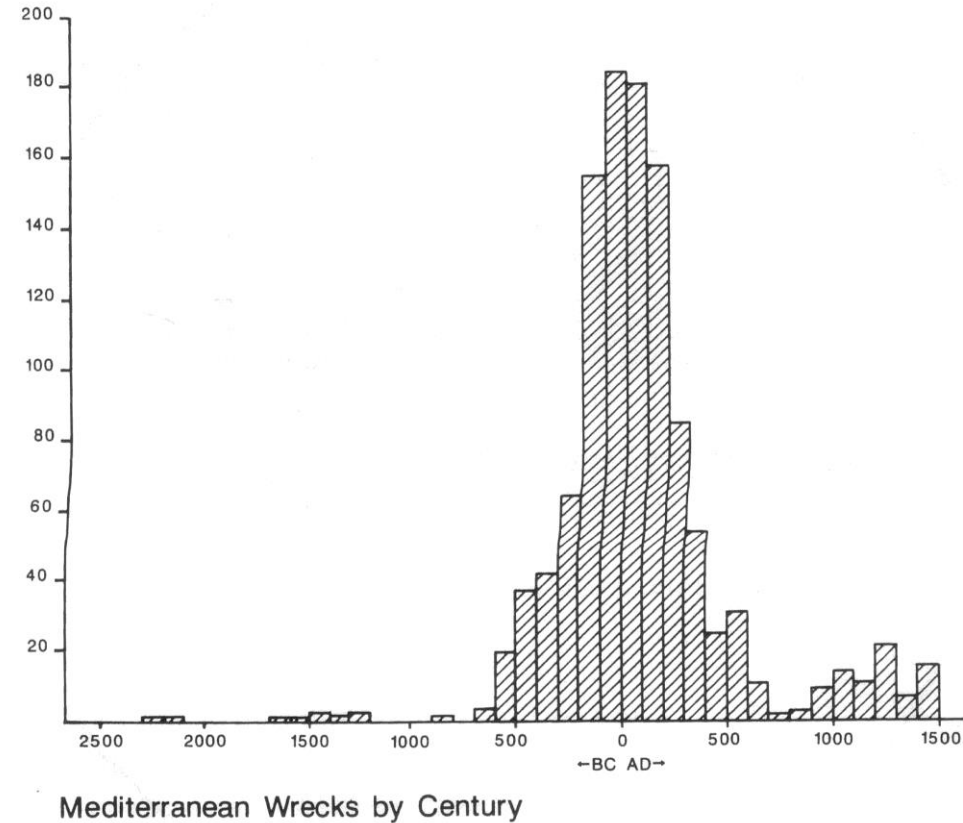
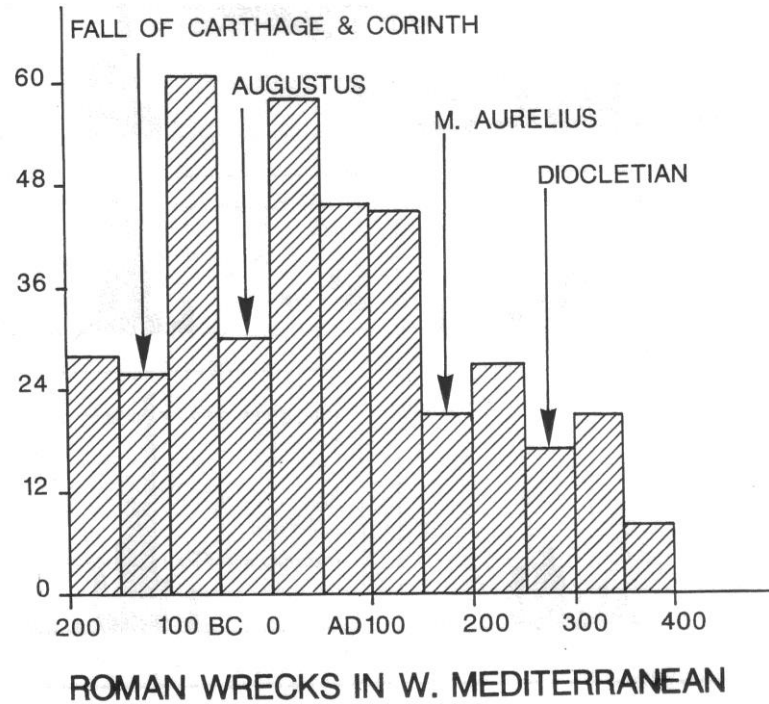
Can we infer anything from the Skerki bank shipwrecks in relation to ship sizes and typologies in the early Middle Ages?



A researcher named A. J. Parker gathered all the available data on Roman and Medieval (1992).

Of a total of 290 shipwrecks only the size of 45 can be estimated.

