



**ANAXUM PROJECT**

**Archaeology and History of a Fluvial Landscape**

**Field 2011**

# The Stella 1 Shipwreck: A Roman Barge from the 1st Century AD

Italian Ministry of Heritage and Cultural Activities

University of Udine

ProMare, Inc.

Texas A&M University Center for Maritime Archaeology and Conservation

Institute of Nautical Archaeology

Anaxum is a Project of Dipartimento di Storia e Tutela dei Beni Culturali dell'Università di Udine in a jointly with the Soprintendenza per i Beni Archeologici del Friuli Venezia Giulia. The mission is the multidisciplinary study of the River Stella, in Northern Italy, throughout time.

In the summer of 2011, a team from ProMare, Texas A&M's Nautical Archaeology Program, and the Institute of Nautical Archaeology was invited to participate in the excavation of a Roman barge: the Stella 1 shipwreck.

The work was directed by Massimo Capulli from the University of Udine and Filipe Castro from Texas A&M University, under the scientific supervision of Luigi Fozzati of the Italian Ministry of Heritage and Cultural Activities.

The excavation was made possible thanks to the ProMare's generous support.



NE  
Italy

Stella  
River

Stella 1  
Site

Aquileia

Venice &  
Venice Lagoon

- Named Anaxum in Roman times
- Materials as old as 2,300 BC
- Abundance of water, clay, & energy

The Adriatic Sea

The Stella River is located in the province of Friuli Venezia-Giulia in northern Italy near the ancient Roman city of Aquileia. The river was named Anaxum in Roman times, and has been a site of habitation for thousands of years. Archaeological materials as old as 2300 BCE have been found on the river's margins. There is an abundance of water, clay, and energy – in the form of timber from the local forests – that allowed for the flourishing of the ceramic industry in the Friuli plains. Archaeological examples of the pottery have been found throughout the Adriatic.



# Roman Roads

The Romans had a rich maritime culture, both at sea and on inland waterways. In Northeastern Italy, the roads often ran parallel to the sea and inland waterways. There was a network of rivers, man-made canals, and lagoons that connected the populations of the southern base of the Alps and the large Roman city of Aquileia to the sea. There is increasing data suggesting that the lower portion of the Stella River was part of the system that served the Aquileia hinterland

The Stella River and the other inland waterways of Italy, have played an important role in the development of the region by providing the means for an efficient transportation system.

The Anaxum Project was started to study the history of the river, its economic activity, and the lives of the peoples that lived nearby, used its water, its strength, and its course.

131 BCE

Titus Annius Rufus' Consular Road

Via Annia Bridge



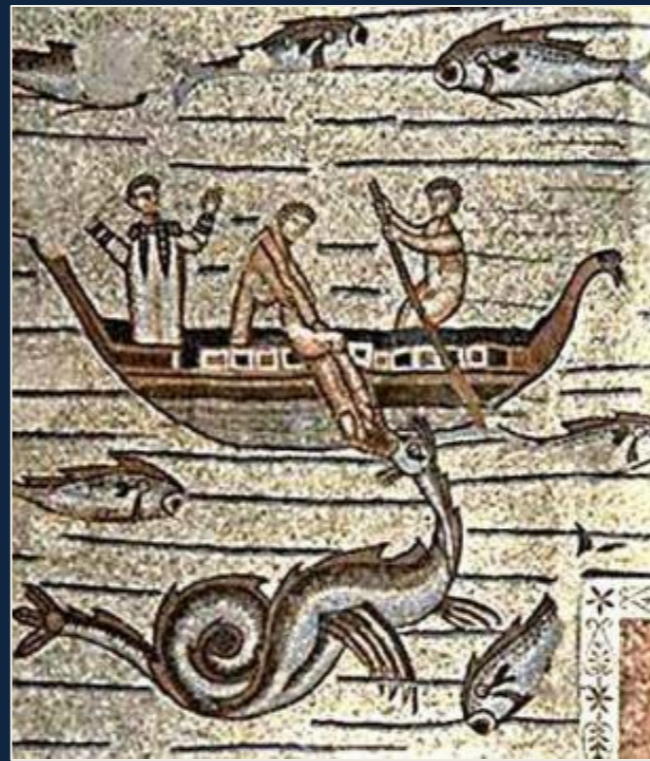
Stella 1  
Shipwreck

Serving a rich region, in the middle of the old amber trade route, the Stella river saw intense traffic in Roman times, and its meandering course conceals a wealth of archaeological sites that modern works expose regularly.

