



Book of Abstracts Posters and Documentary Videos



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POSTERS

Wrecks of 18th-century merchant vessels from Finnish waters

Riikka Alvik

Senior Researcher, The Finnish Heritage Agency

The purpose of this paper is to present the research and interpretation of shipwrecks of 18th-century merchant vessels found in Finnish waters. During that time, British vessels were dominant, but Dutch vessels also maintained their position. The ships operating in the Baltic waters were usually privately owned and unarmed, with the navies joining to secure them during restless times. These ships were relatively small, with the *Vrouw Maria* being around 27 meters long and 7 meters wide. Many other wrecks have similar dimensions, but their construction, space division, and rigging may differ. Well-preserved shipwrecks like the *Borstö I* and *Vrouw Maria* have similarities in space division, such as the aft cabin, a hatch in the aft for loading timber, and a deckhouse behind the main mast, but every wreck is unique. The hull is round to accommodate large amounts of colonial and European cargo, such as tons of sugar, dyes, and textiles, which were changed into Baltic raw materials like tar, timber, leather, hemp, and flax. Loading and carrying long pieces of timber and big, heavy barrels affected the structural construction of the ship. Researching well-preserved shipwrecks is challenging as the inner parts are usually full of cargo covered with marine sediment, and it is impossible to dive into the limited space. Sometimes, a small robot camera can be used, but making the survey requires effective lighting, and handling the cable can be difficult. Historical documents, such as the auction records of the Swedish Diving and Salvage Company, talk about selling the rigging, ship parts, and even entire shipwrecks for reuse and rebuilding. This must also be considered when researching the wrecks.

Construction of Traditional Vessels on the Magdalena River, Colombia

Antonio Jaramillo Arango
Juan David Sarmiento Rodríguez
Ricardo Borrero L.

Maritime Archaeology Laboratory, Center for Functional Ecology, University of Coimbra

For at least five centuries in Colombia, various types of vessels have been constructed on the Magdalena River. The basin of this river covers 24% of the country's continental territory, and approximately 80% of the population resides there. This underscores the significance of shipbuilding throughout this basin and the social role played by master builders. Locally manufactured vessels are used for fishing, transportation, and supplying riverside ports.

This poster presents the first findings from a comprehensive project aimed at creating a nautical atlas of the Magdalena River. It showcases the documentation of the construction process and describes two fishing canoes, consisting of multiple components, manufactured in two different sections along the Magdalena River: in the port of Honda, Tolima, and in the Totumo Swamp, Bolívar, near the river's mouth. Additionally, the analysis includes tools, design methods, and the "chaîne opératoire" of nautical construction. Both analyzed canoes belong to two different construction traditions, contributing to nautical practices that address specific navigation needs. The first, known as Bottom-Based, had not been previously reported in South America, while the other is Hull-Based.

To elucidate the diversity in nautical construction in this region, it is essential to note how the construction process is influenced by social, economic, and cultural demands. It is also crucial to emphasize that the heterogeneity of vessels is partly explained by the owner's needs, the primary propulsion method, and environmental elements, such as raw materials or the characteristics of the waters, shores, and riverbanks to which they are destined. A combined study of these factors allows us to comprehend the array of nautical technologies present in this significant river artery of Colombia.

Navigation limits and speed performances of Athenian Trireme

Bertorello Carlo F. M.¹
Begovic Ermina¹
Garrubba Vincenzo²

¹*Department of Industrial Engineering of the University of Naples Federico II*

²*KAIROS Foundation*

This paper is one of the results of the collaboration between the Department of Industrial Engineering of the University of Naples Federico II and the Kairos Foundation, which contribute: The first with tools and skills for technical-scientific analysis, the second as the driving force of the study that it is functional to the recognition of role and influence exercised by Magna Graecia in the development of Western democracy.

In the frame of the feasibility analysis carried on by KAIROS Foundation about the reconstruction of the trireme that Krotonian Phaillos athlete led to Salamis battle, this paper is focused on the navigation limits of Athenian trireme and on the technical aspects of her sailing and rowing propulsion. Regarding the latter, the work done with CFD (Computational Fluid Dynamics) shows how the rowing rhythm consistent with the speed data available on various routes was difficult to sustain. It is logical to hypothesize a wide use of sail propulsion for the trireme, limiting the oars to battle, manoeuvres and navigation in calm winds and seas. Seakeeping capabilities, as well as powering performances at sail and oars have been assessed through most advanced CFD codes. Trireme main features are reported the basis of a critical analysis of available data and scientific achievements.

“Among the people settled beyond this limit, the only ones to send help to Greece in danger were the Crotonians, with only one ship under the command of Faillo, three times winner of the Pythian games. The Crotonians are of Achaean lineage.” HERODOTUS, THE HISTORIES, book VII, 47

Boa Vista 2. On the trail of a colonial ship from the late 17th century in Lisbon waterfront (Portugal)

**José Bettencourt¹, Francisco Mendes¹, Marco Freitas¹, Sofia Simões Pereira¹,
Patrícia Carvalho¹, Tiago Silva¹, Cláudia Oliveira⁴, Marina Costa^{2,3}, Cláudia S. L.
Vicente³, João Tereso⁴, Dora Teixeira²**

¹*CHAM – Centre for the Humanities, School of Social Sciences and Humanities,
NOVA University of Lisbon*

²*HERCULES Laboratory, Institute for Advanced Studies and Research, University of
Évora*

³*MED – Mediterranean Institute for Agriculture, Environment and Development
& CHANGE – Global Change and Sustainability Institute, Institute for Advanced
Studies, and Research, University of Évora*

⁴ *Research Centre in Biodiversity and Genetic Resources (CIBIO), University of Porto*

Discovered in Lisbon waterfront, the Boa Vista 2 ship was excavated in 2012 and analyzed in two distinct phases. The first, in 2013, consisted of the traditional documentation of a sample of the most important timbers. The second phase, underway since 2023, consisted of the analysis and systematization of all field data, the systematic recording of the timbers, and the analysis of wood samples and other products used to protect the hull.

The ship's structure, which had been deeply damaged, was preserved at the bow along the port side. The frames were in a poor state of preservation, but the bow timbers, the planking and the sheathing were in a fair state of preservation. Among the finds discovered during the excavation, only several coconuts stored at the bottom of the hold can be associated with the ship, pointing to a connection with colonial shipping. The materials found in the sedimentary levels that protected the hull (kaolin pipes, earthenware, and glass) suggest that it dates from the 17th to the 18th century. The characteristics of the context indicate that the ship was abandoned on the beach and partially dismantled.

In this paper we present the context, the documentation procedures and a systematic analysis of the ship construction features, including the timbers identification and the chemical characterization of the material used on the hull protection. Some of the ship's most important features include the use of lead strips to caulk the joints between the planks and the existence of a wooden sheathing to protect the keel and the planking, between which a mixture of lime and different organic components was spread out.

Blue Culture Technology Excellence Hubs in EU Widening Member States

Debra Camilleri¹
Alexandra Camilleri²
Anton Motivans²

¹*Senior Executive Officer. Policy, EU International Affairs and Underwater Heritage Unit (SCH)*

²*Executive Officer. Policy, EU International Affairs and Underwater Heritage Unit (SCH)*

BCTHubs, which stands for Blue Culture Technology Excellence Hubs in EU Widening Member States, is an EU project that aims to build Blue Culture Technology Excellence Hubs in the participating widening countries, Malta, Greece and Bulgaria. These Excellence Hubs will serve as permanent structures supporting new innovative solutions and products the sustainable protection, restoration, valorisation, management, accessibility, and promotion of Underwater Cultural Heritage (UWCH).

The BCTHubs EU funded project has a duration of 4 years and is led by a consortium involving 15 partners. As a new field within the Blue Economy, Blue Culture Technologies (BCT) is being introduced through this project. BCT promotes innovative technologies developed to support underwater cultural heritage in terms of scientific research, accessibility, and valorisation.

Although the new Hubs will be scoped regionally, they will be interconnected and oriented towards national and international synergies (i.e. beyond regional borders), pursuing cross-border collaborations on common strategic goals and alongside value-added chains. Each Excellence Hub will bring together all regional/national actors related to Blue Culture and UWCH, including research/academia, businesses, public sector, and societal actors (i.e. 4-helix approach), which will mutually reinforce their capacities and effectiveness towards raising innovation excellence in sustainable Blue Economy/Culture in respective regions.

The Superintendence of Cultural Heritage (SCH) is one of the key partners in this project and a leader for the Maltese Hub, in collaboration with other organisations from Greece, Bulgaria, Italy, Portugal, Montenegro and Israel. Additional partners based in Malta include Divers Alert Network (DAN) Europe, the Institute for Tourism Studies (ITS) and Aqua Biotech (ABT).

A comparative analysis of Santo Hieronimo's hull: examining Mediterranean and Ibero- Atlantic technical features in the late 16th-century Adriatic

Jose L. Casabán, Ph.D¹
Irena Radić Rossi, Ph.D²

¹Postdoctoral Researcher, KU Leuven, Belgium
²Associate Professor, University of Zadar, Croatia

In the early 1970s, a shipwreck was discovered near the Island of Šipan, off the Dalmatian coast (Croatia). After its discovery, the Maritime Museum of Dubrovnik conducted a rescue excavation. Ten years later, archival research identified the wreck as Santo Hieronimo, a “nava” (type of ship) belonging to the Ragusan merchant Hieronimo Benedicto de Primi (Jerolim Benedikt Primojević), that sank in 1576. The systematic archaeological research of the shipwreck site has continued since 2014.

Santo Hieronimo's hull remains, the wreck's location, the fact that the ship belonged to a merchantman of Ragusan origin, and even the preliminary dendrochronological analysis results suggest that it was built in a Mediterranean shipyard. However, the latest archaeological research of Santo Hieronimo has also revealed a combination of Mediterranean technical features and the influence of the Ibero-Atlantic shipbuilding tradition.

