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BETWEEN CONTINENTS
Proceedings of the Twelfth Symposium on Boat and Ship Archaeology
Istanbul 2009
Edited by Nergis Günsenin
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ISBSA 12

Sponsored and Hosted by the
Istanbul Research Institute of the Suna and İnan Kıraç Foundation

Under the auspices of the Underwater Technology Program at Istanbul University’s
Vocational School of Technical Sciences in partnership with
the Faculty of Letters, Department of Restoration and Conservation of Artefacts

OFFPRINT
To the memory of

Ole Crumlin-Pedersen (1935-2011)
and
Claude Duthuit (1931-2011)

Crumlin-Pedersen founder of the Viking Ship Museum at Roskilde heralded a whole new area of archaeological fieldwork and remained a seminal and inspirational figure in nautical archaeology. Duthuit not only acted as director of the Institute of Nautical Archaeology (INA), but made lifelong contributions to the field. It is thanks to his dedication and his passion that several excavation efforts, including those at Cape Gelidonya, have come to life.
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List of Contributors

Valérie Andreieu-Ponel  
Aix-Marseille Université-CNRS, Europôle Méditerranéen  
de l’Arbois, BP 80, 13 545 Aix-en-Provence Cedex 04, France  
valerie.andrieu@univ-cezanne.fr

Staffan von Arbin  
Bohuslänsmuseum, Box 403, SE-451 19 Uddevalla, Sweden  
staffan.arbin@vgregion.se

Yusuf A. Aydın  
Istanbul University, Faculty of Letters, Department of History,  
Ordu Cd., Laleli 34459, Istanbul, Turkey  
yaa@istanbul.edu.tr

Jens Auer  
University of Southern Denmark, Maritime Archaeology  
Programme, Niels Bohrs Vej 9, 6700 Esbjerg, Denmark  
auer@hist.sdu.dk

Lucien Basch  
Avenue Armand Huysmans 206, bte 9, 1050 Bruxelles,  
Belgium  
sophie.basch@skynet.be

George F. Bass  
Distinguished Professor Emeritus at Texas A&M University,  
and Founder and Chairman Emeritus of the Institute of  
Nautical Archaeology, USA  
gfbass@tamu.edu

Kroum N. Batchvarov  
University of Connecticut, Academic Building 116 C, 1084  
Shennecossett Road  
Groton, Connecticut 06340, USA  
kroum.batchvarov@uconn.edu

Tomasz Bednarz  
Polish Maritime Museum, Ołowianka 9-13, 80751, Gdańsk,  
Poland  
t.bednarz@cmm.pl

Carlo Beltrame  
Dipartimento di Studi Umanistici, Università Ca’ Foscari Venezia,  
Dorsoduro 3484/D 30123, Venezia, Italy  
beltrame@unive.it

Vibeke Bischoff  
The Viking Ship Museum, Vindeboder 12, 4000 Roskilde,  
Denmark  
vb@vikingeskibsmuseet.dk

Jeng-Horng Chen  
Department of Systems and Naval Mechatronic Engineering,  
National Cheng Kung University, 1 University Rd., Tainan 70101,  
Taiwan  
chenjh@mail.ncku.edu.tw

Furio Ciciliot  
via Guidobono 38/3, 17100 Savona, Italy  
buranco@libero.it

Deborah Civikel  
Department of Maritime Civilizations and Leon Recanati Institute  
for Maritime Studies, University of Haifa, Haifa 31905, Israel  
dcivikel@research.haifa.ac.il

Patrick Couser  
Sunnypowers Limited, 1 rue Saint Blaise, Bagneres de Bigorre,  
65200, France  
patcouser@yahoo.co.uk

Hüseyin Çoban  
Bartin 74300, Amasra, Turkey  
info@cobandenizcilik.com

Kostas A. Damianidis  
Deligiorgi 51-53, 10437Athens, Greece  
kostasdamia@gmail.com

Elif Denel  
American Research Institute in Turkey, Şehit Ersan cad. 24/9,  
Çankaya, Ankara 06680, Turkey  
ellidenel@gmail.com

Frederick H. van Doorninck, Jr.  
Emeritus Professor of Nautical Archaeology,  
Texas A&M University and Institute of Nautical Archaeology  
6200 Pelham Court, Bryan, 77802-6059, Texas, USA  
fredvand@suddenlink.net
List of Contributors