In addition to the Stella 1 shipwreck, there is an old Roman Bridge – the Via Annia Bridge - and the remains of a Roman consular road built in the 2nd century BCE by praetor Titus Annius Rufus. It was completed in 131 BCE. As submerged areas around bridges are notorious garbage dumps that tell the story of the people that crossed the river over the centuries, this would be an excellent area for future work to learn more about Romans in the area.

# Aquileia

- Founded 2<sup>nd</sup> Century B.C.
- Destroyed A.D. 452 by Atilla and A.D. 590 by Lombards
- Inhabited by Romans, Celts, Illyrians, Greeks, Egyptians, Jews, and Syrians.



The largest Roman settlement near the Stella 1 shipwreck is Aquileia, which was founded in the 2<sup>nd</sup> century BCE. It was the most important commercial hub of the northern Adriatic area before its utter destruction by Attila in A.D. 452 and later by the Lombards in A.D. 590, which caused its inhabitants to flee to the nearby lagoon and establish Venice.

The network of rivers, canals, and lagoons allowed access to the rest of Europe and trade that resulted in Aquileia becoming a cosmopolitan city, connected to the East and West Roman worlds, and the Baltic. It was inhabited by Celts, Illyrians, Greeks, Egyptians, Jews and Syrians.

The system of canals and the city fluvial harbor have never been excavated. The city recovered part of its importance, lost to Attila the Hun's devastating attack, during the middle ages but today is a small village of around 4000 inhabitants, and its archaeological potential is enormous.



# Stella 1 Shipwreck



Lamboglia 2

Adriatic type, 2<sup>nd</sup> and 1<sup>st</sup> century BC



Dressel 2-4

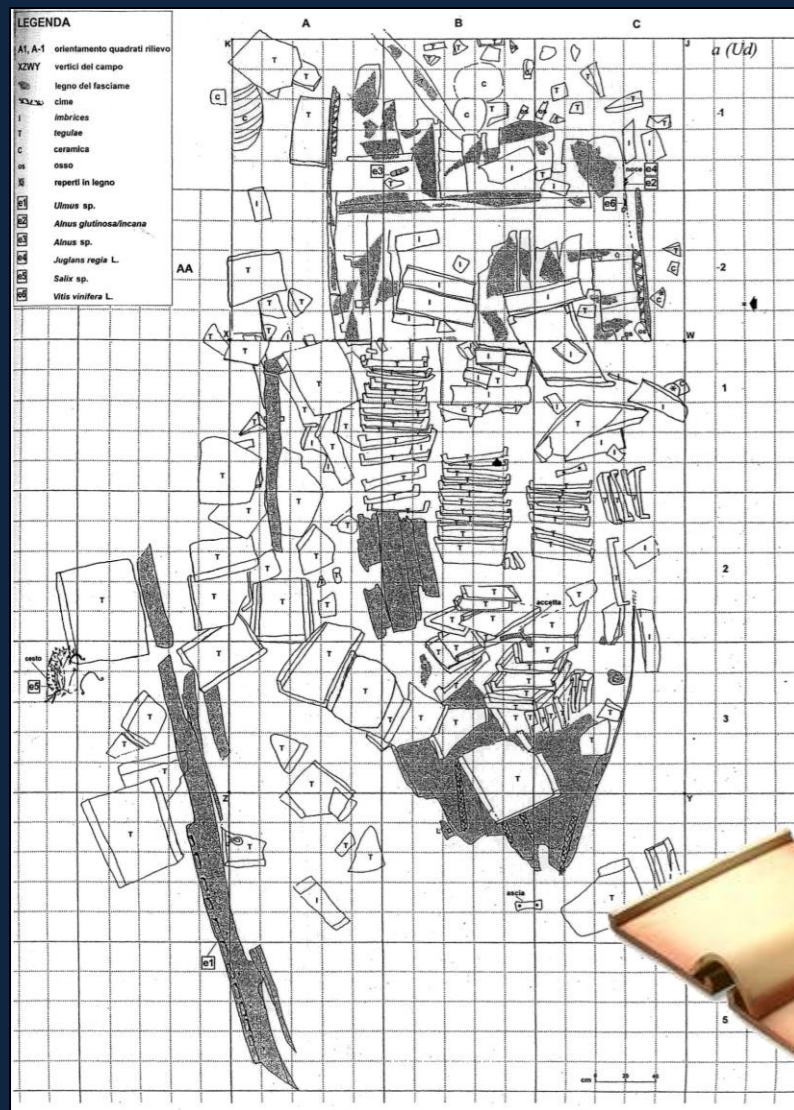
Roman, varied regions. 1<sup>st</sup> century BC

The Stella 1 ship is vastly different from other ancient wrecks. It is a Roman laced vessel from the 1<sup>st</sup> century AD.