This poster presents the results of a comparative analysis between Santo Hieronimo's hull and other 16th-century Mediterranean and Ibero-Atlantic vessels to establish the influence of shipbuilding techniques used in its construction. Additionally, the characteristics of the hull remains of Santo Hieronimo are compared to those described in 16th and early 17th-century Mediterranean and Ibero-Atlantic shipbuilding treatises to determine its hull design.

Does shore shape the ships?*

Jelena Čelebić

PhD Candidate Koç University

As a part of my PhD research on the maritime cultural landscape of the Bay of Kotor (Montenegro), in this paper, I am focusing on the ships mentioned in archival documents in the Kotor Archive. Considering the development of the maritime trade, but also the professional formation of sailors in Perast, as well as the existence of a shipyard, I am primarily discussing sail ships from the 17th century. My goal is to analyze ship types, their characteristics, and possible peculiar/local features of the ships that were adapted to the shores of the Bay of Kotor. Even though archival data does not always contain details regarding ships' characteristics, sails, equipment, or cargo, I try to reconstruct their aspect by finding analogies in the figural representations from the same period. One of the best collections of ship representations in the area consists of ex voto plates kept in the church Our Lady of the Rocks located on an island in front of Perast. Since different ship representations have been identified as fregata (frigate) I aim to compare these figural representations with archival descriptions of this ship type.

Fregata was the most common sailing ship in the Bay of Kotor at the end of the 16th and beginning of the 17th century, based on mentions in archival documents. It was a merchant ship par excellence of the Adriatic coast of the period. The aim of this research was also to check whether a local variation of fregata was produced in the Bay of Kotor.

* This title is inspired by K. Ilves' article "Do Ships Shape the Shore? An Analysis of the Credibility of Ship Archaeological Evidence for Landing Site Morphology in the Baltic Sea" from 2012.

An ethnographic narrative of the encounter between modern culture and the WWII shipwreck Mansei Maru in the Seas of Qimei Island, Taiwan

Ying Cheng

Institute of Anthropology , National Tsing Hua University, Taiwan

The Japanese transport ship Mansei Maru went down on December 8, 1942, in the Taiwan Strait near the northwest coast of Qimei Island. It is more than simply a shipwreck discovered in historical documents; it can be found in many different forms in modern people's daily lives.

Following its sinking, the Mansei Maru was turned into an artificial reef that provided habitat for a thriving ecosystem. Local fishermen discovered Bonito's home there in the 1970s, and they dubbed the place "ian-á khut". However, the 1980s saw the introduction of blast fishing, which led to environmental weariness. Due to the rise in popularity of diving activities in Taiwan starting in 2000s, the wreck of the Mansei Maru has recently become a popular diving destination. The government chose to identify the shipwreck Mansei Maru as a designated underwater cultural heritage in 2023 to offer legal preservation after realizing the potential damage that divers and fishers could cause to it.

The author has conducted research to develop a thorough analysis of the process of Mansei Maru's metamorphosis from a shipwreck and fishing reef to a diving area and, eventually, a legally protected underwater cultural heritage, with the goal of creating an ethnography of this change. Its purpose is to highlight the importance of the unprofessional locals in preserving the underwater cultural heritage.

The Roman Ship Of Antikythera

Sara Colpo
Carlo Beltrame

Dipartimento di Studi Umanistici, Università Ca' Foscari Venezia

The Roman shipwreck of Antikythera was discovered close the Greek island in 1900 by sponge divers at 55- 60 meters deep. The several archaeological investigations and projects carried out during more than one century (the latest project still ongoing since 2012) have still not concluded so much about the dimension and characteristics of the ship transporting the famous and extraordinary cargo of bronze statues and sculptures.

An analysis of the few and scattered wooden remains of the hull, of the anchors, of the remains of bilge pump, of the numerous human skeletal remains and a precise evaluation of the volume and weight of the entire cargo, carried out thanks to a study of any kind of information publicly available from the various excavations and recoveries, allows the authors to formulate a hypothesis about the size, the tonnage and the characteristics of the ship. These data are compared with other ships of Roman period.

A new methodological approach for the conservation of ancient wooden shipwrecks in Museum exhibitions. The example of the roman barge Arles-Rhône 3 (Arles, France)

Marie-Laure Courboulès¹, Daniela Peloso², Vincent Dumas³, Henri Bernard Maugiron⁴

¹*Musée départemental Arles antique, Conseil départemental des Bouches-du-Rhône*

²*Ipsos Facto, Research Company in underwater archaeology, Marseille*

³*Aix Marseille Université, CNRS, MCC, CCJ, , F-13000, Aix-en-Provence*

⁴*Arc-Nucléart, Atelier de Recherche et Conservation, CEA, Grenoble*

The roman barge Arles-Rhône 3 was discovered Rhône river which is located in Arles. A large excavation and lifting program was carried out in 2011, the barge was restored in 2013 to be presented in the new hall of the Musée Départemental d'Arles Antique. The study of the conservation conditions and of the constraints presented in the Roman maritime-fluvial barge AR3 demonstrated the necessity to develop adapted monitoring tools. Since 2015, this scientific collaboration has drawn on the work and technical expertise.

The stricter measures for the conservation, the condition of the material and the wooden shipwreck dimensions demonstrated the necessity to develop adapted monitoring tools to study this barge in its museum environment. The goal is to link the results of the topometrical data with the archaeological data, the restoration treatments and the preventive conservation data within the museum exhibition context. The partnership is very important, several international Institutions are sharing their experience on the long-term conservation and wooden boats monitoring in museums.

The methodology implemented is based on the use of Geographic Information Systems (GIS) as a tool for integrating a relational database in order to collect the wooden shipwreck annual conditions in the museum. It also records all data collected since 2015 as a part of a metrological monitoring operation aimed to quantify any deformation of the barge over time.

Spanish shipbuilding in a time of transition: Archaeological evidence from the San Pedro de Alcántara shipwreck (Marbella, Spain), 18th century

Ana Crespo-Solana¹, Milagros Alzaga García², José Antonio Moya³, Nigel
Nayling⁴,

¹*Instituto de Historia, Consejo Superior de Investigaciones Científicas, CSIC, Madrid,
Spain*

²*Centro de Arqueología Subacuática, Instituto Andaluz del Patrimonio Histórico, CAS-
IAPH, Cádiz, Spain*

³*Universidad de Alicante, Spain*

⁴*University of Wales Trinity Saint David, United Kingdom*

*Research/Diving team Centro de Arqueología Subacuática, Instituto Andaluz del
Patrimonio Histórico, CAS-IAPH, Cádiz, Spain:

Josefa Martí Solano; Aurora Higuera-Milena Castellano; Lourdes Marquez Carmona;
Yvonne Marcela Manríquez; Alberto Salas; Cristina San Martín Bel; David Parrilla Casado

During the year 2023, archaeological excavation has been carried out to determine the identity of the remains of a shipwreck off the coast of Málaga. The study involves a wide range of methods, techniques and scientific disciplines, including documentary, archaeological and dendroarchaeological investigation. Specifically, on a bed of sand and stone and at a depth of between 6 and 7 metres, the remains of a large ship point to a robust constructive structure characteristic of a warship. The remains are scattered over an area 60-65 metres long by 12 metres wide and are in an excellent state of conservation. However, the site has been heavily looted and some of its frames are suffering rapid degradation caused by bionatural organisms that feed on organic matter.

The starting hypothesis, after cross-referencing historical information (Archivo General de Simancas and the Archivo General de la Marina "Álvaro de Bazán") with archaeological materials, is that the shipwreck may correspond to a Spanish military vessel from the mid-18th century - the Fernando - built between 1750-51 and which sank in 1760 on the coast between Estepona and Marbella (province of Málaga, Andalucía). The Fernando was one of the four ships designed to implement a new construction system that was introduced during the period of the Marquis de la Ensenada: the so-called Jorge Juan English system. In this way, the case of the wreck of San Pedro de Alcántara is an exceptional case for the analysis of Spanish shipbuilding at a time of transition in the application of new technologies.

Historic Ship Graffiti on Greek Monuments. Preliminary report of the project “Historic Ship Graffiti on Greek Monuments –HISGM”

**K. Delouca
K. Damianidis
G. Harlaftis**

*Institute for Mediterranean Studies / Foundation of Research and Technology-Hellas
(IMS-FORTH)*

The HISGM is a research program of the Institute for Mediterranean Studies / Foundation of Research and Technology-Hellas (IMS-FORTH). The project aims to record and study historic ship graffiti (SG) in areas of the Aegean Sea.

The first task of this project is to identify historic SG on selected Monuments in Megaris, Aegina, Chios, Andros, Patmos, and Crete. In these areas several SG have been recorded in a haphazard way without systematic research. All the SG that will be identified or updated in these areas will be recorded, classified, documented and published by the HISGM project.

Furthermore, the project will undertake comparison work with other contemporary depictions and evidence about ships from the same period and it will try to cast some new light on the maritime activity, sea communication and ship technology of the Aegean in the post Byzantine period and especially in the 18th and 19th centuries. The project will suggest techniques to protect and preserve SG in situ and promote their significance in the monument.

The project establishes an optimized and effective methodology for the documentation of SG with the use of advanced digital tools (photography, scanning and digital restoration including selected 3D representations). The locations will be established by GIS and special e-publications will be issued for these parts of the monuments that are not easy to be identified. Finally, a web site will be created for the needs of HISGM project including an open data for historical SG in Greece.

VHSS Project, Final Report: 3D digital study of the ship-model of the barque Ellin (19th century)

Kostas Damianidis¹, Gelina Harlaftis¹, Georgios Tzavaras¹, Spyros Vosinakis², Nikolaos Politopoulos², Vasiliki Nikolakopoulou², Eleni Bintsi³, Sotiris Trikas³, Spyros Tsafaras⁴, Alexandros Tourtas⁴, Alexandros Arapandonis⁴, Elli Karyati⁴, Danae Mavridou⁴,

¹ *Institute of Mediterranean Studies, Foundation for Research and Technology Hellas (FORTH)*

² *Department of Product and Systems Design Engineering of the University of the Aegean*

³ *Folklife & Ethnological Museum of Macedonia - Thrace*

⁴ *Tetragon*

The study of the ship-model of the barque “Ellin” was undertaken in the framework of the “VIRTUAL HISTORIC SAILING SHIPS-VHSS” project, which was aimed to create 3D digital models of 19th century sailing ships, based on original data like historic ship-models, drawings, old photographs, technical descriptions, and other contemporary artifacts from Museums and archives.