Wendy van Duivenvoorde
Department of Maritime Archaeology, Shipwreck Galleries, Western Australian Museum, 47 Cliff Street, Fremantle, WA 6160, Australia
wendy.vanduivenvoorde@museum.wa.gov.au

Anton Engler
The Viking Ship Museum, Vindeboder 12, 4000 Roskilde, Denmark
ae@vikingshipmuseum.dk

Niklas Eriksson
Södertörn University, SE-141 89 Huddinge, Sweden
niklas.eriksson@sh.se

Sandra Greck
Arkaeos association, 1 boulevard Longchamp, 13001 Marseille, France
sandragreck@arkaeos.fr

Frédéric Guibal
Aix-Marseille Université-CNRS, Europôle Méditerranéen de l’Ars, BP 80, 13 545 Aix-en-Provence Cedex 4, France
frederic.guibal@univ-cezanne.fr

Jostein Gundersen
The Norwegian Maritime Museum, Bygdøynesveien 37, 0286 Oslo, Norway
jostein.gundersen@marmuseum.no

Marc Guyon
Inrap, 12, rue Louis Maggiorini, 69500 Bron, France
marc.guyon@inrap.fr

Nercis Günsemin
Istanbul University, Vocational School of Technical Sciences, Underwater Technology Program, Avclar 34320, Istanbul, Turkey
ngunsemin@superonline.com

Patrik Höglund
Swedish National Maritime Museums, BOX 27 131, 10252, Stockholm, Sweden
patrik.hoglund@maritima.se

Eyal Israeli
Leon Recanati Institute for Maritime Studies, University of Haifa, Haifa 31905, Israel
eyal@zahav.net.il

Toby Jones
Newport Medieval Ship Project, Newport Museum and Heritage Service, Newport Ship Centre, Unit 22, Maesglas Industrial Estate, Newport, Wales, NP20 2NN, United Kingdom
toby.jones@newport.gov.uk

Yaacov Kahanov
Leon Recanati Institute for Maritime Studies, University of Haifa, Haifa 31905, Israel
yak@research.haifa.ac.il

Viktor D. Kobets
Kiev State University of Taras Shevchenko, Ukraina
kobets@univ.kiev.ua

Ufuk Kocabas
Istanbul University, Faculty of Letters, Department of Conservation of Marine Archaeological Objects, Ordu Cad., Laleli 34459, Istanbul, Turkey
ufukkocabas@gmail.com

İşıl Özsaït Kocabas
Istanbul University, Faculty of Letters, Department of Conservation of Marine Archaeological Objects, Ordu Cad., Laleli 34459, Istanbul, Turkey
isilkocabas@yahoo.com.tr

John D. Littlefield
Nautical Archaeology Program, Department of Anthropology, Texas A&M University, College Station, Texas 77843-4352, USA
jlittlefield@tamu.edu

Vanessa Loureiro
Rua das Janelas Verdes, nº 4-4º, 1200-691, Lisbon, Portugal
van.loureiro@gmail.com

Mohamed M. Abd-al-Maguid
Supreme Council of Antiquities of Egypt, National Maritime Museum, 270 Tariq El-Gueish, Alexandria, Egypt
momaguid@yahoo.com

Sandra Marlier
Conseil Général des Bouches-du-Rhône - Direction de la Culture Musée Départemental Arles Antique, Presqu’île du Cirque Romain
BP 205 - 13635 Arles Cedex, France
sabrina.marlier@cg13.fr

Igor Mihajlović
Department for Underwater Archaeology, Croatian Conservation Institute, Cvijete Zuzorć 43
HR – 10000 Zagreb, Croatia
imihajlovic@h-r-z.hr

Igor Miholjek
Department for Underwater Archaeology, Croatian Conservation Institute, Cvijete Zuzorć 43
HR – 10000 Zagreb, Croatia
imiholjek@h-r-z.hr

Aleydis van de Moortel
Department of Classics, 1101 McClung Tower, University of Tennessee, Knoxville, TN 37996, USA
avdm@utk.edu

Yannis D. Nakas
Isaia Salonon 13, 11475 Gyzi, Athens, Greece
jnak77@yahoo.com

Nigel Nayling
School of Archaeology, History and Anthropology, University of Wales, Trinity Saint David, Lampeter, Ceredigion, Wales, SA48 7ED, United Kingdom
n.nayling@tsd.ac.uk