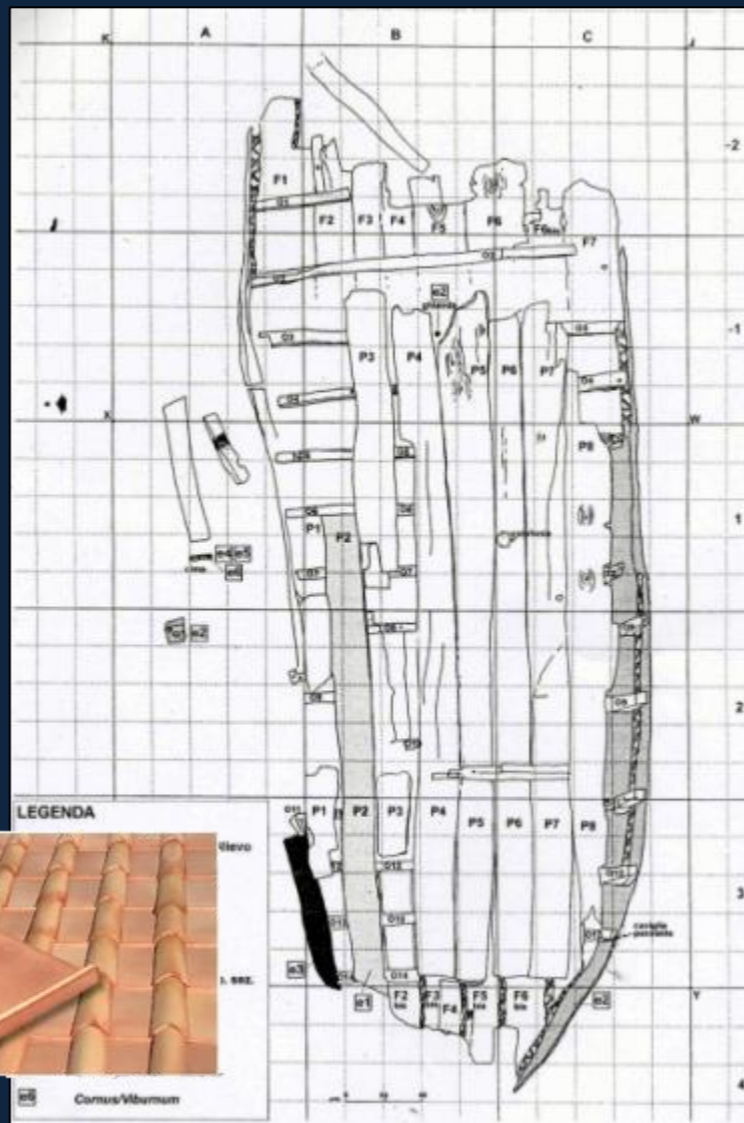
This ship, built at the beginning of the Roman Imperial Age using archaic techniques, was carrying a cargo of Roman tiles when it sunk, a small collection of Dressel 2/4 and Lamboglia amphora, presumably for the use of the crew, iron carpenter's tools, a small wicker basket, and some ceramic artifacts, presumably for personal use. Stamps on the tiles indicate local production.

# 1998 and 1999 Field Seasons

## 1998 Artifact Plan



## 1999 Hull Plan



The shallow site was discovered by sports diver in 1981. An unknown number of artifacts were removed before archaeologists were able to assess the site.

In 1998 and 1999, two rescue excavations were conducted by Serena Vitri, Francesca Bressan and IDRA. In 1998, an area of around 12 x 15 m was inspected and found to contain a concentration of artifacts, though further exploration revealed that it was spilled over an area at least 30 m long upstream of the site.