The physical model of the wooden ship “ELLIN” is in the permanent exhibition of the Industrial Museum of Ermoupolis / Syros. The model was built by M.S. Kouphoudakis and it was an exhibit of the Greek representation in the International Maritime Exposition of Bordeaux in 1907 receiving the golden medallion of the Exposition. The model has an overall length of 240cm and offers a very detailed representation of all the interior structural components of a barque of the 19th century.

The model’s geometry and structure have been studied and recorded in great detail with the use of a handheld scanner. Based on this work, a digital reconstruction of the original ship has been produced. The sequence of the phases of the ship's construction was studied and combined with other data from bibliography and archival material. An animated demonstration of the building process and an exploded view of the real ship were accomplished. Furthermore, a mixed reality application was developed with lofting techniques and production of moulds for the frames of the barque "Ellin". All digital applications and copies of the original data were presented in an exhibition under the name “From counter stern to stem” at the Folklife & Ethnological Museum of Macedonia – Thrace in Thessaloniki, in 2023. The project was an interdisciplinary work and the study of the barque Ellin incorporated an insightful view of the construction of the three-masted sailing ships of the Mediterranean from the 19th century.

Preliminary results of the wood analyses of the ancient sewn boats from Zaton near Nin, Croatia

Alba Ferreira Domínguez¹
Dušanka Romanović²

¹*Ipsa Facto*

²*Senior Curator Archaeological Museum Zadar*

The port of Zaton near Nin was an ancient port of the municipium Aenona, in the province of Dalmatia (Croatia). The most significant finds in the port are the remains of three sewn boats assembled with the ancient Liburnian sewing technique. The first boat Zaton 1 was discovered in 1966, documented and salvaged in 1979. After its conservation all data about the boat is lost, until 2020 when it was found at the old Museum's depot in a very bad condition. The second boat Zaton 2 was discovered in 1982, documented, salvaged and stored in the Museum in 1987, where it waited for its conservation for 29 years. Neither campaign recorded the hulls of the Zaton 1 and 2 boats in situ. The third boat Zaton 3 was discovered in 2002, documented in detail in 2019 and still remains on the sea bed in situ. Using the 14C method, the Zaton boats were dated to the period between mid-3rd century BC and mid-2nd century AD.

Samples of all structural elements and assemblies of the boats were taken for the systematic xylological analysis, in order to identify the species used in the construction. For Zaton 1 the analyzes were carried out after its location in 2022, for Zaton 2 before its conservation in 2015 and for Zaton 3 during the research in 2019 and finished in 2022.

This poster provides an overview of the preliminary results of the wood analyses of Zaton sewn boats that will help us understand the development of the north-eastern Adriatic sewn boat tradition and its relationships with other different shipbuilding traditions.

Dockyards in ancient Egypt between textual evidences and iconographic depictions until the end of the late period

Ahmed Galal Mesbah, MA

Researcher at Alexandria Centre for maritime Archaeology & Underwater Cultural Heritage, Underwater Archaeologist at the Department of Underwater Antiquities- Ministry of Tourism and Antiquities

Technology represents the most fundamental clue we use to recognize the past, and nowhere in antiquity was technology more evolved than when it was utilized in manufacturing boats and ships. Shipbuilding in ancient Egypt is fascinating for several causes; it represents the earliest recorded technique of shipbuilding with precision in ancient world. Actually, despite the wealth of archaeological discoveries of ancient Egypt in different aspects of life in general and in the issue of the shipbuilding in particular, there is a significant gap in that expertise. This gap is reflected in determining the places and specializations of shipbuilding workshops. Unfortunately, so far, we don't have what can be considered as a shipbuilding workshop among our massive archaeological discoveries, notwithstanding the shipbuilding workshop represents the most crucial part of the shipbuilding process, since without the availability of the appropriate area for construction, how the ships would have been built? However, written documents and various iconographic depictions of diverse activities within ship construction workshops provide us with data on shipbuilding enterprises in ancient Egypt. These documents are administrative records, particularly dockyards inventories, they could provide us with many hints on the different types of tools, wood, materials, cordages, and also structural characteristics of Egyptian shipbuilding. Therefore, this paper will discuss preliminary an analytical study of those administrative papyri and iconographic depictions related to shipbuilding workshops in ancient Egypt to determine the places of the workshops and the different specializations of its laborers, the paper will also include a detailed study of all material evidences (shipbuilding tools, materials, wood species, the constructed ships) of shipbuilding workshops in ancient Egypt in order to provide a comprehensive and clear vision of what was going on inside the workshops.

Study on the wooden remains found on the Phoenician Shipwreck of Xlendi - Initial observations & preliminary conclusions

**Alberto Bravo-Morata Rodríguez¹
Dr. Alba Ferreira Domínguez²
Prof. Timmy Gambin³**

¹*University of Malta, Université d'Aix-Marseille - CNRS - Centre Camille Jullian*

²*Ipso-Facto*

³*University of Malta*

The Phoenician shipwreck of Xlendi has been under study since its discovery in 2007. In 2021, the last phase of a 4-year excavation which began in 2018 concluded. This excavation allowed the team to gather extensive data which allowed to conduct a wide study on this exceptional site.

This poster will be focused on the wooden remains which appeared on site since 2018's campaign, when the cargo layers started to be excavated. The campaigns conducted in 2020 and 2021 focused on excavating the last level of cargo, which was accompanied by the presence of a larger concentration of wood and finally with the appearance of the vessel's wooden structure remains in situ in 2021.

Once the excavation phase concluded, a basic architectural observations and an intensive analysis of extracted wooden remains started. This study included the identification of wood species and dendro-morphological analysis to determined tree-felling types and tree-morphology restitution. The ongoing study includes samples identified as structural elements from the vessel, undetermined pieces and a series of wooden stoppers related to the sealing of the amphoras. Our analyses gave important information in relation on selected wooden species, the possible timber supplies and the manufacturing techniques that have been used. This provides us a valuable data for interpreting both the wreck and the cargo.

The presentation intends on offering not only a brief image of an interdisciplinary project, but the latest data which has been obtained in relation to the first structures of a Phoenician shipwreck of this category excavated in a central Mediterranean context.

SSBS_1337: Archaeology and Contextualisation of an Armed Brig in the Western Black Sea

Dragomir Garbov (BA, MA, PhD)

M. ICOMOS-ICUCH, Centre for Underwater Archaeology, Bulgaria

The proposed paper will discuss ongoing work on one of the nearly intact shipwrecks recorded by the Black Sea Maritime Archaeology Project (Black Sea MAP 2015-2017). The archaeological site lies in c. 1700 m of water on the western continental rise in the Bulgarian EEZ, deep into the anoxic layer of the Western Black Sea. At the time of the archaeological inspection, the site was covered with a layer of marine sediment giving it a characteristic “snowed in” appearance, with significant amounts of organic material suspended in the water column inspiring the nickname, the “Snowy Wreck”.

The Snowy Wreck represents the remarkably well-preserved remains of a 33-metre-long wooden sailing ship. The vessel is oriented southwest – northeast, bow pointing to southwest. The hull is in a coherent state with most mechanical damage appearing to be caused by seabed impact. The vessel is flush-decked. The deck layout, fittings and deck furniture are clearly observable, the rudder is still in situ, the ship’s steering wheel is lying next to its original position. The stump of the bowsprit is in place and two masts have collapsed on deck, crushing beneath them a ship’s boat. Four anchors, sixteen gun-ports and four guns of two calibres were identified and recorded in situ.

The typological and chronological evidence for hull and rigging, allow for interpreting the Snowy Wreck as a late 18th early 19th century armed brig (privateer / naval cruiser / sloop of war). This the largest and one of the best-preserved shipwrecks recorded by Black Sea MAP. The proposed paper will discuss the characteristics of this significant underwater archaeological site and present the author’s initial remarks on its archaeological and historical contextualisation within the themes of state and private shipbuilding, and naval warfare on the Western Black Sea in the tumultuous period between the treaties of Küçük Kaynarca (21 July 1774) and Adrianople (14 September 1829).

The "Golden" Logboat From The Mura River Near Hrastje (Slovenia) – 16th-Century Float And Similar Monoxyl Vessels From The Pannonian Plain And Its Surroundings

Andrej Gaspari

University of Ljubljana, Faculty of Arts, Department of Archaeology, Aškerčeva 2, SI-1000 Ljubljana

In August 2023, an 11.21 m long and 1.22 m wide dugout made of hollowed oak, with a separately crafted transom at the stern, was discovered in the Mura riverbed near the village Hrastje. The shape of the bow and the grooves on the better-preserved right side indicate that it is likely half of a tandem float used in a boat mill or ferry. Radiocarbon (AMS) dating of one of the youngest preserved tree-rings and moss, used to seal the gap between the stern board and the corresponding slot, suggests that the float was probably built in the second half of the 16th century.

The presentation provides a description of the circumstances of the find, assumptions about the original deposition of the dugout, details of its construction, and an archaeological and cultural-historical definition of the object and its technological features. According to the latter, the dugout belongs to the regionally differentiated group of floats with transoms that were used on the rivers on the fringes of the Pannonian Plain between the (late) Middle Ages and the pre-modern period. The adjective "golden" refers to the numerous tiny golden flakes of smallest sizes that fill the fissures in the wood and glow under the microscope. Notably, it is a known fact that the Mura River carries gold from the deposits in the Hohe Tauern mountain region in its upper course.