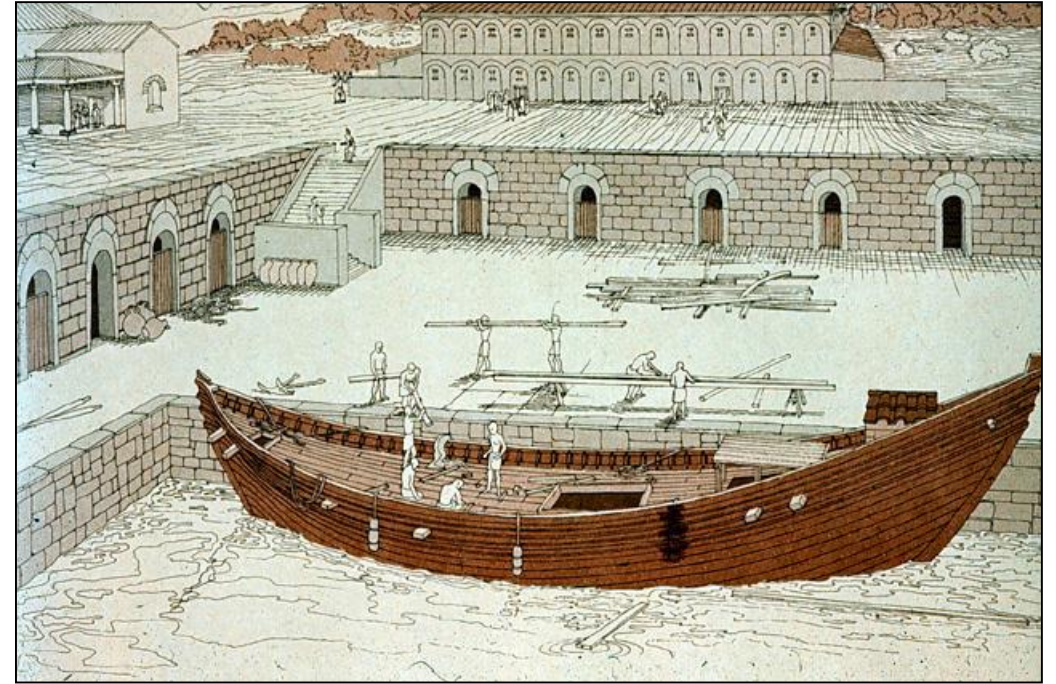
Date	Century	Name	Country	Hull Size	Cargo or Use
200	3	Capo Taormina	Italy	90-100t	marble
200	3	Cervia	Italy	12-15m	construction materials
200	3	Fiumicino H	Italy	4.4m	
200	3	Fiumicino K	Italy	22m	
205	3	Punta Scifo A	Italy	30-35m	stone blocks
212	3	Giglio Porto	Italy	30m	amphorae
225	3	Marzamemi A	Italy	172t	amphorae, stone
225	3	Methone C	Greece	130t	amphorae, marble
225	3	Monaco A	Monaco	15m	amphora
250	3	Capo Granitola A	Italy	350t	marble blocks
250	3	Giardini	Italy	95t	marble blocks
250	3	Punta Ala	Italy	25m	amphorae
250	3	Torre Castellucia A	Italy	17m	warship
300	4	Fiumicino D	Italy	12m	
300	4	Fiumicino G	Italy	24m	
300	4	Isola Delle Correnti	Italy	350t	marble
310	4	Cap Blanc	Spain	16m	amphorae
312	4	Lugue B	France	20m	amphorae and lamps
325	4	Sobra	Croatia	25m	amphorae
350	4	Fiumicino B	Italy	11.5m	
350	4	Fiumicino C	Italy	13.5m	
350	4	Fiumicino F	Italy	21-22m	
375	4	Acque Chiare	Italy	50m	amphorae
400	5	Dramont F	France	10-12m	amphorae
400	5	Port-Vendres A	France	18-20m	amphorae
400	5	Yassi Ada B	Turkey	20m	amphorae
422	5	Dramont E	France	15-18m	amphorae
550	6	Tantura A	Israel	12m	
587	6	Iskandil Burnu A	Turkey	20m	amphorae
612	7	Saint Gervais B	France	15-18m	wheat
625	7	Pantano Longarini	Italy	30m	
627	7	Yassi Ada A	Turkey	20m	amphorae
870	9	Bozburun	Turkey	20m	amphorae
950	10	Agay	France	20-25m	amphorae
950	10	Bataiguier	France	20m	amphorae
1025	11	Serci Lamani A	Turkey	14m	glass
1075	11	Nin B	Croatia	9m	
1150	12	Camarina C	Italy	25-30m	galley
1150	12	Pelagos	Greece	100t	pottery, mill-stone
1175	12	Marsala A	Italy	15m	
1175	12	Marsala B	Italy	12m	
1200	13	Brindisi	Italy	20m	amphorae
1225	13	Contarina	Italy	21m	no cargo
1350	14	Emploi	Italy	11m	
1400	15	Pomposa	Italy	50m	
1475	15	Logonovo	Italy	10m	



As it should be expected, a clear pattern emerges from the data: the number and size of the ships is related to the health of the economy, and the safety of the environment.



One of Nero's (AD 37-68) floating palaces found on the bottom of Lake Nemi.