That year, the team concentrated its efforts on the cargo still in place inside the vessel. The cargo found *in situ* consisted mainly of roof tiles, both *embrici* and *coppi*, which were stacked vertically on the flat bottom of the barge (Fig. 2). In 1999, a second campaign was carried out, lasting two weeks and aiming at the recording of the hull remains. After a complete recording of the wooden structure the hull was covered with several layers of geotextile and sand bags, and left *in situ*.

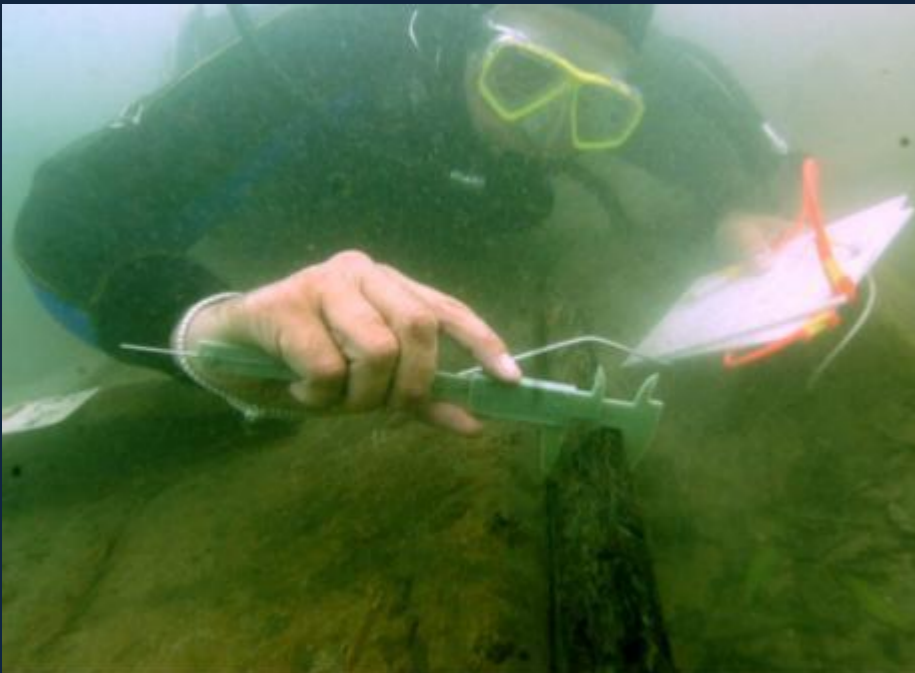


Our team returned in 2011 to reassess the site and conduct a full recording of hull details and construction.