3D Digital Modelling of Yenikapı 16 Shipwreck

Hilal Güler

Istanbul University, Turkey

Archaeological salvage excavations were started in 2004 within the scope of the Metro and Marmaray projects in Yenikapı, Istanbul. Harbour of Theodosius, built by the Byzantine Emperor Theodosius I in the late 4th century AD, was unearthed during the excavations carried out under the supervision of Istanbul Archaeological Museums and lasted for nine years. The remains of 37 shipwrecks dating between the 5th-11th centuries AD were discovered in the deep fill within the harbour.

Yenikapı (YK) 16 shipwreck was discovered 1.30-1.80 meters below sea level, in the northwest- southeast direction on the eastern side of the site. The YK16, considered to be a galley-type oared warship, is one of the earliest known archaeological evidence of this ship type. The field studies of the ship, which has a preserved length of 22.5 m and a width of 2.40 m, were carried out in 2008 by Istanbul University, Division of Conservation of Marine Archaeological Objects.

All data of 175 frames, 4 parts of the keel, a keelson, 31 planking, 3 wales, 2 stringers, a knee, and 11 dislocated ship elements, totalling 228 parts of the YK16 wreck were collected using the Faro Arm Fusion model and transferred to Rhinoceros programme. In this context, features such as tool marks on wooden elements, wooden and metal fasteners, original fittings, and damaged parts that contribute to the identification of shipbuilding techniques were recorded in different layers of the programme. 3D solid models of the individual ship elements whose drawings were completed were created in the Rhinoceros programme. These obtained solid models were placed on the 3D AutoCAD drawing made according to the Total Station measurements in the in situ state of the wreck, and the in situ 3D model of the YK16 wreck was obtained. It is planned to use the data obtained in the preparation of the shipwreck reconstruction project and in future exhibition works.

A curatorial dilemma – Reconstructing the Barangaroo Boat at the Australian National Maritime Museum, Sydney

Kieran Hosty¹
Irina Malliaros²

¹*Maritime Archaeologist, Australian National Maritime Museum*

²*Maritime Archaeologist, I AM Archaeology: Habitat & Heritage*

Discovered during the construction of Sydney's metro system, the Barangaroo Boat is the oldest known Australian colonial-built vessel ever located, archaeologically excavated, recorded digitally in 3D and conserved in Australia. The boat has also been assessed as being of State and National significance. Dating from the late 18th or early 19th century, at a time when boat building was strictly controlled in the convict colony of New South Wales, the wooden boat exhibits a unique and idiosyncratic building method that reflects the colonial / convict spirit of enterprise in the use of indigenous timbers and demonstrates a make-do and adaptive attitude in its construction when access to specialist boat building skills and materials were restricted.

Shortly after the boat's archaeological recovery in 2019, the Australian National Maritime Museum commenced discussions with Sydney Metro – the owners of the boat – regarding the boat's future disposition. These discussions resulted in the two parties agreeing to work together to have the Barangaroo Boat Hull preserved and displayed at the museum. Sydney Metro is responsible for the documentation and conservation of the boat's hull - this has not been attempted in Australia since the conservation and reconstruction of the partial Batavia hull in Fremantle, Western Australia in the late 1980s and it has never been attempted on a wreck made of native Australian timbers.

The museum is now in the planning stages of the boat reconstruction project and is facing several curatorial dilemmas one of which is choosing between reconstructing the boat as found, as an archaeological site, or reconstructing the boat as built, by its original colonial boat builders.

This paper discusses the conservation requirements; curatorial and design advantages and disadvantages of both options; and sets out how the museum hopes to overcome this dilemma.

The Mansei Maru And The Japanese Shipbuilding Industries During The First Half Of The Twentieth Century

Ellen Hsieh¹
Zong-Jhe Li
Han-chang Huang
Cheng-hwa Tsang

¹Assistant Professor, Institute of Anthropology, Deputy Director, Research Center for Underwater Archaeology and Cultural Heritage, National Tsing Hua University, Taiwan

After yielding to the demands of the 'Black Ship' in 1853, Japan underwent a rapid modernization, strategically directing its efforts toward developing the shipbuilding industry. This initiative was a crucial policy to liberate the nation from Western economic dominance, ultimately transforming Japan into a formidable maritime power. The Mansei Maru, constructed in 1919, was a steam cargo ship affiliated with the esteemed Yamashita Transporting Company, one of Japan's most influential shipping entities. Requisitioned by the Japanese army during World War II, it played a vital role in transporting metal resources from Southeast Asia to Japan before succumbing to a storm and sinking in 1942. With dimensions of 130 meters in length and 17 meters in width, this well-preserved vessel now rests as one of the most significant shipwrecks in the Taiwan Strait. Through an in-depth analysis of this shipwreck and its counterparts crafted by Osaka Iron Works, the present research endeavors to unveil the distinctive characteristics of Japanese-made cargo ships from the early 20th century, offering insights into their pivotal roles before and during the Second World War.

The Last Vikings: Seafaring Continuities In Scandinavia As a Window On The Distant Past

Greer Jarrett

PhD candidate, Department of Archaeology and Ancient History, Lund University

The Viking Age is a favourite period for experimental boat and ship archaeology, but many of the reconstructed vessels used suffer from high levels of uncertainty due to the poor preservation of the originals, as is the case for rigging, rudders, masts, and sails. In this presentation I would like to present an alternative avenue into exploring Viking Age voyages by taking a *longue durée* perspective, and conducting trials onboard 19th century Norwegian clinker-built square rigged boats. This has been the subject of my PhD project, which is scheduled to be completed in late 2024. The high levels of continuity in movements, practices, and technologies along the Norwegian coast means that much can be learnt about earlier periods from these late examples of the Scandinavian clinker tradition. In this presentation I would like to present some of the preliminary results of the project, as well as evaluating this method for future research both in Norway and elsewhere. Experimental ship and boat archaeology still lacks a standardised methodology, and so the data-gathering method used before, during, and after trial voyages will also be presented in the hopes of contributing to safer and more comprehensive data-capture in future research.

Could The Karaburun Anchors Be a Key To Understanding The Size Of The Archaic Period Ship They Belong To?

Ufuk Kocabaş

Department of Conservation and Restoration of Cultural Property, Division of Conservation of Marine Archaeological Objects, Istanbul University Letters Faculty, Istanbul, Türkiye

In 2011, wooden fragments discovered near the Karaburun Lighthouse in the Black Sea, close to Istanbul, were identified by Istanbul University experts as remnants of two ancient wooden anchors. These artifacts, named Karaburun Anchor 1 (KA1) and Karaburun Anchor 2 (KA2), underwent scientific investigation and conservation at İÜ Laboratories. Dated to the final quarter of the 6th century BC through C-14 analysis, these unique double-armed wooden anchor-frames of a stock-anchor type offer valuable insights into maritime technology of the time.

KA1 and KA2, measuring 460.5 cm and approximately 502 cm (reconstructed) in length respectively, are among the largest wooden anchors discovered from the Archaic period. The detailed construction, featuring mortise and tenon joints and locked with pegs, alongside the consideration of stone stocks based on stock-aperture measurements, provides a rare glimpse into ancient shipbuilding techniques.

This poster presentation seeks to extrapolate the size of the ships that utilized these substantial anchors, drawing on comparative analysis with Mediterranean shipwrecks from the same era. The paucity of Archaic period shipwrecks in the Eastern Mediterranean and the Black Sea further underscores the significance of this study.

Looking forward, underwater research scheduled for the summer of 2024 near the Karaburun Lighthouse is anticipated to enrich our understanding of these anchors and their associated ships. This endeavor not only bridges a gap in our knowledge of ancient maritime history but also sets a precedent for future archaeological discoveries in the region.

Reconstructing Ship A From Pisa San Rossore: Between Archival Research And 3D Modelling

Cristina Laurenti

PhD candidate, University of Oxford

This paper considers the methodological challenges faced in undertaking a reconstruction of Ship A, a medium-tonnage cargo vessel found in 1998 in the Pisa San Rossore archaeological site. Reconstructing this Middle Imperial ship requires re-establishing the three-dimensionality of an object that has lost its primary function and become a mass of disarticulated and degraded timbers, and, in this case, a museum piece.

The reconstruction of Ship A was, however, far from straight forward and presents multiple issues: the entire hull was not excavated because it was cut into two by the edge of the excavations; it was dug in four different campaigns by four diverse teams; the timbers were not drawn and cannot be handled or disassembled as there are displayed in the museum; and finally, the restoration process has led to the loss of parts of the timbers and, most seriously, to the partial change of their original shape.

This paper consequently aims to highlight the methodological difficulties encountered in the process of recreating Ship A's original form. It will focus on the process of research and the methods I have used starting from the archival materials from the 15-years-old excavation campaigns and arriving at the modern-day investigation involving the original wreck in the museum. The intention is to provide insights into the reconstruction of Ship A's shape and lines. The convergence of archival research and 3D modelling techniques, as applied to the evidence of the shipwreck, is presented within a framework that exemplifies a comprehensive inter and multidisciplinary approach.

Baltic Sea 3D Wrecksite Ontology

Markku Luoto
Vesa Saarinen

Maritime Archaeological Society of Finland (MAS) executes a long-term shipwreck surveying program "Baltic Sea 3D Shipwreck Ontology", which aims at surveying all historic shipwrecks in the Baltic Sea and producing a virtual 3D-model and a scientific dating of the wrecksite. This program has been active since 2018 and has already produced more than 150 surveyed sites and 3D-models/datings thereto. They can be found here: <https://sketchfab.com/mas-fi/models>.

Many written sources contain information on hundreds or maybe even thousands of ships, that never made it to their next port of call. Likewise, the Finnish territorial waters contain thousands of wrecksites - especially in the Gulf of Finland and in the Archipelago Sea. Matching wrecksites against the historical records and vice versa presents a fundamental research question in maritime archaeology.