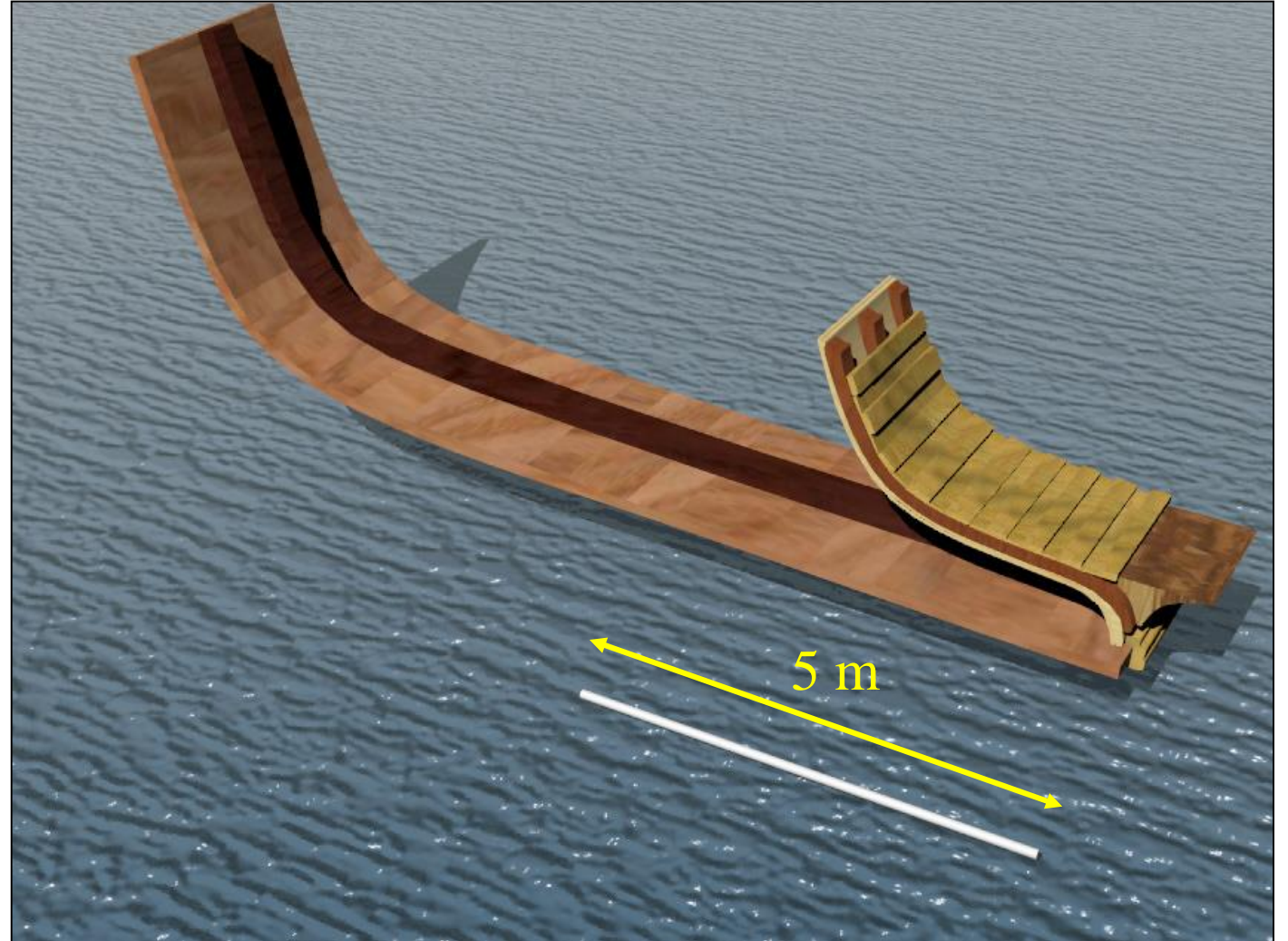


Small Byzantine trader of the 7th century found at Yassıada.

100 BC to AD 200

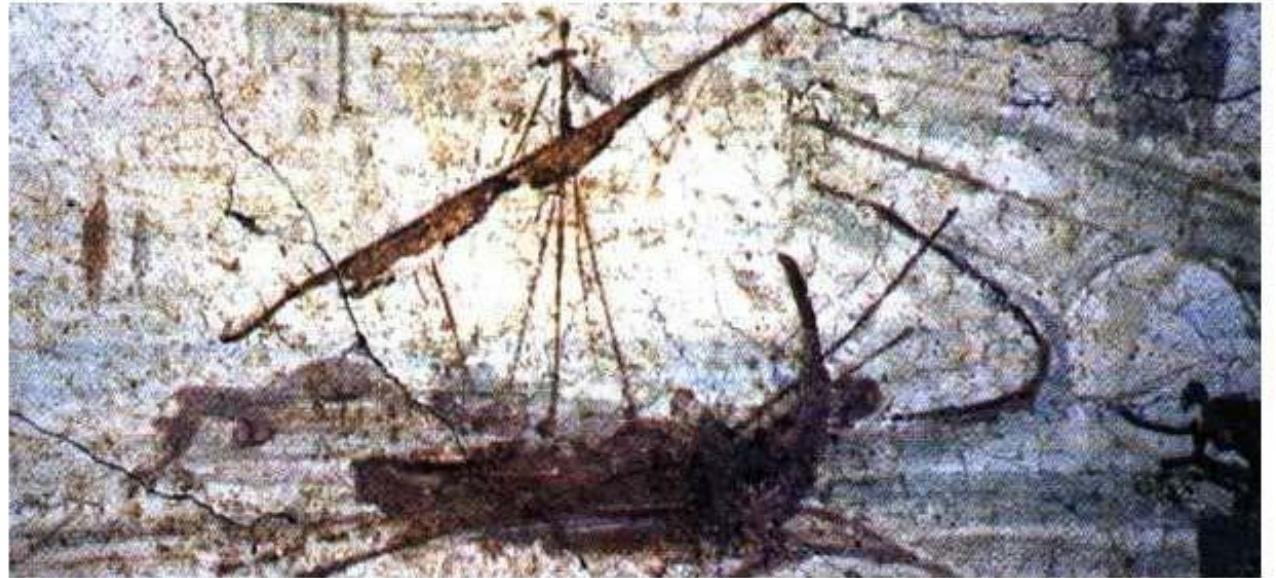
Large ships:

Nemi Barge (a palace) &
Madrague de Giens (a
large merchantman)



Roman Empire

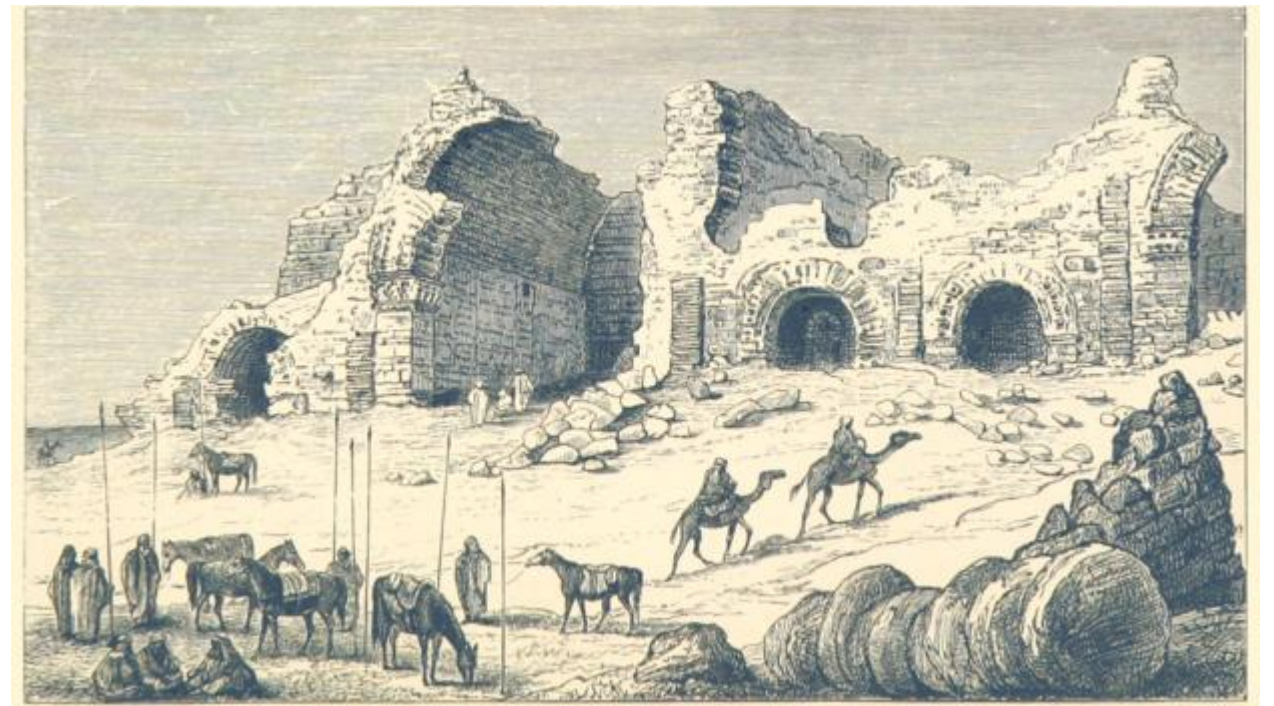
- Agrarian economy:
 - government subsidies;
 - Long distance trade.
- Large ships in grain trade: Alexandria to Rome:
 - Grain carriers were 65 -325 tons;
 - Obelisk ship at least 40 m in length.