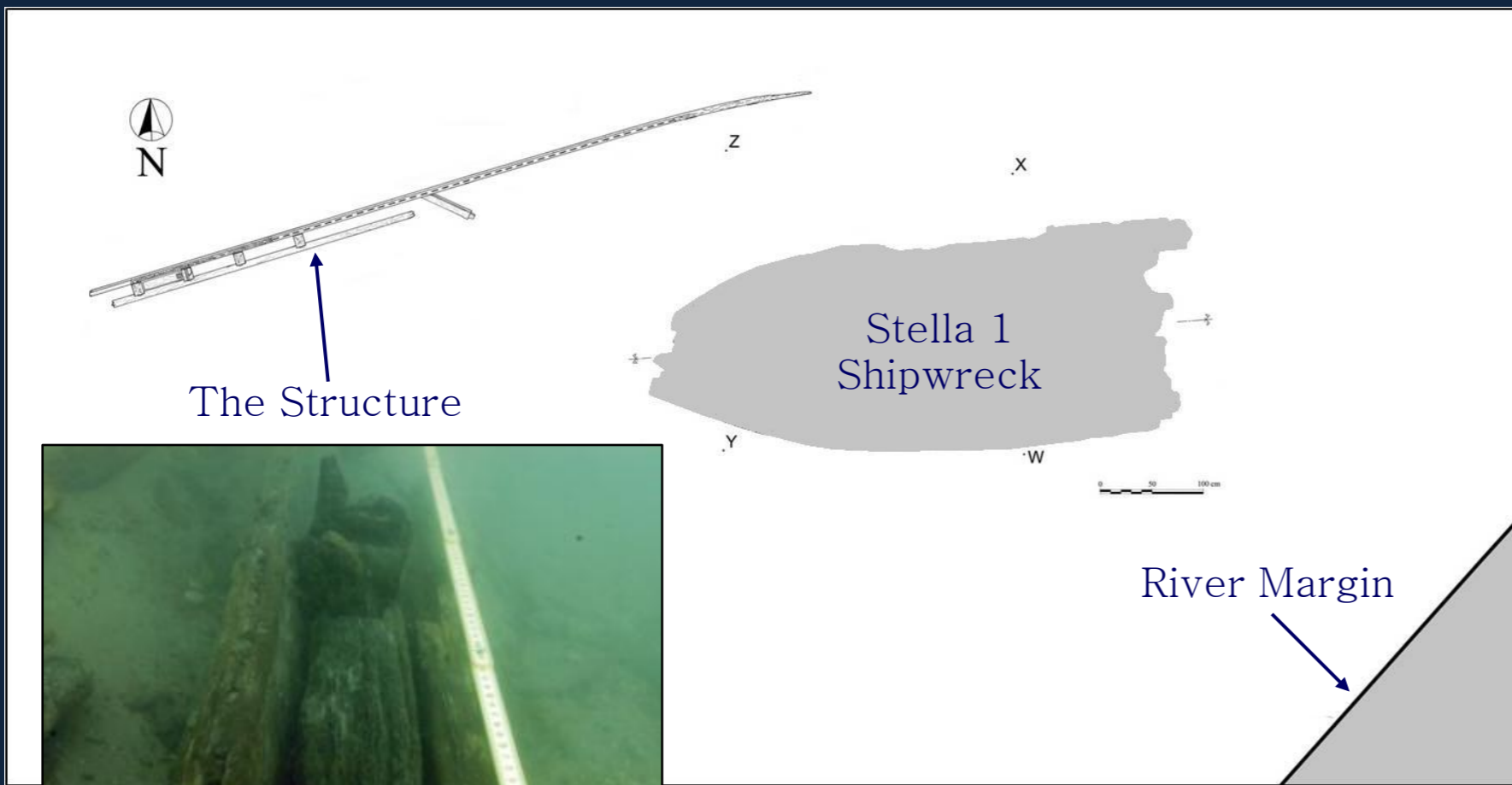
The majority of the project dealt with the survey of the extant ship's structure. In order to access some of the timbers, it was necessary to use a water dredge to remove the sediment obstructing access to the shipwreck.

The survey and excavation conducted on the 2011 field season resulted in the creation of a partial reconstruction of the shipwreck.

All extant timbers were recorded and a corresponding timber catalog created. A combination of direct measurements and trilateration from control points was used.