New technologies like photogrammetry based 3d-modeling and scientific dating methods like AMS radio-carbon and dendrochronological dating have made the maritime archaeological research data much more accessible to maritime historians. MAS is the leading provider of maritime archaeological survey data, with more than 150 wrecksites surveyed and all data thereto made available on the Internet. The 3D-models of the mentioned wrecksites can be viewed here: <https://sketchfab.com/mas-fi/models>. This is the world's largest collection of 3D-models of historic shipwrecks today.

MAS publishes all its research data and results on the internet at <https://mas.mikrojebe.fi> and reports them to Finnish Heritage Agency, which is in charge of the national cultural heritage registry. Furthermore, maritime historians and other researchers in the universities around world, but namely in the northern and western Europe, have begun to utilize MAS findings within their research for the identification of the surveyed wrecksites.

MAS (<https://www.mas.fi/>) is a 100% volunteer NGO, accredited by UNESCO and Finnish Government. MAS funding is based on grants, donations and MAS volunteers private contributions.

Monoxyl Logboats from Bohemia and Moravia, Czech Republic

**Barbora Machová¹
Jason Rogers²**

¹Institute of Archaeology CAS, Prague, Czech Republic

²U.S. National Park Service, Anchorage, Alaska

The first presentation of Czech monoxyl dugout logboats was in 2006 at ISBSA-11 in Mainz, Germany. Details on eleven vessels were provided, with absolute dating for only three boats. In the nearly 20 years since ISBSA-11, further discoveries and analysis have occurred, most recently in 2019 and 2023. This poster will provide documentation on all twenty-four currently known Czech logboats, including vessel plans, descriptions, and analyses.

Fastening Methods Of Ancient Egyptian Shipbuilding From The Early Dynastic Period Until The End Of Late Period

Marwan Mady

Throughout the Pharaonic periods, Egyptian shipbuilding witnessed various fastening methods during the assemblage of its planks. The difference and variety of fastening methods in shipbuilding according to the ship's purpose: ceremonial as in Abydos, Abu Rawash, Cheops and Dahshur ships, or cargo as in Ayn Sokhna and Wadi Gawasis ships, or working as in Lisht and Heracleion 17 ships. In addition to the nature of the water bodies which the ship sails; either the fresh water, such as the Nile River and lakes or seawater, such as the Red and Mediterranean seas, both types of water need specific characteristics of fastening methods in shipbuilding. From the Early dynastic until the end of the late period, ancient Egyptian shipbuilders used soft methods such as the lashing and hard methods such as the wooden joints in addition to the metal joints to assemble the ship's planks. Besides, the methods through plank morphology. This poster aims to present all fastening methods discovered in ancient Egyptian ships to the date and elucidate the common and different methods and the types of wood. In addition, the poster presents the development of these methods and the other abandoned methods from the early period until the end of Late period and the important results of this research.

The Shape Of Wood: 3D Recording Australia's Earliest Known Excavated Working Boats

Irini Malliaros

I AM Archaeology: Habitat & Heritage

The end of the last decade marked some particularly significant discoveries relating to Australian colonial era boats. In 2018 the articulated remains of a clinker-built vessel, colloquially known as the Barangaroo Boat, were located during the construction of a Metro station by Sydney Metro (SM) in Sydney. In 2019 the fragmentary remains of three other boats, one carvel and two clinker, collectively known as the Windsor Boats, were found during bridge replacement works in Windsor by Transport for New South Wales (TfNSW). All four vessels are constructed entirely of native Australian timber and date to the end of the 18th and first half of the 19th centuries.

Following excavation and recovery, the boats entered a 3D recording and conservation program, funded by the NSW government through SM and TfNSW. It is the first time such projects have been undertaken on the east coast of Australia, the only other project of similar scope was in Western Australia on a section of Batavia, a 17th century Dutch vessel in the 1980s. There are no other colonial era vessels, constructed in Australia of native timber species, to be archaeologically excavated, digitally recorded and conserved. These projects also mark the first time the Annotated Scans Method, developed and utilised in shipwreck timber recording in Europe and employing structured light scanning technology, was used in a maritime archaeological context to record boat timbers in Australia.

This paper focuses on the method and importance of the 3D recording phase within the context of the future the boats face. The record that has been created has already provided critical information in understanding the significance, character and nature of the boats, their life and times and the colonial world in which they were built and operated.

Updates from the Far North – Melckmeyt and Eyðanstovuskipið. Two recently investigated 17th century wrecks in the North Atlantic

Philipp Grassel¹
Kevin Martin²

¹*German Maritime Museum*
²*University of Iceland*

Iceland and The Faroe Islands have long been considered peripheral and remote in terms of trading connections to Europe in the Early Modern Period. This issue combined with a traditional focus of research investigating terrestrial remains from the Viking- Age, has resulted in a large gap of knowledge in terms of our understanding of marine and ship archaeology on these islands during the Post Medieval Era.

However, two recent shipwreck investigations - Melckmeyt & Eyðanstovuskipið - highlight the relationships and prominent roles the islands played within the European maritime trade and also illustrate the potential for further developing maritime archaeological research. The two wrecks represent the remains of the oldest identified shipwrecks investigated so far in Iceland and The Faroe Islands. An overview of the results from recent investigations will be presented by Dr. Kevin Martin (University of Iceland) and Dr. Philipp Grassel (German Maritime Museum).

Melckmeyt, Iceland

In 2016 & 2018, two seasons of fieldwork took place at the wreck site of a Dutch merchant ship Melckmeyt which sank off the west coast of Iceland in 1659. The wreck was discovered in 1992 but had only been provisionally examined. The recent investigations led by the author (Dr. Kevin Martin) exposed and recorded the full extent of the wreck site as well as dendrochronological sampling of ship timbers and ICP analysis from some of the ceramics onboard. Spatial analysis and a 3D reconstruction of the ship were also carried out.

Eyðanstovuskipið, The Faroe Islands

The storage facility at the National Museum of the Faroe Islands (Tjóðsavníð) contains parts of a wooden shipwreck, found along the beach of Sandavágur in 1947. Although some had speculated it might be the remains of either a Viking-Age ship or a cog-type vessel, no formal archaeological assessment was carried out. In 2018, (71yrs later) - based on a mutual interest in the Faroe Islands - the authors in collaboration with the National Museum of the Faroe Islands devised a project to examine these remains to further determine their age and uncover their provenance.

Beyond The Painted Surface: a Reassessment Of Old Kingdom Tripod Mast

Marwa Ahmad Mohamed Abd El Aziz

Central Department of Underwater Antiquities, Alexandria, Egypt

Reliefs and scenes depicted on the walls of Ancient Egyptian temples and tombs have played an important role in providing us with vast information about their beliefs and technology; these scenes are the source of abundant information about Egyptian nautical past.

These scenes have represented the technological level evolved by the Ancient Egyptian shipwrights through the oldest presentations of planked boats known to date. They have provided a valuable documentation of a much-diversified fleet adapted to the peculiarities of the Nilotic environment, where many types of boats were conformed to their various functions. This fleet has gradually developed through centuries carrying out all their environmental particularities and has singularized its traditions of construction and navigation among the others.

The sail system has witnessed major improvements in both structural and technical aspects during Old Kingdom. Despite that the first representation witness for the mast was the pole mast but, it has proven its incompatibility with the papyrus boat bottom. Accordingly, the bipod mast was the most frequently depicted on Old Kingdom's scenes as it protect the bottom of the papyrus boats from destruction upon the pressure of the pole mast. By the end of the Old Kingdom; Egyptians replaced it with the pole mast after they were certain of its efficiency and its compatibility with the new hulls. As for the tripod mast, it was a matter of conjuncture as it was rarely illustrated; therefore this paper will discuss the presence and existences of the tripod mast by relate the secondary backstays and the bipod mast as an evolution of the tripod mast.

Following The Trail Of Roman Sails

Laure Meunier

PhD student, LUHCIE, Université de Grenoble Alpes (UGA)

Fabrics from Gallo-Roman river boats from Lyon Saint-Georges (France) and Arles-Rhône 3 (France) have already been presented at ISBSA 15 in Marseille. The aim of the current project is to highlight their specific characteristics in relation to other known bodies of Roman fabrics, and then to compare their characteristics with those of archaeological or historical sailcloth.

Archaeological fabrics belonging to the domestic and military spheres (Mainz, Germany) and to dump sites (Arles-Rhône 3, Le Petit Creusot and Marseille Place de la Bourse, France) have been examined. In order to be able to form groups quickly and efficiently, a graphic representation of each fabric with parameters including its provenance was drawn up. This enabled tissue type frequencies to be determined for each group.

Secondly, the characteristics of historical and ethnographic sailcloths were researched in order to find determining factors for these fabrics. The first is the weight per m² of these fabrics. We observed a great deal of consistency from the Viking era to the Royal Navy, although the constituent materials were different (wool then linen or hemp). We therefore decided to apply this research to archaeological fabrics in order to see the results.

Finally, most of the fabrics from the archaeological wrecks at Lyon Saint-Georges show ochre impregnated right to the heart of the threads. Research into the techniques used historically since Antiquity to protect fabrics from the demanding environment of the navy is tanning. We therefore carried out a number of investigations to determine whether fabrics from the archaeological wrecks of Lyon and possibly Arles Rhône 3 had received this treatment, which would link them more closely to their use as sails or tarpaulins to cover goods.

Mooring Practices: An Analysis Of Visual Representations Of Sailing Ships In Mediterranean Harbours (19th-20th Century)

Ioannis Nakas
Emmanuel Nantet

University of Haifa

In the age of the sail, a ship spent a significant part of her life in a harbour. Therefore, her presence impacted the layout of the port, especially the numerous quays that facilitated loading and unloading, or the areas that allowed for her beaching, whereas harbour configuration impacted on the types of ships that could use it and on the practices employed by them within it. These practices however, often leave few traces in the field and thus for their study we often need to turn to other sources of evidence such as visual representations. Such a rich but virtually unexplored form of evidence is photography. This artform developed swiftly in the 2nd half of the 19th century and naturally included contemporary maritime landscapes, and the documentation of ships within harbours, their typology, and the various methods employed to be accommodated in such environments.