Søren Nielsen
The Viking Ship Museum, Vindeboder 12, 4000 Roskilde, Denmark
sn@vikingskibsmuseet.dk
WALDEMAR OSSOWSKI  
Polish Maritime Museum, Ołowianka 9-13, 80751, Gdańsk, Poland  
w.ossowski@cmm.pl

MLADEN PEŠIĆ  
International Centre for Underwater Archaeology in Zadar  
Božidara Petranovića 1  
HR-23000 Zadar, Croatia  
mpesic@icua.hr

MARK E. POLZER  
Archaeology M405, The University of Western Australia  
35 Stirling Highway, Crawley, WA 6009, Australia  
markpolzer@gmail.com

PATRICE POMEY  
Centre Camille Jullian, CNRS, Université de Provence, 5 rue du Château de l’Horloge, 1390 Aix-en-Provence, France  
pomey@mmsh.univ-aix.fr

PIERRE POVEDA  
Bureau d’archéologie Navale, B032, MMSH, 5 rue du Château de l’Horloge  
BP 647 13094, Aix-en-Provence Cedex 2, France  
pierre.poveda@gmail.com

MORTEN RAYN  
The Viking Ship Museum in Roskilde, Vindebyder 12, 4000 Roskilde, Denmark  
rayn@vikingeskibsmuseet.dk

ERIC RIETH  
CNRS (LAMOP), Musée National de la Marine, Palais de Chaillot  
75116 Paris, France  
erieth.cnrs@gmail.com

THOMAS SCHMIDTS  
Römisch-Germanisches Zentrum, Forschungsbereich und Museum für Antike Schifffahrt, Neutorstraße 2b, 5516 Mainz, Germany  
schmidt@mufas.de

HOLGER SCHWEITZER  
Maritime Archaeology Programme, University of Southern Denmark, Niels Bohr Vej 9, 6700 Esbjerg, Denmark  
holger.schweitzer37@gmail.com

MARTIN SEGGSCHNEIDER  
Archaeological State Office Schleswig-Holstein, Schloss Annetteenhöhe, Brockedorf-Rantzauf Str. 70  
24837 Schleswig, Germany  
martin.segschneider@alsh.landsh.de

PETR SOROKIN  
Institute of the History Material Culture, Russian Academy of Science, St. Petersburg, Dvorzovaya nab. 18., 191186, Russia  
petsorokin@yandex.ru

EVREN TÜRKMENİOĞLU  
Istanbul University, Faculty of Letters, Department of Conservation of Marine Archaeological Objects  
Ordu Cad., Laleli 34459, Istanbul, Turkey  
evrent@istanbul.edu.tr

METİN ÜNVER  
Istanbul University, Faculty of Letters, Department of History, Ordu Cad., 34459 Laleli, Istanbul, Turkey  
umver@istanbul.edu.tr

HILDE VANGSTAD  
The Norwegian Maritime Museum, Bygdøyynesveien 37, 0286 Oslo, Norway  
hilde.vangstad@marmuseum.no

DAVID VANN  
University of San Francisco, 33 East Las Palmas Ave., Fremont, CA 94539, USA  
david@davidvann.com

GÜZDEN VARINLIOĞLU  
Sualtı Araştırmaları Derneği, Gazi Mustafa Kemal Bulvari, Akincilar Sokak, 10/1  
Maltepe, Ankara, Turkey  
sanalmuze@sad.org.tr

VALERIA VITTORIO  
via G., Marconi 66/a, 36016 Thiene (VI), Italy  
vale.vitt@tiscali.it

TOM VOSMER  
Ministry of Foreign Affairs, PO Box 812, Postal Code 100, Muscat, Sultanate of Oman  
foxlake@omantel.net.om

CHERYL WARD  
Director, Center for Archaeology and Anthropology, Department of History  
Coastal Carolina University, P.O. Box 261954, Conway, SC 29528-6054, USA  
cward@coastal.edu

OLEG A. ZOLOTAREV  
18-35 Leninsky Village, Leninsky District, Tula Region, Russia  
oaisis66@list.ru
The island of Tatihou in France was the site of the first ISBSA meeting I attended in 1994. Encircled by seminal figures in our field, it was the most inspiring event of my academic career. At the time, it became clear that the attendees were eager to hold one of their future meetings in Turkey. Their wish was the driving force that finally led me to this special day.