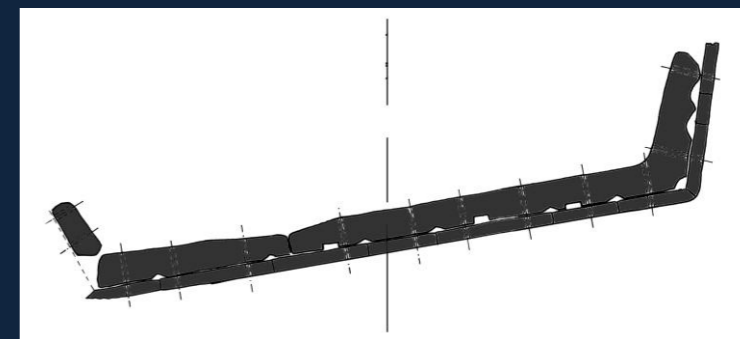


# Stella 1 Shipwreck & Unidentified Structure



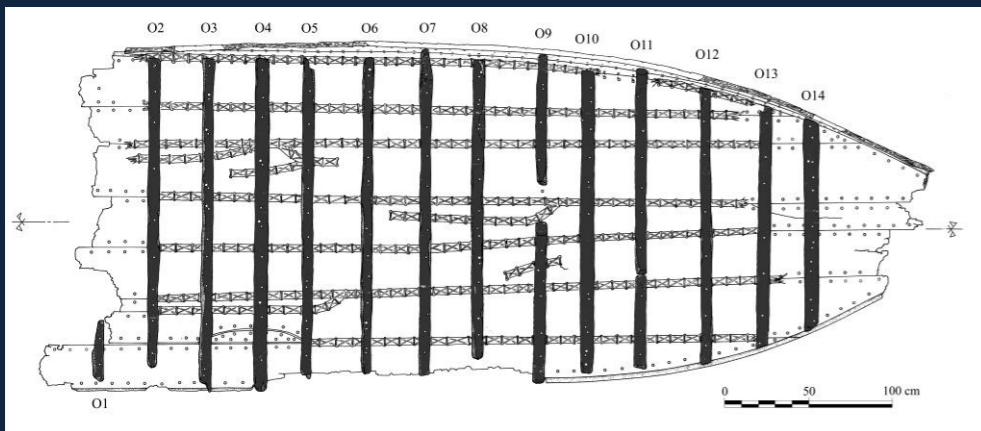
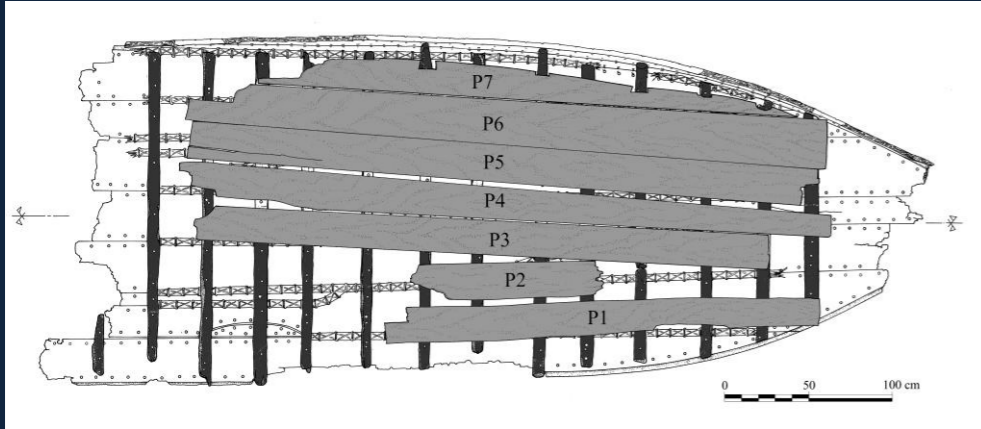
The hull remains of this boat lie on the left margin of the river in approximately 5 m of water. The river bottom is slightly inclined towards the center of the river and tilted to upstream.

The vessel lies on a layer of sand of between 5-10 cm deep around the shipwreck, with large timber fragments mixed with twigs and leaves. The hull sits on a slight incline.



There is an unknown structure near the wreck towards the middle of the river, which at this time is of unknown origin.

# Shipbuilding Technology (Notes)



The Stella 1 boat is a flat bottomed barge. Its bottom is a little over 2.00m wide at its known widest point. This barge was constructed with laced planks, following a traditional construction system in the region, as in the Greek tradition of the Pre-Classical and Classical periods.

The bottom planks seemed to have been sawn from large logs of reasonably good quality. There were few knots and the grain ran regularly along the entire length of each plank.

The frames were composed of floor timbers and first futtocks, many of which appeared to have been cut from small trees. They were treenailed to the hull planks. Each frame had approximately a dozen treenails. The bottoms of each frame were notched to fit over to fit over the planks underneath, the attachments to the futtocks were also all very different.

The frames were notched to fit over the lacings. Two side planks were preserved on the downstream (S) side of the shipwreck, to a maximum height of 40 cm. After the assemblage of the bottom planks, floor timbers were probably fastened to the bottom with treenails, after which the side planking was added also laced, followed by the futtocks. Some of the floor timbers were cut from curved logs, and curve upwards on one of the sides, forming a futtock.

Due to the incomplete nature of the hull sides, the depth in hold is unknown, but the embrici stacked over the ceiling planking were about 60 cm tall. It is possible that the sides of the Stella 1 boat stood about 70 or 80 cm high, requiring a draft of around 25 cm when loaded with embrici.

# Stella 1's Place Among Laced Vessels

## Older Laced Vessels of the Mediterranean

Giglio – 580 BC

Bon Porte –  
525 – 575 BC

Jules Verne IX –  
525 – 575 BC

## Transitional Laced Vessels of the Mediterranean

Jules Verne VII – 525  
BC

Gela – 500 BC

Ma'agan Mikhael – 400  
BC

The Roman laced vessel in the Stella River is one of a collection of laced vessels from Northeastern Italy that utilize the relatively archaic form of laced hull construction. Most often utilized by Greek shipbuilders in the Mediterranean as early as the 6<sup>th</sup> century BC, lacing became less common as mortise and tenon and nails began to replace lacing. Famous laced-only vessels in the Mediterranean such as Giglio, Bon Porte, and Jules Verne IX vessels of the 6<sup>th</sup> century gave way to the more transitional vessels Gela, Ma'agan Michael, and Jules Verne VII of the 5<sup>th</sup> century BC that included both lacing, mortise and tenons, and copper nails.