Late Roman Empire

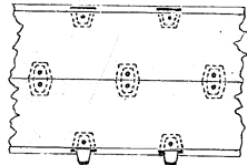
(AD 300 to 600)

- Luxury goods
 - Speed important, not size.
- Decline in population
 - War and plague.
 - No government subsidies.
- Decline in Roads
 - Increase transportation on sea.



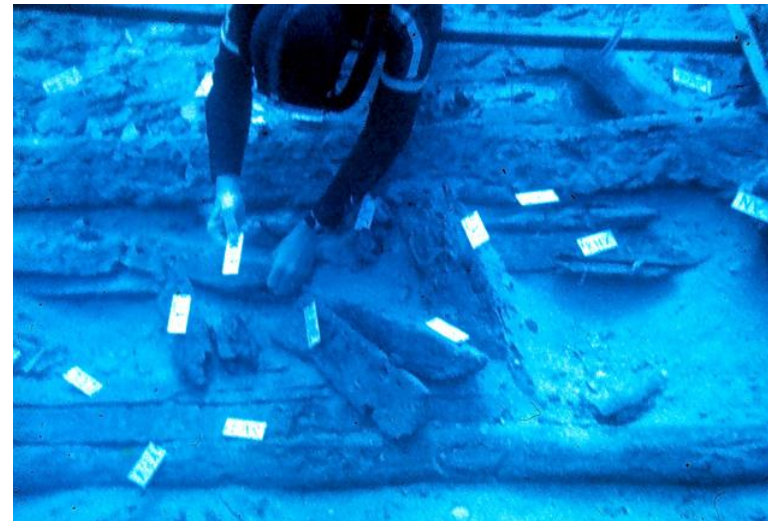
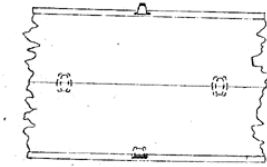
Yassi Ada 4th C.

- 19 m
- 1,100 amphorae



Yassi Ada 7th C.

- 21 m
- 900 amphorae
- 60 tons?



- Palestinian monk: ships of 120-200 tons considered large for period; 40 tons was possibly the average size...

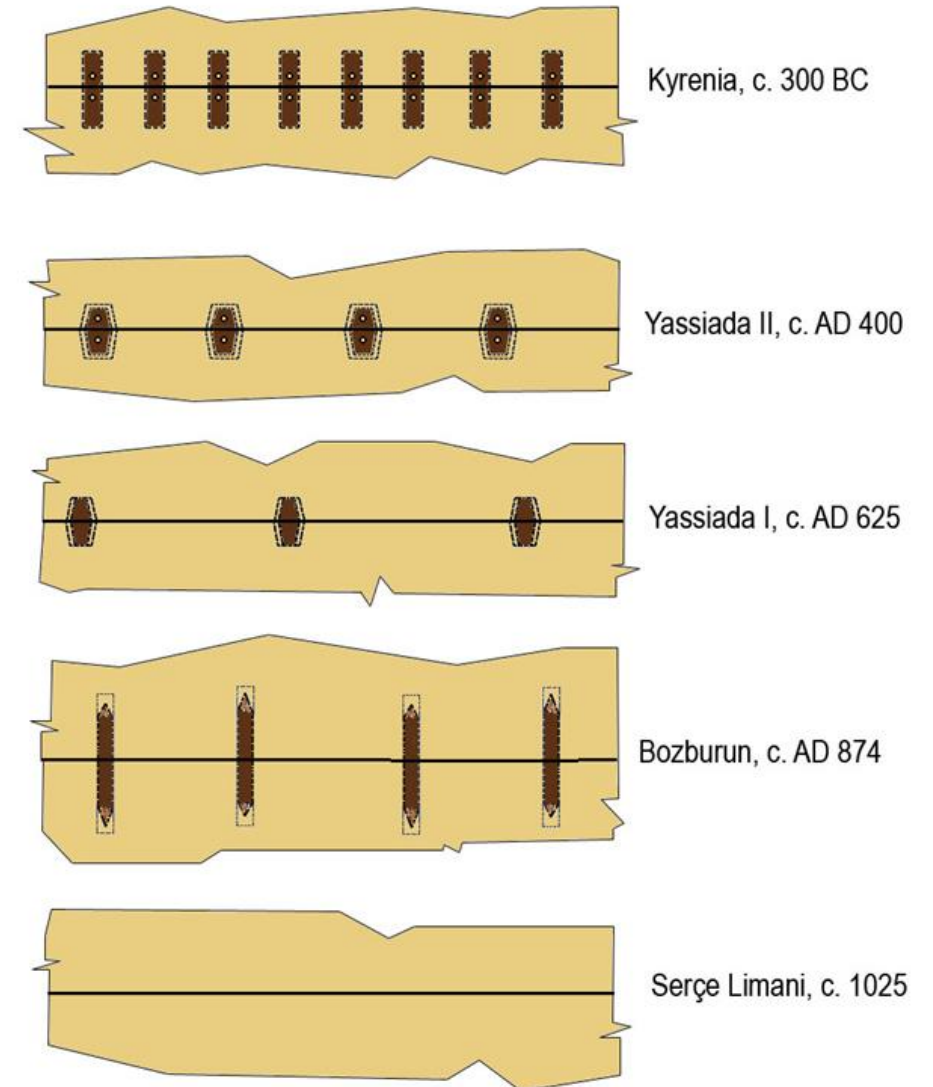
Byzantine Naval Ships

- According to their possibility, always aiming at the need to try to maintain order in Mediterranean;
- After Anastasius I (AD 430-518) development of certain types of larger naval ships:
 - Dromon: crew of 100, 40-50m
 - Ousiakos: crew of 108
 - Pamphylos: crew of 162