This paper deals with the study of mooring practices documented in photographic archives of the Mediterranean during the end of the age of sail between 1850 and 1950. Its focus is on different sources of photographic data including albums, postcards, and personal photographs (more than 500 have already been studied), as these are preserved and catalogued in several collections in Greece, Italy, and the Levantine coast. It proposes a new insight into the study of maritime iconography by studying photography as a source of information on the practicalities of the use of harbours by ships, drawing statistical and empirical data on the different methods employed by them. It also emphasizes the implications these had not only on the use of harbours itself, but also in relationship with contemporary history, representation, and society, especially considering the passage from sail to steam, the gradual decline of vernacular shipbuilding, as well as the new dynamics of trade and maritime interaction during the 20th century.

The investigation is funded by the SHIPs ERC project 101088962, directed by Emmanuel Nantet (University of Haifa).

3D Modelling in Naval Archaeology: Reconstructing the Sewn Boat Poreč 1 (Beginning of the 1st Century BC, Istria, Croatia)

Kato Nees

Aix-Marseille University, CNRS, Centre Camille Jullian, Aix-en-Provence, France

In the past two decades, research in naval archaeology has experienced a profound transformation due to the widespread integration of 3D modelling tools. These advanced technologies now play a pivotal role in the study of a wreck: as a method to permanently capture the existing remains, to create hypothetical models of the ship's original form, and ultimately as a way of presenting the final reconstruction of the vessel.

In early 2020 the remains of a sewn boat were discovered near the Porta da Mar (Sea Gate) on the southern waterfront of the historical centre of the city of Poreč (Istria, Croatia). The Museum of Poreč territory was tasked with archaeological supervision and excavation. The Poreč 1 wreck, dating to the beginning of the 1st century BC, was documented in situ and recovered, and then re-examined in 2021 prior to conservation treatment. Poreč 1 is part of a noteworthy collection of sewn boat wrecks found in the north-eastern Adriatic and adds new information to the study of defining local shipbuilding traditions. The results of the study of Poreč 1 have been published recently in the International Journal of Nautical archaeology (<https://doi.org/10.1080/10572414.2023.2286998>).

This poster will elaborate on the digital reconstruction of the shape, structure and technical system (propulsion and steering) of Poreč 1. It will also discuss the methodology of digital ship reconstructions developed by the Centre Camille Jullian and outline the systematic process used to derive hypotheses about the original vessel from archaeological remains.

Restoring a 20th century wooden boat at risk: The case of Lambousa project

Constantinos Nicolaou¹, Dr. Marinos Ioannides, Panayiotis N. Panayiotou, Dr. Petros Siegkas, Dr. Athos Agapiou, Stelios Fotiou, Giorgos Neofytou, Elena Karittevli, Neofytos Kokkinos, Drew Baker²

¹*Independent Researcher*

²*Cyprus University of Technology (CUT), Faculty of Engineering and Technology*

Lambousa is a 25-meter long wooden boat the type of liberty, built in 1955 in Greece. It was registered in Cyprus in 1965 and was used as a fishing trawler until 2004, when it was withdrawn according to EU Fishing Policy. The boat was preserved in the sea, as a monument of the local cultural heritage by the Municipality of Limassol. In 2020, the boat was dry docked and a European fund of more than one million euros, was acquired for its full restoration. The project began in January 2023, undertaken by a local marine maintenance company. More than 20 different craftsmen were engaged in a combination of simultaneous works and completed the restoration in one year. The project was under the supervision of a municipal engineers' team and Constantinos Nicolaou as archaeologist-consultant, in order to record the restoration procedures and follow traditional shipbuilding technics during the restoration. This, constitutes the largest and the most expensive project of its type in Cyprus and most probably in the Eastern Mediterranean.

The UNESCO Chair on Digital Cultural Heritage at CUT team, undertook a detail 2D and 3D survey of the boat including its entire intangible/memory. For the digital surveying a high- resolution photogrammetry and LIDAR was undertaken, which concluded with an accurate 3D model.

An online platform for the holistic documentation of the boat including its entire biography/memory has been developed to serve further research and the multidisciplinary community of users.

This paper discusses the boat's characteristics, its restoration procedures and the positive impact for the preservation of the local Maritime Cultural Heritage and the study of the wooden ships of the Eastern Mediterranean. It is important to highlight that most of the wooden parts of the boat were replaced, emerging an interesting discussion, about a modern case of the *Theseus Ship Theory*.

Historical reconstruction of the Rodolico Shipyard of Aci Trezza through the sources

Grazia Nicotra

In the seaside village of Aci Trezza, in Sicily, the Rodolico family's shipyard has been building boats since at least 1808, as evidenced by an invoice. They use the "mezzo garbo" construction technique passed down orally. In 1960 the golden age for the shipyard began, Salvatore Martino, assisted by his sons and over thirty workers. He began building large wooden boats by applying a modification of his own invention to insert a third engine on the hull, applying a modification in the hull of his invention to insert a third engine on board. Orders come from all over Italy.

The Turi Rodolico represents the old tradition, with his own naivety he manages to relaunch the economy of the village. In 2018 he was recognized as a Living Human Treasure. The shipyard is located in the ancient Malavoglia railway yard, mentioned in Verga's works. Among the construction techniques of the shipyard, the use of the "Jupiter's dart" (an ancient Phoenician carpentry technique) also stands out. The importance of his work, and of his ancestors, was recognized by the inclusion in 2014 of their "trezzote wooden boats" in the REIS. The last heirs of this technique are the members of the Rodolico family. The decorations present in the wooden boats, characteristic of the traditional Sicilian naval carpentry. The motivations that push to decorate the hulls are to be found in superstitions, which lead to elevate the boat to the status of a living being. An example is the Providence of "I Malavoglia" in which the Sardara, in addition to being conceived as a member of the family, also becomes a paradigm of their destinies.

The study examines archaeological finds, literary works, paintings, engravings, amateur videos, films, interviews, archival documents: to trace a continuity over time in support of the oral transmission of the construction technique of the wooden lateen sailboats typical of Trezza. It is a focus on the innovation by Maestro Rodolico, of the modification in the classic construction technique of large fishing boats.

Experimenting with stone, wood and fire: Insights from a logboat construction with a replicated Palaeolithic toolkit

Christina Papoulia, Markella Petrogiannaki, Joanne C. Tactikos

University of Crete, Department of History & Archaeology

The logboat is the oldest aquatic vessel preserved in the archaeological record and is associated with a Mesolithic maritime lifestyle. Any evidence for crossing the water before the Mesolithic remains indirect. Yet, even though organic remains are rarely preserved in the archaeological record, evidence for woodworking is testified since the Lower Palaeolithic. Considering the fragile nature of organic artefacts how can we address questions pertaining the issue of early prehistoric boatbuilding?

A two-year research project funded by the H.F.R.I. (Project no. 7186) *Routes, tools and sea- vessels: A multiproxy reconstruction of the reciprocally transformative relationship between Stone Age communities and the sea – SeaROOTS 2022-2024* attempts to transform a pine log into a logboat using materials available and techniques known to Palaeolithic foragers of the southern Balkan peninsula. Within this framework we collected chert nodules from West Greece and produced an experimental lithic assemblage guided by the characteristics of the archaeological LCTs, bifaces and flake tools recovered in the area under study. The recording of the qualitative and quantitative attributes prior to use and the production of casts of their working edged before and after each use-cycle will allow for a comprehensive analysis of the replicated tools' biographies. Additional material employed were a red deer antler, pine resin and charcoal. Two different manufacturing techniques were tested, i.e., with/without the use of controlled fire.

An analytic study of the tools' use-wear traces funded by the Honor Frost Foundation (Project title: *Early prehistoric boatbuilding under the microscope: object biographies of an experimental logboat construction*) is underway. Upon completion an open-access database will be available online. This will act as a reference collection and help identify analogous traces in archaeological assemblages.

The project follows the theoretical questions of Prehistoric Maritime Archaeology and the methodological protocols of Experimental Nautical Archaeology. Here we discuss the results of the first seasons.

A Distinct Identity of a 1st Millenium CE Lashed-lug Boats in Malay Peninsula

Napat Piromrak

*Assistant Archaeologist, Underwater Archaeology Division, Fine Arts Department,
Thailand*

Lashed-lug boat refers to a traditional boat-building technique spanning all over Southeast Asia's mainland and insular. This technique consists of the preparation of boat planks to create a protruding lug, which will be used as a lashing point for other components. Previous studies and research have recorded more than 20 sites of this type found across the region. In Thailand, the continuous archaeological expedition since the 1990s has located six archaeological sites attributed to lashed-lug boats, three of the sites revealed the same characteristics as other lashed-lug boats found throughout the regions, however, the last three (Khlong Thom Boat, Khok Yang Boat, and Pak-Khlong Kluai Boat) show a unique and distinctive plank's design, which are comparable to the Pontian Boat, Pahang, Peninsular Malaysia. The purpose of this study is to examine the boat-building technique of each lashed-lug vessel, particularly on their plank design, pattern, and method of plank-fastening within this unique group. Furthermore, a precise record of each site location can be used to study its relation to the nearby environment as well as related archaeological sites. An absolute dating of wooden planks can also be beneficial for further interpretation of parallel aspects. As a result, preliminary analysis of each plank suggested that they were built using the same manner, each plank was carved leaving an off-center rectangular lug with trapezoid holes, this is the main feature that differentiates them from other lashed-lug boats. In addition, the similarities were not shown only from a boat-building perspective but also from site locations which were located particularly in the Malay Peninsula, dating from as early as 2,300 BP (Pak-Khlong Kluai site), 1,800 BP (Khlong Thom), and 5th century CE (Pontian). The conclusion can also be drawn that lashed-lug boatbuilding can vary in an individual place, in this case, the Malay Peninsula's traditional lashed-lug building has shown its distinct, as well as representing the earliest known archaeological vessels of Southeast Asia.

The title saints of the churches with ship graffiti on the East Adriatic - To whom the seamen turned for protection?

Ita Praničević Borovac

University of Split, Academy of Arts, Department of Visual Culture and Fine Arts

Because of the dangers that threaten from the sea, sailors have developed special relationships with divine protectors to whom they turned and expected help in times of need since ancient times. Communication addressed to selected gods or Christian saints was achieved through rituals, prayers and offerings and was manifested in the construction of sacred buildings or places of worship in prominent places along the navigation routes. Various works of art, especially ship graffiti, played an important role as mediators in this process.

As an extra-liturgical, spontaneous act of expressing a request or thanks, often interpreted as an *ex voto* realized by a drawing, graffiti are a symbolic proof of a connection with a saint, so the finding of ship graffiti on the wall of a church dedicated to a certain saint can be interpreted as a confirmation or at least indication of the maritime aspect of the protective action of that saint.

The paper will give an overview of Christian saints, patrons of churches and chapels in Istria and Dalmatia, on which graffiti of ships created in the Middle and Early Modern Ages were found.

Reconstruction of a 28-gun Algerian Chebec - 1735

Rahati Amine

Département de Génie Maritime. U.S.T-MB-Oran

In this article, a reconstruction of an original Algerian chebec based on a plan is presented. This plan was discovered in a book published in 1768 by Fredrik Henrik Af Chapman (Chapman, 1768). This book contains high-quality plans. Excellent drawings. Total historical reliability. Original plans, reproducing only the hull. Equipment, rigging and fittings must be completed by model builders. For this reason, their use is restricted to experienced model builders and connoisseurs. This chebec is estimated to have been built in 1735. This chebec has a total keel length of 38 m, and can carry between 28 and 30 guns of various calibers. It can also carry a crew of between 300 and 400. To download this plan, a direct link is used on the site: plan n° LVIII.

<https://digitaltmuseum.se/011024789752/ritning>.

Detailed studies of the reconstruction of the Algerian chebec are presented in two chapters. The first presents a description of the chebec and its origins. A brief historical-technical overview of the appearance and evolution of chebecs during the Ottoman presence in Algeria over three centuries. The second chapter is devoted to a description of the chebec's architectural appearance, rich in ancient marine vocabulary. A purely technical reconstruction of the chebec in question, based on several previous works. Several references have been used for this purpose, and the reconstruction work concludes with a detailed 3D drawing of all the parts of the hull structure. This reconstruction is divided into two distinct parts, the hull first, then the rigging in the second stage. Photos also show the construction of a 1/30-scale dockyard model of this chebec.

“Catharina”, “Leopold” and “Helena” shipwrecks – a local early 20th century coastal shipping of the Gulf of Gdańsk investigated

Janusz Różycki, Krzysztof Kurzyk, Paweł Litwinienko, Anna Rembisz-Lubiejewska, Tomasz Bednarz

National Maritime Museum in Gdańsk

At the turn of the 20th century a small fleet was used for transportation of goods on the waters of the inner Gulf of Gdańsk, originating from the small coastal town Rewa. These vessels, called “Schuten from Rewa”, owned by the local Kashubian entrepreneurs were small wooden craft rigged as schooners, yachts, barges and ketches. Some of these ships were originally built in Germany in the late 19th century and were later bought by the owners from Rewa and brought there for intense refurbishment. They transported various cargo such as grain, sand, stones, bricks, colonial goods or tools to various small Gulf of Gdańsk ports – Hel and Jastarnia on the Hel peninsula or Rewa, Gdańsk and Gdynia on the mainland. Ten of them survived long enough to witness the Polish regain of independence and return to the Baltic coast in 1920.

The National Maritime Museum in Gdańsk had the opportunity to study the remains of three of Rewa vessels. One of them is “Helena” sunken in 1945 by the Soviets while lying at anchor near Rewa and explored by divers cooperating with the Museum in the late 1960s. The other two are more recent research. “Leopold” was found and identified in 2020 near Jastarnia, where it was shipwrecked in 1926 while carrying stones for building the harbour. “Catharina”, lying close to “Helena” and also explored in 1960s was recently documented in 2023. The documentation and artefacts from the wrecks presented in these posters are planned to form a future museum exhibition on the local Kashubian shipping, which is still remembered and cared for by the descendants of the hard working sailors. Furthermore, the wrecks are planned to be opened for scuba diving in a form of an underwater tourist route.

The ancient shipwrecks of Tarifa Island (Spain)

Soledad Solana Rubio

University of Granada

In this communication we will present the most relevant results from the recent research on the UCH in Tarifa Island, southern Spain. Specifically, we will focus on the data obtained after developing and applying the non-intrusive intrusive methodology in several shipwrecks. Marine geophysics and virtual archaeology techniques have enabled to document them in situ, obtaining answers to questions about their chronology, origin, type of vessel, sinking and post- depositional process.

Our study area is a crossroads of navigation routes in the Strait of Gibraltar, widely used throughout history. Furthermore, the island of Tarifa offers two anchorages, one to the east and the other to the west, which provide shelter from westerly and easterly winds, respectively. It is also a watering point where, according to several sources, there was a coastal sanctuary associated with seafaring. The intense navigation and the nautical conditions of the area have led to shipwrecks of different chronologies lying under the waters near Tarifa, but our current research focuses on Punic, Roman and Late Roman remains.

To date, eight shipwrecks of ancient chronology are known on the island of Tarifa, in addition to the diachronic artefacts from the anchorages. According to the sources, three of these shipwrecks are Punic and five are Roman or Late Roman, whereas the cargo consists of amphorae in all but one case, which also contains millstones. Until the beginning of our research, the knowledge of these sites was superficial and partly unpublished. It has therefore become necessary to survey these sites to understand more precisely their characteristics.

Since this is ongoing research, the results presented will be preliminary, but also updated, recent and unpublished. The information obtained after the application of this methodology, complemented with other sources, as well as with the analysis of the Nautical Landscape, enables the study of each shipwreck from a multiple perspective.

Ship's Construction From The Southern Reef Shipwreck Site Near Silba Island

Dino Taras

Department of underwater archaeology, Archaeological museum in Zadar, Croatia

Shipwreck on Southern reef near the island of Silba is a Roman shipwreck site that has been known since the late 20th century. Although its surface has been mostly looted, ship's construction was buried and untouched. Most of the archaeological finds were excavated from the site during the early 2000s, from parts of the cargo (amphorae) to parts of the ship's inventory (pottery) and parts of the ship's construction (fastenings, possible bilge pump parts). Most of the cargo comprises Dressel 2-4 type amphorae, while other types are represented with a smaller number of specimens. New research campaigns starting from 2021 are focused on the study of ship's construction. Two short campaigns revealed how much of the ship's construction was preserved under the sediment, and 14C analysis of wood samples suggested a date of the second half of the 1st century to the beginning of the 2nd century - a date that was also confirmed by the 2022 discovery of a coin of Emperor Claudius. Due to the size of the ship's remains and modest financial support, the research was divided into several campaigns. Research in 2023 began with the detailed cleaning of the first quarter of the ship's structure from one end, looking for the full width of the structure, and further collection of samples. Newly discovered elements of the ship's construction, such as the element resembling a bilge keel confirm that this is a ship of massive construction. The 2024 campaign is focused on further cleaning and documentation of the parts of the construction, as well as on the excavation of the ship's structure to its full width. The final goal of the research of the shipwreck on the South Reef near Silba is reconstruction of its dimensions, depending on the amount of preserved elements of the ship's structure.

Ships and Boats Transporting Roof Tiles in the Roman Period

Caterina Tomizza¹
Carlo Beltrame²

¹*PhD Student, Department of Humanities, Ca' Foscari University*

²*Associate Professor, Department of Humanities, Ca' Foscari University*

The ceramic roofing materials were one of the most significant market segments in the Roman period, nonetheless, many questions still remain about the mechanisms that regulated the maritime distribution of these materials. Here is proposed an analysis of the shipwrecks that includes an outlining of the stowage techniques and an attempt of reconstruction of the types of hulls involved in this transport, along with their tonnage. To reconstruct the stowing techniques for the ceramic roofing materials there has been carried out an analysis on the sites' documentation to find out if there were some patterns in the disposition of the roof tiles and bent tiles on board. At the same time, for the study of the hulls and their tonnage, there has been made – where possible – a volume estimation to determine the load capacity. In the Gallic area we can notice the employment of medium-small vessels, suitable for coastal navigation of cabotage, with an average length of about 10-12 meters and characterized by a small tonnage. The same peculiarity belongs to the small river boats used for fluvial circulation, flat-bottomed and assembled according to a regional sewing tradition. Finally, there is a great lack of data regarding the vessels employed in the handling of large cargoes and used probably for direct, offshore circulation. The stowing patterns for these commodities could be resumed in a general scheme, whereby the roof tiles are arranged in two or three parallel rows positioned in the middle of the hull, with the bent tiles arranged in side stacks and inserted vertically in the gaps to stabilize the cargo. The systematic study of the 41 shipwrecks of ceramic roofing materials so far reported led to the hypothesis that their diffusion took place on various scales and through different sailing modes.

The Discovery of the Wreck of Guangbing, one of the First Modernized Chinese Warships in the late 19th Century

Cheng-hwa Tsang
Han-chang Huang

Research Center for Underwater Archaeology and Heritage, National Tsing Hua University, Taiwan

Numerous ancient cultural artifacts have been submerged in the waters surrounding Taiwan, particularly in the Penghu archipelago. They possess significant worth as submerged cultural heritage. Consequently, the Ministry of Culture of the Republic of China (Taiwan) has made significant endeavors in recent years to enhance the advancement of underwater archaeology. The primary objective is to bolster the safeguarding and research of underwater cultural heritage, resulting in the discovery of numerous ancient shipwrecks. Notably, the Guangbing Warship stands out among them. This ship served as a torpedo cruiser under the Guangdong Navy Fleet during the Qing era. The battleship was constructed in 1892 at the Mawei shipyard in Foochow (Fuzhou), China, making it one of the earliest Chinese warships built in a western-style and modernized manner by the Fujian Shipping Bureau. The production cost of this battleship amounted to around 200,000 Chinese silver taels. The vessel is 71.63 meters in length and 8.23 meters in width. Its draft water depth is 3.96 meters, and its displacement is 1000 tons. The Guangbing battleship was equipped with dual steam engines and a boiler, boasting a formidable power output of 280 horsepower. It was designed to reach a maximum speed of 16.5 knots (31 km/h; 19 mph). This marks the inaugural construction of the protection cruisers by the Fujian Shipping Bureau. The vessel possessed three masts, with the fore and aft masts constructed from steel and equipped with observation platforms, while the central mast was composed of wood. All three masts were capable of supporting sails.

The Guangbing was once a vessel of the Qing's Guangdong Fleet and was seized by the Japanese navy during the first Sino-Japanese war (1894-1895) before its ill-fated journey to the Penghu archipelago in Taiwan.

The wreckage of the Guangbing was found on the seafloor of the Taiwan Strait in 2010. Due to her immense historical importance in the first Sino-Japanese war and the Chinese navy, the government has made substantial efforts to preserve, manage, investigate, and promote this valuable wreck of maritime heritage battleship. This paper aims to present a significant underwater archaeological finding and analyze its importance in enhancing our knowledge of the advanced techniques used in ship production during the late 19th century in China.

Yenikapı 34: Construction Features and Minimum Reconstruction

Evren Türkmenoğlu¹
Işıl Özsait- Kocabaş²

¹*Asist. Prof. Istanbul University, Division of Conservation of Marine Archaeological Objects*

²*Asist. Prof. Istanbul University, Division of Conservation of Marine Archaeological Objects*

Yenikapı 34 is one of the thirty-seven ship remains uncovered at Theodosian Harbour in Istanbul between 2004 and 2013. Representing perhaps the earliest ship in the assemblage, it is preliminarily dated to the 5th century AD. One side of the ship's bottom, possibly that of the starboard side, was remarkably well-preserved, extending nearly up to the waterline.

The surviving hull measures approximately 7.6 meters in length and 2.9 meters in width, including the keel timbers, at least 16 strakes of bottom planking, 27 frames, and several fragments of ceiling planking. The framing pattern consists of floor timbers alternating with paired half-frames, and futtocks. At specific frame stations, floor timbers are secured to the keel with metal nails, while planks are attached to frames with only treenails. The utilization of planking edge fasteners at YK 34 is distinctive among the Yenikapı vessels. Pegged mortise and tenon joinery is employed only for joining the bottom strakes. Interestingly the mortise and tenon joinery between the planks at the turn of the bilge are left unpegged and no edge fasteners have been found above the first wale to date.

Yenikapı 34 stands as a well-preserved vessel, offering the opportunity for a reconstruction study. Additionally, it provides important insights into the historical use of planking edge fasteners in the form of mortise and tenon joinery, particularly during a period when shipwrights were gradually abandoning this practice.

A Sea Peoples Ship Image from Mitrou, Central Greece, and its Historical Implications

Aleydis Van de Moortel¹
Salvatore Vitale²

¹*Department of Classics, University of Tennessee*

²*Dipartimento di Civiltà e Forme del Sapere, University of Pisa*

Sea Peoples were groups of marauders who attacked the Levantine and Egyptian coasts from the 14th through early 12th centuries BCE, likely contributing to the downfall of Bronze Age palatial civilizations. Images of Sea Peoples and their ships are known from Egypt, the Levant, and the Aegean, helping to trace the origins of at least some of the attackers to the Aegean. Most of those images have been dated to ca. 1190-1100 BCE, or the Late Helladic IIIC Early and Middle phases in the Aegean.

At Mitrou, a coastal settlement in Central Greece, a fragment of a pictorial jug partially preserves two ship depictions displaying close similarities with Sea Peoples ships, including a duckhead figurehead and a mast with a yard and crow's nest. The jug's date in the Late Helladic IIIB2 Late phase, ca. 1210-1190 BCE, makes this one of the earliest such images in the Aegean. Its find context suggests that it may have functioned within an official, possibly even state-sponsored setting, unlike most other Aegean Sea People ship images, which can be situated in the more informal milieu of small, fragmented 12th-century BCE societies ruled by warrior leaders.

Mitrou's pictorial jug provides the first incontrovertible evidence for the involvement of Sea Peoples in Central Greece before the fall of the palaces. Van de Moortel (2020) has argued that ships with duckhead figureheads go back to the Early and Middle Bronze Ages in the Aegean, and that this ship iconography was suppressed by the Minoan and Mycenaean states of the Late Bronze Age. The new find from Mitrou suggests that, in contrast, this iconography may have been part of the official imagery of the palace of Thebes, which is likely to have ruled Mitrou around 1200 BCE. While other interpretations are considered, this opens up the possibility that at least one of the Sea Peoples groups, coming from Central Greece, was state-sponsored.

Ultimate strength analysis of wooden joint on ancient ship structures

Davor Bolf ¹
Albert Zamariņ¹
Davor Bolf ²
Albert Zamariņ³

¹*Faculty of ENgineering, University of Rijeka*

²*Faculty of Mechanical Engineering and Naval Architecture, University of Zagred*

³*Department of Archaeology, University of Zadar*

The poster presents an analysis of the strength of wooden joints of the structures of ancient ships. The aim of the analysis is to contribute to the discussion to what extent did joining technology and types of joints contribute to the strength of the hull. In this case, the keel-post joints are examined. Two types of joints are considered; scarf joint from the ship Jules Verne 9 (6 th c. BC), and scarfed joint from the ship Toulon 2 (1 st c. AD).

The capacity, i.e., the ultimate strength of the joints is compared to the strength of the structure as if there were no joints. The analysis consists of simulating the independent joint loading of each of the three numerical models in compression, tension and bending, until collapse. The results are presented in the form of a Load-end-shortening curves and the stress distribution in the structural details, i.e., elements of each joint. The calculation was performed as nonlinear FE analysis on solid elements, in the LSDYNA program package, using an implicit solver.

Since wood is an anisotropic material, a large number of parameters are needed to describe the behaviour as realistically as possible, as well as additional parameters within the material model of the software itself. Therefore, in order to determine material model parameters for various types of wood, a three-point-bending experiments were made, and results were compared with numerical simulation of the same experiments.

An Outline For an Atlas Of The Traditional Watercrafts In Italy

Marco Bonino

A distribution chart of different boatbuilding traditions still existing around 1850-2000 in Italy is proposed. Such traditions developed more or less dynamically, with an important transition starting from Napoleon's time, but older methods had been surviving in some areas, even since Antiquity.. Modern ship design was accepted after mid 19th century for major wooden crafts, without affecting basically vernacular boatbuilding.

The regions of traditional boatbuilding regions in Italy, are recognized mainly on the basis of the building techniques and of their general cultures and spoken dialects, as summarized by the map and by a selection of representative craft types.

Interactions and differences vs traditions of continental Europe (Olttralpe, including the Balkans), of Eastern and Western Mediterranean (Levante, Ponente) are also summarized.

The fourth panel reports schemes of eight of the main of our traditional building and moulding methods.



DOCUMENTARY VIDEOS

The Contemporary Lacustrine Traditional Boats of Manzala and Burullus.

Yadd Baḥari

Manzala and Burullus lakes are significant among the series of coastal lakes of the Nile Delta, as the tradition of life of their inhabitants is still tied to boats and they perform most of their daily duties depending on them. These lakes include a broad range of wooden working sailboats which come in many different types, shapes, sizes, and uses. Additionally, the operators of these boats gave a bewildering range of names to their traditional boats, that varied from one lake to another. These boats continue to rely primarily on wind and human power for propulsion and steering.

Throughout the 20th century, a few incomplete ethnographic and documentation studies have been conducted on specific boats of Manzala and Burullus Lakes, seeking to investigate their types, technical features, and origins. Further, some of these studies indicated that all the boats of Manzala and Burullus lakes are the successors of the traditions of building Nile boats of different eras, without providing a comprehensive vision of the reasons for this rooting. In the framework of their lacustrine communities, the movie will address the reasons for the diversity of the contemporary boats in Manzala and Burullus lakes, as well as the types, features, and equipment of each. Videos of 3D models of some of the prevalent sailing boats in these lakes will also be shown in the film. The purpose of this film is to deepen the knowledge of the public about the value of the coastal lakes' material cultural legacy.

This short documentary is part of the preliminary results of the ethnographic study that is being conducted within the ongoing documental project “Yadd_Baḥari” to record the tangible and intangible maritime cultural heritage of the traditional boats of Egyptian coastal lakes, funded by Honor Frost Foundation.

The Voyages of Gagliana Grossa. Exciting Story of a Late Renaissance Venetian Merchant Ship

Irena Radić Rossi¹

¹Department of Archaeology, University of Zadar

Setting forth from the islet of Gnalić, the shipwreck site of the Venetian merchantman sunk in 1583, the story encompasses all of Renaissance Europe, the eastern Mediterranean and even Peru; touches upon the great events that marked the Renaissance era and brings closer the main protagonists on the historical scene as well as figures from everyday life who never appear in history textbooks. This documentary is the outcome of the COST Action 18140 "People in Motion: Entangled Histories of Displacement across the Mediterranean" Project – PIMo.

The Slumber of Soomaa Soomaa Uni

Aivar Ruukel

¹*Department of Classics, University of Tennessee*

²*Dipartimento di Civiltà e Forme del Sapere, University of Pisa*

To save and support the unique ancient Finno-Ugric tradition! This is a once-in-a-lifetime chance. Young restorer Darja and her teacher Aivar Ruukel are trying to build “haabjas” – the dugout boat, which is also an ancient symbol of the Soomaa National Park. Aivar Ruukel learned his trade from the last masters and wants to preserve this skill for the local community and future generations. Hard work awaits the master and his assistant. The boat must be made for the “fifth season” in Soomaa, which is a unique natural phenomenon.