Positioned between two continents, Istanbul was the perfect place to hold the Symposium. Throughout history, the exchange of goods and cultures between east and west, as well as north and south, was realized in the waters of the Anatolian coast, with the Black Sea to the north, the Sea of Marmara to the northwest, the Aegean Sea to the west, and the Mediterranean Sea to the south. Given the vast area of interest, we invited participants to focus on the four seas and address their pivotal role not only for Turkey but also for the rest of the world.

The Turkish coastline had already been the site of pioneering underwater excavations since the 1960s. Indeed, nautical archaeology was initiated in Turkey under G. F. Bass and further developed under the auspices of the Institute of Nautical Archaeology (INA). Today, the development of nautical archaeology and boat and ship archaeology on an international level far surpasses the initially limited field of underwater archaeology. Moreover, the discovery of the harbour of Theodosius, one of the most outstanding archaeological events of our era, has further enriched our field and added yet another dimension to our symposium.

The excavations in the harbour are still ongoing. Thirty-six shipwrecks dating from the 5th to the 11th centuries have been excavated. Their study will make an enormous contribution to our understanding of ship construction and the transition from shell-first to skeleton-first techniques. It will also allow us to re-examine Byzantine trade and the economy of the period. Furthermore, the remains revealing settlements dating back to 6500 BC, will shed new light on our understanding of the history of the ancient peninsula.
The ISBSA 12 was held under the auspices of the Underwater Technology Program at Istanbul University’s Vocational School of Technical Sciences in partnership with the Faculty of Letters, Department of Restoration and Conservation of Artefacts. It was sponsored and hosted by the Istanbul Research Institute of the Suna and İnan Kıraç Foundation and was held at the Foundation’s Pera Museum on 12-16 October, 2009.

More than 200 participants from 24 countries attended the Symposium where 50 papers, 25 posters, and various films were presented (Fig. 1). This also allowed numerous young scholars to present their work and contribute to ongoing debates in our field and even launch new areas of research based on recent discoveries. The papers for the symposium were selected by the ISBSA committee from among a multitude of excellent proposals. The mission of the ISBSA is focused on ship construction. While related subjects are welcome, the main thrust has traditionally been a discussion of the ship itself.

It is our hope that the conference theme which has helped bring together numerous scholars from around the world, will also bring together the two sub-fields of archaeology which have until recently remained separate. It is believed that a genuine thematic and methodological dialogue between land and underwater archaeology can only enrich the field and uncover the mysteries of past civilizations. “Between Continents” will thus re-map our field and reset its intellectual boundaries.

Following the Symposium, an excursion to Amasra on 16-18 October offered the opportunity to visit workshops that still continue the traditional art of shipbuilding in Tekkeönü and Kurucaşile in the Black Sea Region. Participants learned methods of ship construction directly from the local shipbuilders. The Shipbuilding Program at the Kurucaşile Technical High School, the Amasra Castle, and the Amasra Archaeological Museum were among the local sites included in the itinerary (Fig. 2). Hüseyin Çoban was pivotal to the success of this excursion; his hospitality and his immense knowledge of traditional shipbuilding enriched our trip.

Like many other scholars in our field, I owe my presence here today to George Bass who not only accepted our invitation to attend the symposium but also graciously delivered the keynote address. Frederick van Doorninck, Jr., the late Claude Duthuit, Don Frey and Robin Piercy from the Institute of Nautical Archaeology further enriched
this symposium with their presence. It was a genuine honour to have them in our midst. As in all scholarly disciplines the master - apprentice relationship is central to our field. This was made amply clear during the course of this symposium.

However, our field is based not only on scholarly research. The constant interaction between nature and humans is an inextricable part of it: sailing on a fickle sea, working in the hostile underwater environment, and living in often difficult conditions are among the challenges that make our field so special.

May God save sailors and nautical archaeologists for future research and many more symposia!

Acknowledgments
I would like to express my sincere thanks to Suna, İnan and İpek Kıraç, founders of the Suna and İnan Kıraç Foundation, and Özalp Birol, General Director of the Suna and İnan Kıraç Foundation Culture and Art Enterprises; they made it possible for us to hold the meeting at the Pera Museum. The hospitality of the museum staff was also central to the success of this meeting.

My thanks also go to Gülru Tanman of the Istanbul Research Institute whose help and friendship made it easier to navigate through a complexity of organisational issues. Erkan Bora, also of the Istanbul Research Institute, deserves special thanks for his assistance, not only during the Symposium, but also during the excursion to Amasra. Else Snitker welcomed everyone with her endless energy and friendly, familiar countenance.

I want to express my gratitude to Zeynep Kızıltan, directress of the Istanbul Archaeological Museums, who made it possible for us to visit the Yenikapi excavation site.

Commandant Ali Rıza İşipek generously opened storerooms of the Istanbul Naval Museum, which is presently under construction. Thanks to him, participants had the opportunity to see the sultans’ kayiks and the famous kadırga.

The Setur Travel Company team contributed to a remarkable organisation.

My heartfelt thanks also go to Carlo Beltrame, Ronald Bockius, Anton Englert, and Fred Hocker, who shared their invaluable experience as previous ISBSA organisers.

I would also like to acknowledge Ayşin Akyor for providing much needed editorial help with the English text.

Finally, my sincere thanks go to Rezan Benatar for her valuable intellectual and editorial contributions. She not only helped create a seamless text but also attempted to make rather complex material intelligible to the reader.

The success of a symposium is always determined by the contributions of its participants. I would like to sincerely thank each and every one of them for an intellectually stimulating exchange.

This volume is published by Ege Yayınları which has a long-standing commitment to archaeological research. I would like to thank its owner Ahmet Boratav for his interest in our work. My thanks also go to Hülya Tokmak for her patience with the layout of the manuscript.
Introduction

The absence of the wood eating Teredo navalis, commonly referred to as the shipworm, provides the Baltic Sea with ideal conditions for preservation of organic material. For hundreds of years hulls of sunken ships can remain virtually intact. The state of preservation does not only offer a unique opportunity to record and to discuss almost any aspect of ancient seafaring, but also creates a fragile and complicated cultural heritage to monitor, preserve and to record. Research and fieldwork must correspond to approaches and strategies of governmental cultural heritage management and the aim of this paper is to describe how the Swedish National Maritime museums (SMM) have worked within these given circumstances.

A strategy for Well Preserved Wrecks

When recreational diving became popular in Sweden in the 1960s, a lot of old shipwrecks were located. In these early years, wrecks did not have legal protection, and as a consequence, several were destroyed by salvage operations. In 1967 the National Heritage Act in Sweden was extended so that shipwrecks deemed to be older than one hundred years were protected. However, although the jurisdiction prevents salvaging, diving is still allowed on historic wrecks. From that precise moment when a wreck is located and its existence becomes known to society, it loses its natural protection of obscurity. It is neither possible nor desirable to excavate and to deprive these sunken ships of their contents. The strategy for preservation of fragile sites has been, up till recently, to prohibit diving. To exclude people from the cultural heritage does not seem to be a durable solution; as such behavior rather seems to provoke contempt for authorities. For this reason, SMM has initiated a pilot study. In the waters outside Dalarö, one of the richest wreck-site areas in the Stockholm archipelago, a dive park will be created. The aim is to give recreational divers access to the wrecks under controlled terms, via certified diving organisers. These organisers will have to report to SMM.

Before offering this service to the public, the wrecks will first be documented in situ, as the threat of looting still remains. Instead of excavating and raising vital construction elements and artefacts, the hull, as well as the loose finds and contexts, are recorded under water. The wrecks will be visited by archaeologists and surveyed twice a year. Such an approach of course has impact on how archaeological fieldwork is carried out at the site, and what kind of research questions we are able to discuss. However, the nature of the well-preserved shipwreck itself contributes to a somewhat different approach, as

But does it really have to be this way or is it possible to gather substantial archaeological information without removing finds? Can we preserve the wrecks and at the same time carry out archaeological research?

Technical diving has become both an opportunity to explore, as well as a threat to deeper lying wrecks. Previously unknown wrecks are located each year. From that precise moment when a wreck is located and its existence becomes known to society, it loses its natural protection of obscurity. It is neither possible nor desirable to excavate and to deprive these sunken ships of their contents. The strategy for preservation of fragile sites has been, up till recently, to prohibit diving. To exclude people from the cultural heritage does not seem to be a durable solution; as such behavior rather seems to provoke contempt for authorities. For this reason, SMM has initiated a pilot study. In the waters outside Dalarö, one of the richest wreck-site areas in the Stockholm archipelago, a dive park will be created. The aim is to give recreational divers access to the wrecks under controlled terms, via certified diving organisers. These organisers will have to report to SMM.

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much of the information that forms the departure point of ship-archaeological discussions is not accessible on a coherent, intact hull.

The significance of Baltic Sea Shipwrecks

The archaeology of ships often takes its point of departure in well recorded source material. Tool marks, different kinds of joints, framing, etc. form the basis for reconstruction of the ships’ construction sequence. These are the cultural-technological clues that form the basis for analysis of the societal context of the ship. On a well-preserved Baltic wreck, these traces are hidden inside the coherent hull structure and are not accessible for recording.

The aspects of shipbuilding that we are able to discuss from such a well preserved wreck concerns the result of the construction sequence rather that the sequence itself. The state of preservation enables us to view the complete ship and discuss the stylistic features. But in some cases, as will be described below, we are sometimes also able to go onboard the ships and experience the architecture. In other words, instead of observing the ship from the view of those who built it, we observe it from the user’s point of view. It is possible to focus on other features and aims of the construction and the different reasons why the ship is arranged the way it is.

The Dalarö Wreck and its Recording

The Dalarö wreck was discovered in 2003 in the Stockholm archipelago. Although the ship lies at less than 30 m, it is one of the most intact 17th-century ships ever found. The 20 m long and 6 m wide hull leans 17 degrees to starboard. Two of originally three under masts are still standing and most of the main deck is still intact, with hatches, pumps and a capstan still in place. The beakhead with its lion figurehead has collapsed, as has the upper structures in the stem and stern. The wreck lies in a sound with a weak current and the structure is quite eroded.

The wreck has been surveyed by SMM, in cooperation with Southampton and Södertörn universities over two field seasons. As the site, together with other shipwrecks in the area, will be a part of the above mentioned Dive Park, the ship had to be recorded with minimal effect to the surrounding sites, focusing on visible artefact contexts and architectonical structures.

The hull structure of the Dalarö wreck was recorded using the direct survey method. Approximately 40 datum point tags where nailed to the structure and the distance between these point were measured with

Fig. 45.2. Section of the Dalarö wreck, illustrating the three-dimensional character of the site (Drawing: Niklas Eriksson).

Fig. 45.1. Deck-plan of the Dalarö wreck, made during first season of fieldwork (Drawing: Niklas Eriksson & Jon Adams).
a tape measure. The position of each datum point was then calculated with the program Web for Windows, originally developed for the Mary Rose project (Adams & Rule 1991: 145-154; Marsden 2003: 48).

The result is a three dimensional grid that determines the position of each datum point. On the basis of these datum points, the hull structure was sketched under water in order to establish a deck plan (Fig. 45.1). Although the positions for the datum points were determined with quite high accuracy, the sketching is not 100%. It is accurate enough to discuss the major features in the ship’s design. The deck plan, describing the general shape of the hull, hatches, pumps, etc. was drawn during the first season of fieldwork. The second season aimed to add a third dimension to the deck plan, by adding a profile cut-through section of the hull (Fig. 45.2).

Parallel to the recording of the hull structure, the site was searched for loose artefacts. Although a lot of finds are buried in sediments, these efforts have provided us with information regarding the use of different areas of the ship, as well as provenance and dating, as detailed below.

**Description**

The section drawing enables an almost full reconstruction of the rooms/spaces within the hull. Together with the recorded artefacts and the closed context, this forms a unique opportunity for interpretations of life onboard a ship in the second half of the 17th century.

Starting in the bow, we have a low forecastle. Although the main deck has been lowered in this part, the height between decks is only 140 cm. In this space eating utensils were found. Probably some crew members stayed here. But they had to share the forecastle with two iron guns, the galley and the foremast. Also, the anchor cable was passing through this room, making it a sometimes quite wet environment, one can imagine. Besides the eating utensils, artillery equipment and the remnants of the galley have been found here.

The cargo room is not so well defined and the extension is not known in detail. However, it should not have extended very far aft of the capstan. The two small ports located amidships may be regarded as loading ports or lighting holes. As the cargo room has not been excavated, we do not yet know what the cargo consisted of in detail but we know that the ship carried a considerable load of Bartman jugs, the suggested provenance and dating of which is Freshen, Germany 1600-1660 (Gaimster 1997: 208ff). As the room has not been fully examined, the matter of the cargo remains unsolved for now.

The extension of the officer’s cabin in the stern is marked by remaining bulkhead constructions. There is no supporting deck but the knees are preserved in their original position at the quarter deck. The original height inside the cabin has not been possible to determine exactly. However it is unlikely to have been much higher than in the forecastle, meaning that it was not possible to stand upright here. In the cabin area a lot of items connected to the officers onboard have been found, such as round and square glass bottles, typologically dated to the period 1640-1680 (Bäck 2009 personal communication). Apart from these, 15 Bartman jugs, possibly of the same character as those in the cargo room, were also found. At the starboard side, stands an iron gun together with
loading equipment, lintstock, etc. Handguns have also been found here, a flintlock and a wheel-lock pistol, a musket and two swords (Figs 45.3, 4).

In the remains of a cupboard, attached to the portside bulwark, a number of tools were found, including axes, hammers, chisels and planes. A pair of shoes was also found in this context suggesting that someone kept his personal belongings there, perhaps the ship’s carpenter. On the starboard side, a grindstone is attached to the side of the ship.

**Interpretation**

The analysis of a ship’s architecture may be done from a functional point of view, discussing aspects such as carrying capacity and sailing abilities. One may also use a more stylistic approach discussing influences in style and the owner’s social ambitions. Viewing the profile of the Dalarö wreck from some distance she ought to have appeared like a mighty warship - but in a puny scale. The ship’s architecture is, in spite of its size, an expression of power, from the distribution of guns along the ship’s side (two in the forecastle and up to four under the quarterdeck), to the beakhead and lion figure head. But this small ship has several other naval architectonical peculiarities, besides those stylistic elements borrowed from considerable larger ships.

As already mentioned, the observations that usually form the point of departure in constructions sequence discussions, are almost impossible to make on a well preserved Baltic Sea ship structure, while recorded under water. But in spite of this, it is possible to draw some conclusions regarding the ships building tradition just by viewing the structure from outside. Seen from above, the hull has a sharp bow, which contrasts to that of merchant ships of Dutch origin (Eriksson forthcoming). The hull is quite wide and has a massive tumble home. Although the bottom shape is not known in detail, the accessible portion of the ship’s profile gives enough information to state that it is fairly sharp and not as flat as common Dutch constructions. But the hull differs from these ships in other aspects as well. The stern is of a round tuck fashion. The planking does not end in a rabbet in the sternpost but rather under the main transom. Such constructions are known to be used by naval architects working in an English tradition during the second half of the 17th century. As an example, the Swedish navy built their first round tuck ships when master shipbuilders were imported from England in 1659. Denrochronological analysis to some extent confirms the assumption of the English origin since one sample was possibly traced to northeastern England.

There is more to architecture than function and tradition. A well-preserved wreck may be studied as the material setting of the everyday practices carried out onboard. Architecture may be regarded as a physical structure that makes people behave in a certain manner. Discussions concerning the mediating aspect of architecture may focus on the distribution of space within the hull. In contrast to other sources that used when discussing ship architecture, such as paintings or drawings a well-preserved wreck enables us to go onboard the ship and experience the architecture for ourselves. Shipwrecks which are often routinely described as ‘closed finds’ or ‘time capsules’ have a great potential in this sense.

**Concluding Remarks**

This was just a brief overview of the kind of discussions that have circulated around the Dalarö wreck at present and should be regarded as an introduction to the kind of analysis that may be done within the framework of the current approach in cultural heritage management. The positive aspects of recording a wreck without disturbing cultural layers or raising artefacts are that it reduces conservation costs to a minimum. Also the wreck remains as it was found and may be used in diving tourism. But the approach also limits the amount of archaeological information that may be collected from the site.

We are never able to spot the small artefacts, such as coins, buttons, clay-pipes or similar, or objects buried in sediments, without affecting the cultural layers. These are the objects whose information may be crucial for detailed dating of the wreckage. Such artefacts are also important when trying to determine the provenance of the ship with more certainty. As a consequence we are not able to identify the ship through written sources. Without limited excavation we will probably never know the original identity of the ship.

**Note**

1 See Eriksson forthcoming, for a discussion of the archaeological potential regarding differences and similarities in the division of space in ships.
References


Gaimster, D., 1997, German Stoneware 1200-1900. Cambridge


Personal communication.

Bäck, M., 2009, Swedish National Heritage Board.