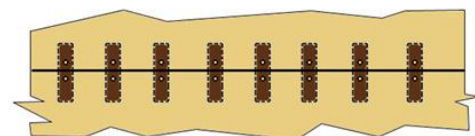
Middle Ages: Arab attacks

- ↓ governmental protection, ↑ piracy, ↓ trade
- Roller Coaster Ride
 - 717 Arabs threaten Constantinople: ↓ trade
 - 827 Arabs conquer Crete: ↓ trade
 - 878 Arabs seize Sicily: ↓ trade
 - 961: Byzantines recapture Crete/Cyprus: ↑ ship size
 - Pamphylon: 200-300 men
 - Larger galleys: 1000 + men
 - Fueled by religious pilgrimages to Holy Land

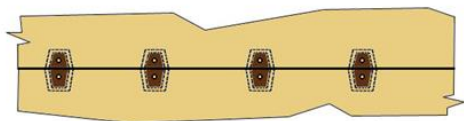
Less slaves possibly meant less skilled labor to build mortise and tenon ships, and perhaps is the main cause for the transition to frame-based construction.



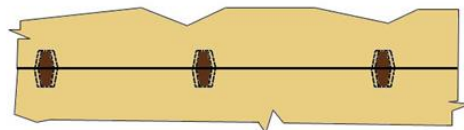
Case Studies: Skerki Bank



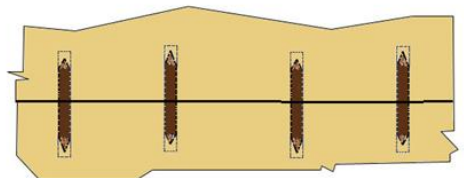
Kyrenia, c. 300 BC



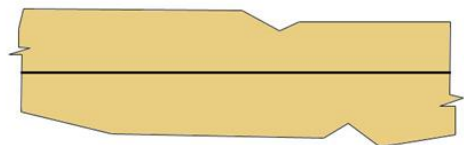
Yassiada II, c. AD 400



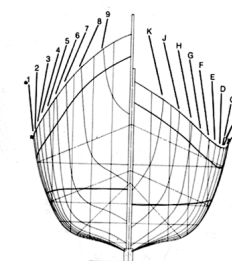
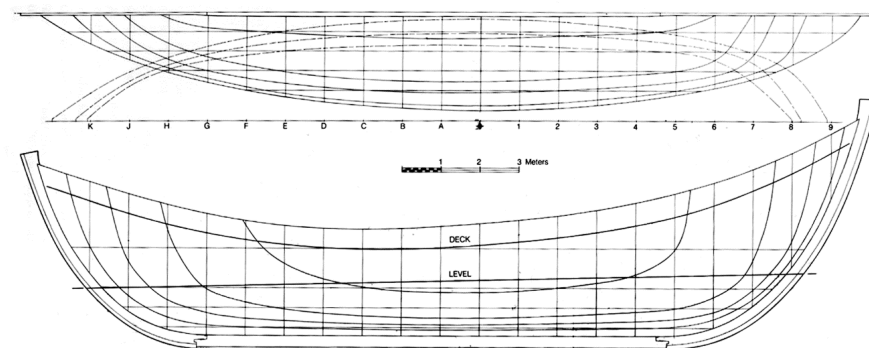
Yassiada I, c. AD 625



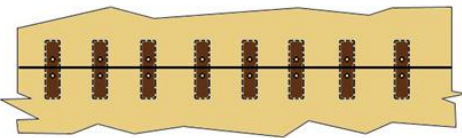
Bozburun, c. AD 874



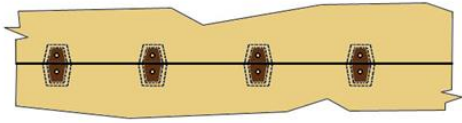
Serçe Limani, c. 1025



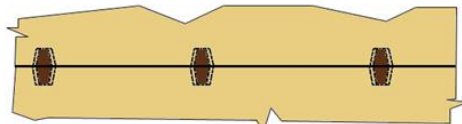
Case Studies: Skerki Bank



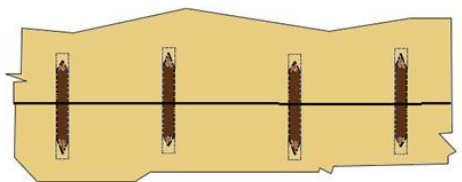
Kyrenia, c. 300 BC



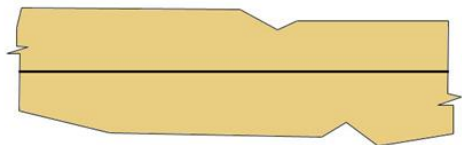
Yassiada II, c. AD 400



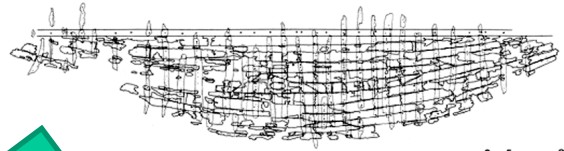
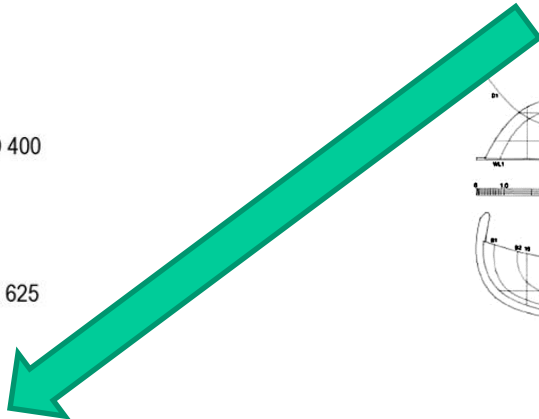
Yassiada I, c. AD 625



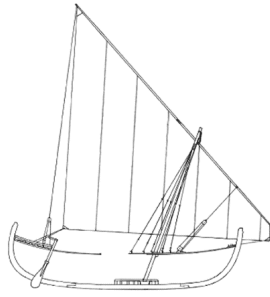
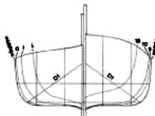
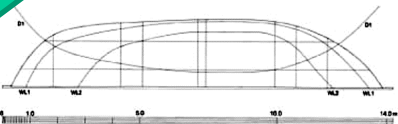
Bozburun, c. AD 874



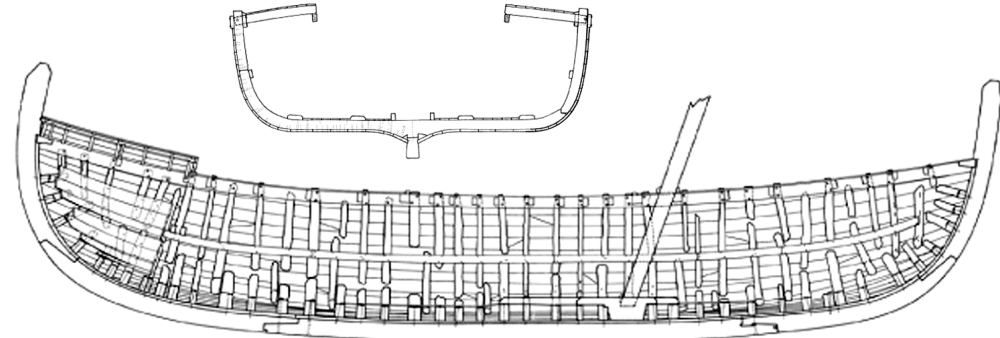
Serçe Limani, c. 1025



0 5 20 m

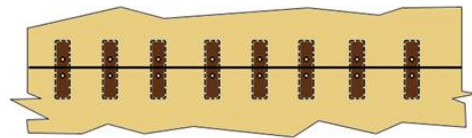


0 20 50 m

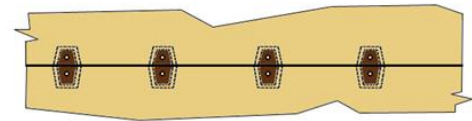


0 1.0 5.0 10.0 14.0 m

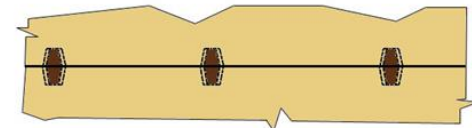
Case Studies: Skerki Bank



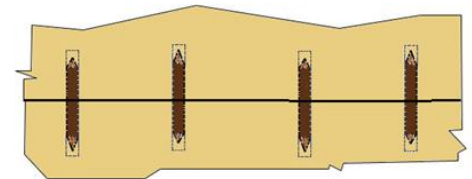
Kyrenia, c. 300 BC



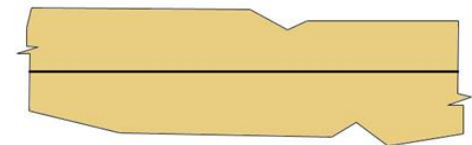
Yassiada II, c. AD 400



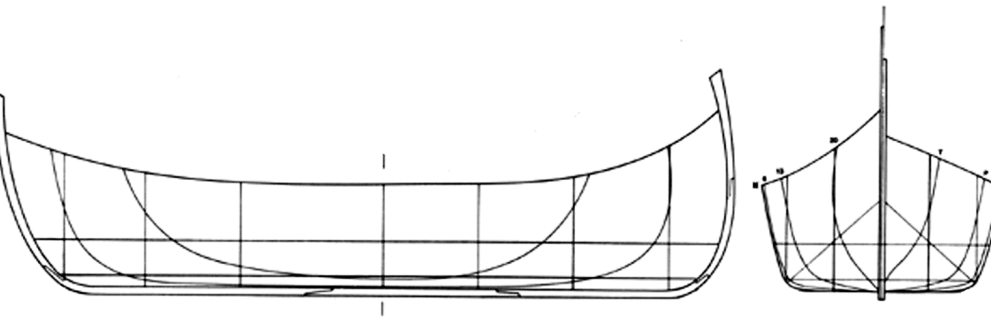
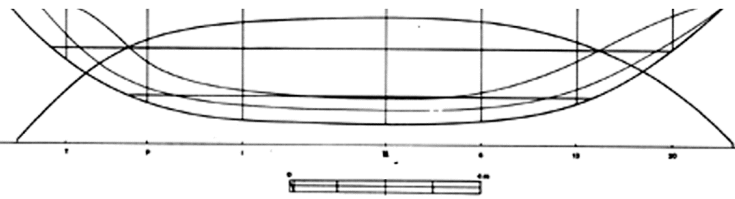
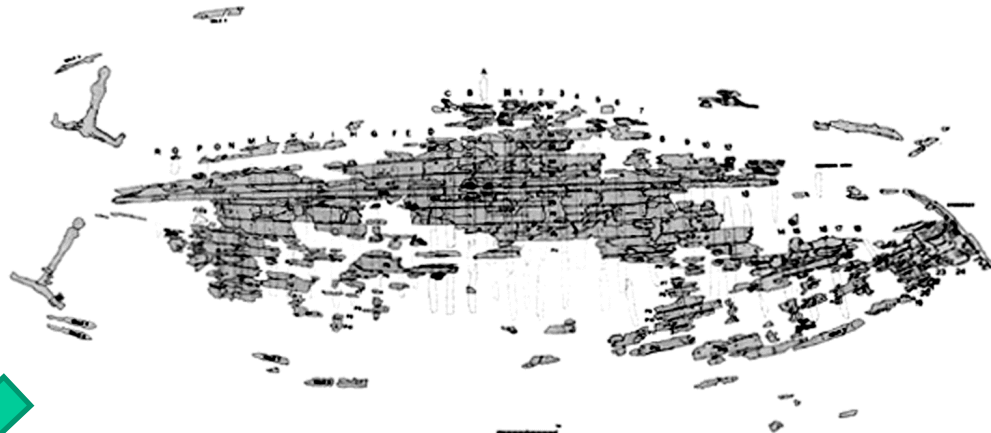
Yassiada I, c. AD 625

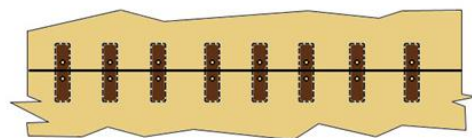


Bozburun, c. AD 874

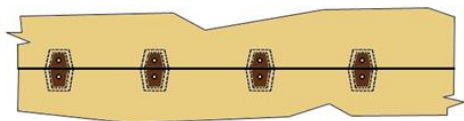


Serçe Limani, c. 1025

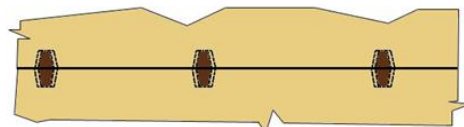




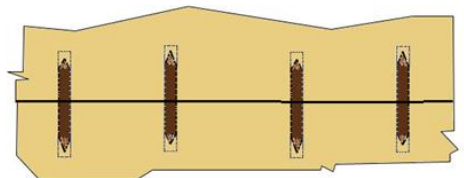
Kyrenia, c. 300 BC



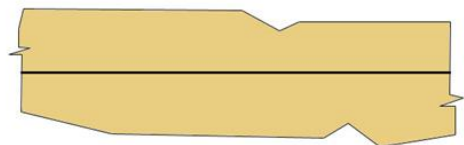
Yassiada II, c. AD 400



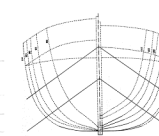
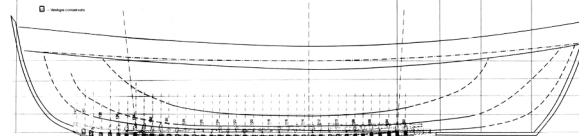
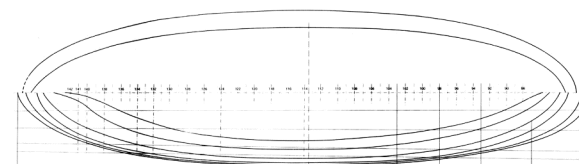
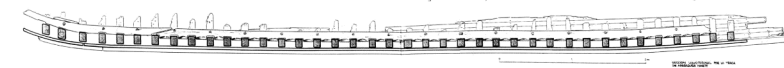
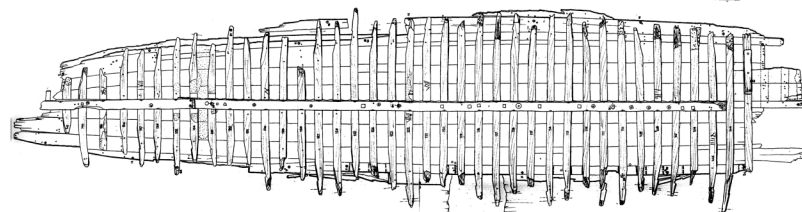
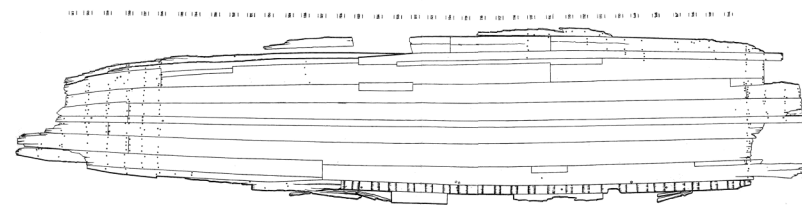
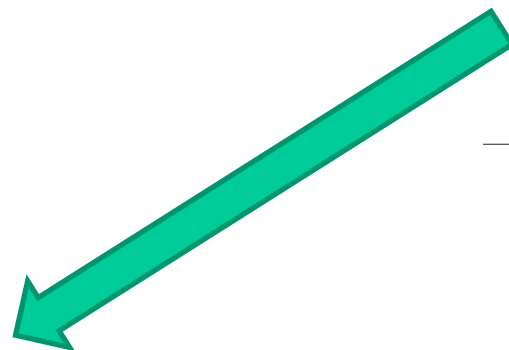
Yassiada I, c. AD 625



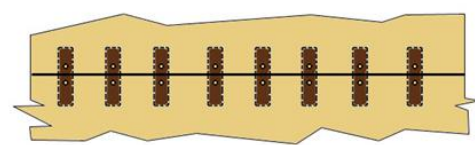
Bozburun, c. AD 874



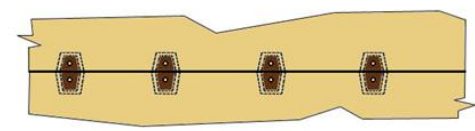
Serçe Limani, c. 1025



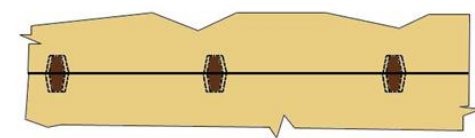
Case Studies: Skerki Bank



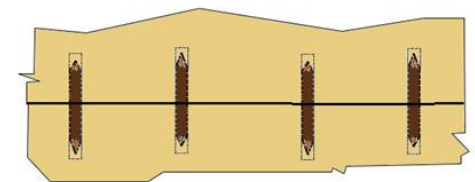
Kyrenia, c. 300 BC



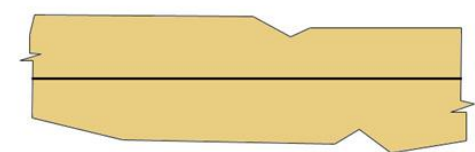
Yassiada II, c. AD 400



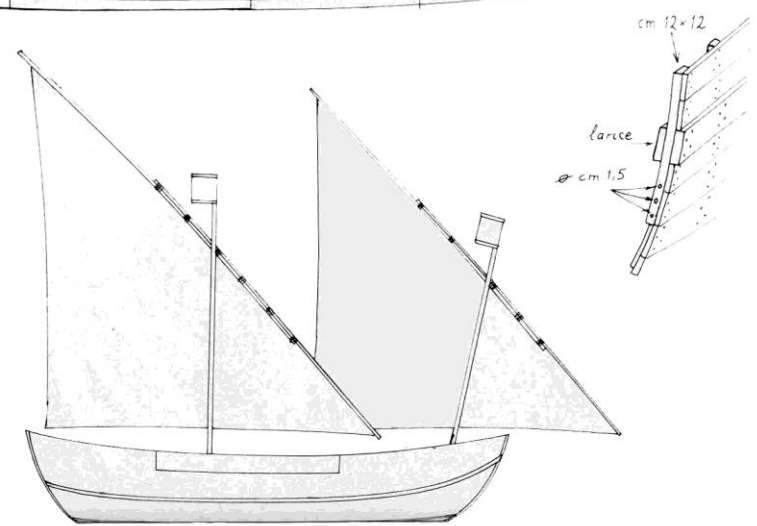
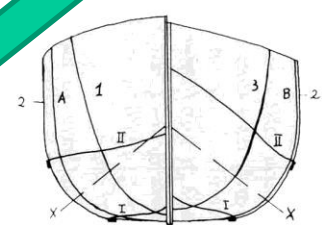
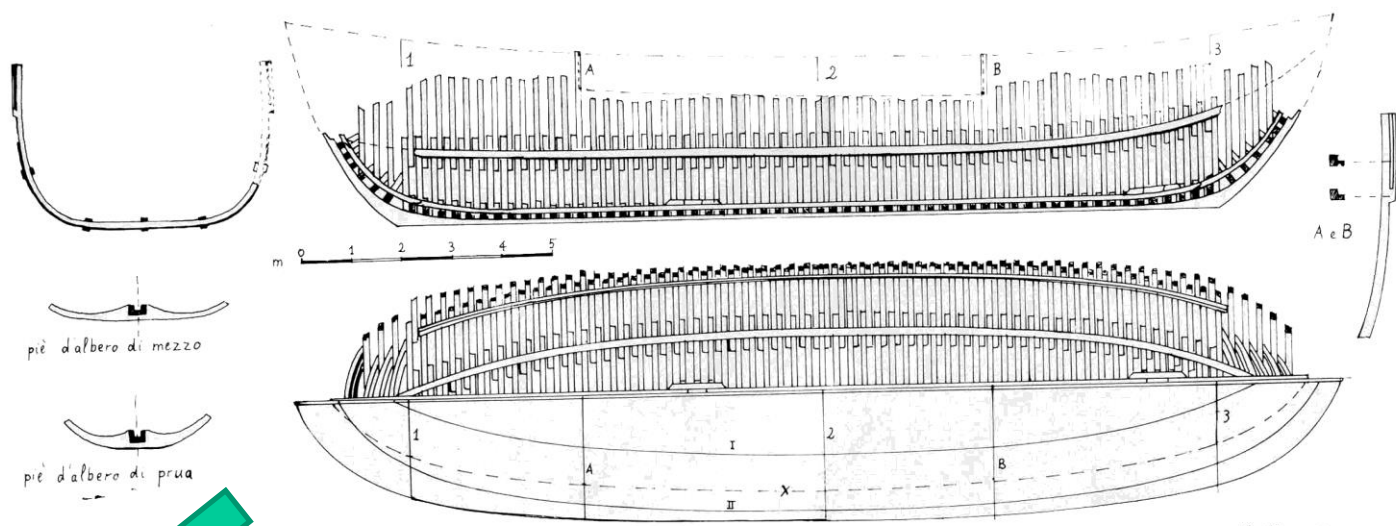
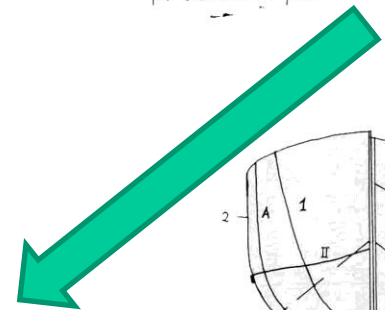
Yassiada I, c. AD 625

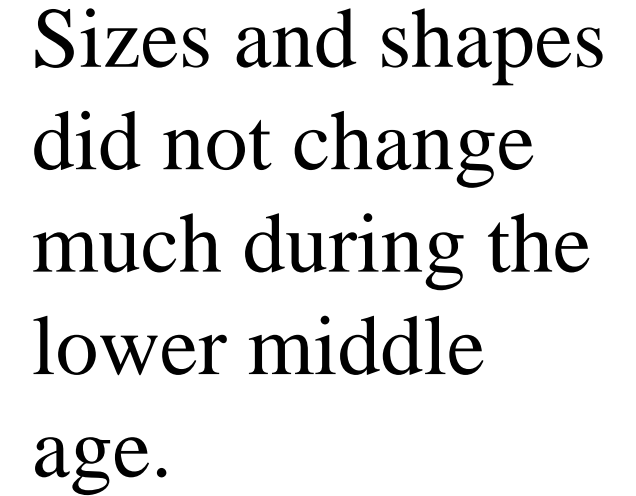


Bozburun, c. AD 874



Serçe Limani, c. 1025





Serçe Limani

- Revival in trade led to larger ships;
- Skeletal construction.
- C. 1025 AD
- 15.6 m
- 30 tons



- Classical period: big and small ships, many shipwrecks
 - Capacity important;
 - Economy booming.
- Late Antiquity (AD 300-600): smaller ships, few shipwrecks
 - Speed important;
 - Decline in economy;
 - Change in shipbuilding.
- Middle Ages: Smaller ships, larger warships
 - Defense important;
 - Rise in trade.

Conclusions

- Size closely tied to socio-economic environment and technology
- Difficult to determine
- Many “sources” of data

Questions?