# Regional & Temporal Variations in Lacing

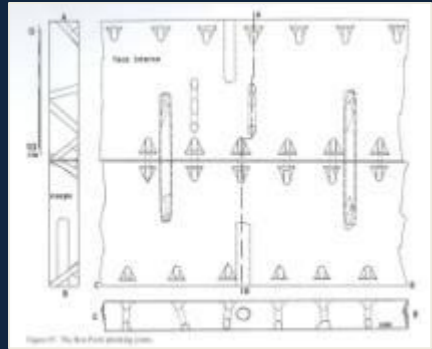
## Mediterranean

Tetrahedral holes  
Rounded frames  
Rounded hulls  
Dowels for edges

600 BC    AD 200

## Adriatic

Round holes  
Rectangular frames  
Flat hulls  
No dowels for edges

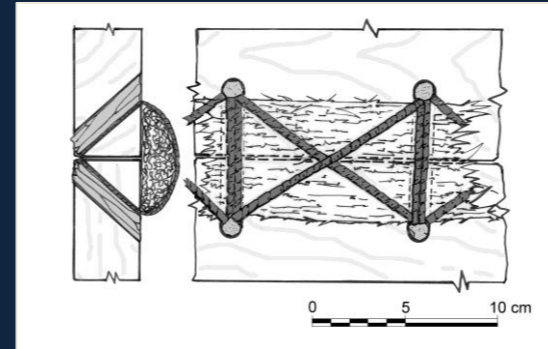
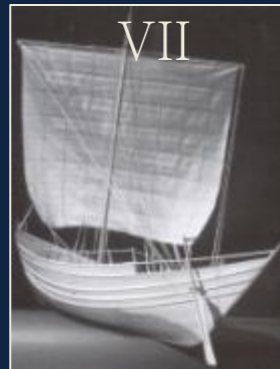


Bon Porte

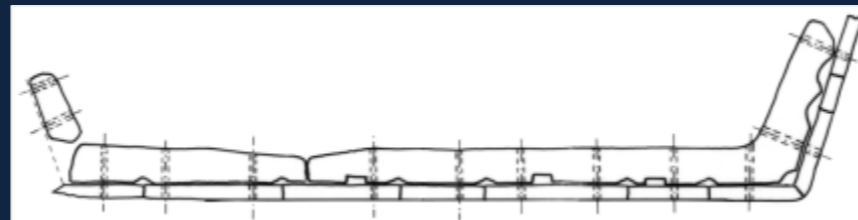


Jules Verne

Jules Verne



Stella 1



Around the Adriatic, however, laced vessels without mortise and tenon or nails survived at least until the 2<sup>nd</sup> century AD, often in rivers and lagoons. The style was likely familiar to shipwrights and suited to the local conditions and shipwrights were slow to change because there was little need. There are differences from the Mediterranean boats, of course, such as the use of round holes for lacing rather than tetrahedral holes more common to Greek vessels. In Greek vessels, frames with rounded tops were often lashed to the hull, while the later Italian boats had square or rectangular frames affixed with treenails. In addition, many of the older laced vessels had rounded or wine-glass shaped hulls, more suited for the oceans upon which they sailed, while the Adriatic vessels were generally flat bottomed for the rivers upon which they traveled.

# Roman Empire During Reign of Augustus Caesar – A.D. 8



The first century AD was a time of extraordinary expansion for the Roman Empire. New Roman territories and settlements to the north and east of the Adriatic Sea required vast amounts of building material. Later, these settlements would be able to establish their own production centers, but in the early phases of Romanization, most supplies were shipped from existing production centers. The Stella 1 vessel was likely part of this vast network of supply for the growing Roman Empire. Loaded with locally made tiles, it may have been heading to Aquileia, from which the cargo could have been sent to any part of the expanding empire.

# Anaxum Project 2011: Research Team



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**MINISTERO PER I BENI E LE ATTIVITÀ CULTURALI**  
 Soprintendenza per i Beni Archeologici del Friuli Venezia Giulia



**UNIVERSITÀ DEGLI STUDI DI UDINE**  
 Dipartimento di Storia e Tutela dei Beni Culturali

# Acknowledgements:



...and:

