

Logboats and the river: utilisation of the Po Valley in Early Medieval times

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Resumo

Desde o fim do século XIX, as numerosas descobertas de pirogas monóxilas destacam-se pela quantidade entre os raros achados arqueológicos que dizem respeito à utilização dos rios da planície Padana da Alta Idade Média. Este estudo quer chegar a uma melhor compreensão global destes artefactos, através da recolha de resultados de análises arqueométricas desenvolvidas anteriormente nos ditos artefactos e da promoção de novas análises. No futuro, os dados irão confluir em reconstruções 3D, com o propósito de determinar as características destas embarcações, quer em termos de navegação quer a nível de capacidade de carga. Este trabalho visa também delinear algumas hipóteses sobre o uso das embarcações, tendo em consideração as fontes escritas contemporâneas e as mudanças ambientais dos rios ao longo dos séculos.

Palavras-chave:

Pirogas monóxilas, Alta Idade Média, planície Padana, portos fluviais

Abstract

Since the end of the XIX century, the numerous logboat findings have stood out for their consistency from the scarce archaeological evidence about the utilisation of the Po valley rivers in the Middle Ages. This study aims to reach a better understanding of early medieval logboats, collecting previous studies of archeometry and providing new analyses. In the future, the data will be brought together in a 3D reconstruction to assess the performance of these boats in terms of navigation and cargo capacity. It also aims at suggesting hypotheses on the uses of logboats, considering written sources from medieval times, studies from the past and environmental changes of the river system over time.

Keywords:

Logboats, Early Medieval Period, Po Valley, Emporia

HISTORY OF STUDIES, TOPICS, ISSUES AND GOALS

The main purpose of this research is to enhance the knowledge of river navigation and river trade in the Po valley in early medieval times. The Po valley, in Northern Italy, is the main Italian plain in terms of its surface area. It benefits from a complex tributary system that includes more than one hundred rivers, streams and brooks descending from the Alps and the Apennine mountains.¹ Since the Bronze Age, the richness of waters in

¹ Pier Francesco Ghetti, "Si fa presto a dire Po," in *Un Po di Acque: Insediamenti Umani e Sistemi Acquatici del Bacino Padano*, ed. Irene Ferrari, Lucio Gambi, Gilmo Vianello, 1-3 (Reggio Emilia: Diabasis 2003).

the Po plain has favoured the flourishing of many settlements around lake basins, marshes and near rivers.²

During the second half of the twentieth century, the start of a new revaluation process of the middle age's legacy and economy lead to consider the Po valley and its major tributary systems as part of a larger trade network. New use of waterways also emerges in the works of late antiquity scholars and travellers Sidonio Apollinare and Rutilio Numanzio.³ The major hint for this hypothesis comes from the study of early medieval written sources. The documents of this period often involved and mentioned fluvial docks, tolls and rights on streams.⁴ In the late 1960s, some hints also came from archaeological investigations that started to focus on the maintenance, reuse and the decline of Roman infrastructures. These studies identify the partial abandon of Roman streets, between Late Antiquity and the Early Medieval Period, and connect it to a presumed increase in the use of waterways.⁵ New use of waterways also emerges in the words of late antiquity scholars and travellers Sidonio Apollinare and Rutilio Numanzio.⁶ The recent archaeological "rediscovery" of Upper Adriatic's emporia and studies on the Early Medieval material culture made it possible to trace a bustle of containers and goods coming and going through the Po valley.⁷ For many scholars, this presence points to a

² Gianluca Bottazzi, "La pianura padana dai primi insediamenti alla cultura terramaricola dell'età del Bronzo," in *Un Po di terra. Guida all'ambiente della bassa pianura padana e alla sua storia*, ed. Carlo Ferrari, Lucio Gambi, 353-359 (Reggio Emilia: Diabasis, 2000).

³ Gina Fasoli, "Navigazione fluviale. Porti e navi sul Po," in *La navigazione mediterranea nell'alto medioevo, Atti della XXV Settimana di studio del Centro Italiano di Studi sull'Alto Medioevo*, 565 (Spoleto: CISAM 1978); Roberto Sabatino Lopez, "The Evolution of Land transport in the Middle Ages," in *The Past and Present Society*, no. 9 (April 1956): 21-22.

⁴ The Liutprando's Capitulary has been considered a major source for what concerns trade and commerce—since the beginning of the XX century, see Hartman Ludo Moritz, "Übereinkunft zwischen den Langobarden und den Comacchiesen," in *Zur Wirtschaftsgeschichte Italiens im frühen Mittelalter. Analekten*, 123-124 (Gotha: Friedrich Andreas Perthes 1904); Fasoli, "Navigazione fluviale. Porti e navi sul Po," 583-585. Mentions of port and rights on streams can also be found in minor deeds.

⁵ Other scholars paid more attentions to the materiality of the transports and infrastructural changes from the late Roman Empire and early medieval period. Gian Piero Bognetti, "La navigazione padana e il sopravvivere della civiltà antica," in *Archivio Storico Lombardo*, n. 89, (1962):7; Albert C. Leighton. *Transport and Communication in Early Mediaeval Europe AD 500-1100* 206-213 (Newton Abbot: David & Charles 1972); Lopez, "The Evolution of Land transport in the Middle Ages," 17-20.

⁶ Both authors describe their travels in the context of a badly conserved road network. While Sidonio uses mainly the rivers, Rutilio prefers to travel by sea., Sidonio Apollinare, *Poems and Letter I-II*, translated by William Blair Anderson, Epist. I,5 Cambridge:Loeb Classical Library, 1936; Rutilio Numanziano, translated by Alessandro Fo, I, 35- 45, Torino:Einaudi, 1992.

⁷ Richard Hodges, "Adriatic Sea trade in a European perspective," in *From one sea to another. Trading places in the European and Mediterranean Early Middle Ages. Proceedings of the International Conference Comacchio 27th-29th March 2009*, 207-214 (Turnhout: Brepols, 2012); Sauro Gelichi, Claudio Negrelli, "Anfore e commerci nell'alto Adriatico tra VIII e IX secolo," in *Mélanges de l'Ecole française de Rome*, 120/2, (2008): 307-326; Carla Corti, "Importazioni e circolazione lungo il corso del Po tra IV e VII secolo," in *La circolazione delle ceramiche nell'Adriatico tra tarda antichità e altomedioevo, III incontro di studio CER.AM.IS*, 237-256 (Mantova: SAP, 2007).

transnational trade network. According to Franz Theuws, this network did not just satisfy a long-distance elite demand but also integrated smaller-scale regional trade.⁸ Although this scenario acquired credibility over time, archaeological information about the boats and the infrastructures used along the rivers is still quite scarce. We know very little about the vessels used for transportation and, although we do have some data about the inner docks of the Po's delta areas, we are still missing a lot of information about the organisation of life and work around the main course of the Po and its tributaries.⁹ Written sources give us some details, but we are far from having a complete description of what was going on around rivers in the Early Middle Ages, while the scarcity and the lack of variety of direct archaeological records for river navigations have discouraged studies on the topic.¹⁰

Approaching river navigation from an archaeological point of view will meet with several problems. First of all, the diffusion in the early medieval period of wood and perishable materials for constructions reduces the opportunities of finding surviving ancient infrastructures now. Likewise, the lessening of pottery and the widespread use of degradable containers affected the formation process of archaeological shipwrecks.¹¹ A second problem is early medieval climate change. This phenomenon was recorded by many ancient historians and churchmen, not without exaggeration, in the form of floods, overflows and modifications to riverbeds. These texts often refer to the lives of saints or God's will and describe major climatic events by referring to parts of the Holy Scripture, making it hard to discern whether they are telling a fact or a literary *topos*.¹²

⁸ Franz Theuws, "River-based trade centers in early medieval northwestern Europe. Some 'reactionary' thoughts," in *From One Sea to Another. Trading Places in the European and Mediterranean Early Middle Ages, Proceedings of the International Conference Comacchio 27th-29th March 2009*, 38-45 (Turnhout: Brepols, 2012).

⁹ I use the term vessel here to indicate different kind of ships and boats. Sauro Gelichi, "Societies at the Edge: New Cities in the Adriatic Sea during the Early Middle Ages (8th-9th centuries)," in *New Directions in Early Medieval European Archaeology: Spain and Italy Compared: Essays for Riccardo Francovich*, 292-297 (Turnhout: Brepols, 2015).

¹⁰ There are different references of harbor in written sources of the Lombard and Carolingian period, but few of these dock structures in Italy were recognized and archaeologically investigated. An exception is the dock of San Vincenzo in Volturno Federico Marazzi, Alessia Frisetti "Porti monastici in Campania fra VIII e X secolo," in *Hortus Artium Medievalium*, 22 (2016) 230-233. What we find in the area of the study in this period are only logboats and, in delta's area few other vessels or uncertain wooden remains. We have some traces of pottery and containers indeed. For direct and indirect archaeological record we adopt here the definitions of Ulrike Teigelake, Ulrike Teigelake, "Tracing Ship Traffic without Ships—Alternative Methods of Finding Evidence for Pre- and Early Historical Inland Water Transport," in *Boats, Ships, and Shipyards*, 154-155 (Oxford: Oxbow books, 2003).

¹¹ Sauro Gelichi, "Infrastrutture marittime nell'alto medioevo: una prospettiva archeologica," in *L'acqua nei secoli altomedievali, Atti della LV Settimana di studio del Centro Italiano di Studi sull'Alto Medioevo*, 300-301, 306-311 (Spoleto: CISAM, 2008).

¹² Paolo Squatriti, "The Floods of 589 and Climate Change at the Beginning of the Middle Ages: An Italian Microhistory," in *Speculum*, 85/4 (October 2010), 820-825.

However, in the latest decades, some of these events were observed locally in the Po valley plain during surveys and core sampling campaigns. We must, therefore, assume that those movements of river beds actually occurred, affecting the spatial distribution of streams and moving rivers from river-settlement deposits without modifying their names.¹³ A third problem is linked to recent developments in towns after the Second World War that moved human populations and activities away from river beds and river lands, decreasing the opportunity of running into archaeological data along the rivers.¹⁴

In this context, characterised by a scarcity of material evidence, logboats are a relevant exception. Logboats are long and narrow vessels built from one single log (*picture 1*). From the second half of the 19th century, these boats were common findings in Alpine lakes and in the Po valley but, due to a romantic vision of prehistory and a positivist approach to the history of technology, for a long time, these artefacts were reputed to be primitive boats.¹⁵ It was shown only in recent decades, thanks to the diffusion of radiocarbon dating methods, that logboats were a long-standing technology between the prehistoric and the modern age. Many of these boats, found in rivers, belong to the Early Middle Ages.¹⁶

This new scenario brings about many questions concerning the use of logboats and their value after the decline and reorganisation of Roman Empire infrastructures, but also about the existence and the significance of settlements or harbours around the medium course of the Po river, of which, as suggested previously, we have almost no archaeological evidence regarding their materiality. However, these data are not simple to understand. Monoxyllon boats are often found floating on riverbanks. In many cases, they cannot be connected to a stratigraphy, and they have lost their chance to tell us more about their contexts (*picture 2*). Additionally, because of the scarce consideration of

¹³ Fabio Saggioro, "Insediamenti, proprietà ed economie nei territori di pianura tra Adda e Adige (VII-IX secolo)," in *Dopo la fine delle ville: evoluzione nelle campagne dal VI al IX secolo. 11° Seminario sul tardo antico e l'alto Medioevo*, 84-87 (Firenze: All'insegna del Giglio, 2005); Stefano Cremonini, Donato Labate, Renata Curina, "The late-antiquity environmental crisis in Emilia region (Po river plain, Northern Italy): Geoarchaeological evidence and paleoclimatic considerations," in *Quaternary International*, 316 (2013):162-167

¹⁴ Some data are visible in Pietro Remitti, Marco Lazzari, "Demografia e sviluppo economico nei comuni rivieraschi", in *Un Po di terra. Guida all'ambiente della bassa Pianura Padana e alla sua Storia*, ed. Carlo Ferrari, Lucio Gambi, 537-538 (Reggio Emilia: Diabasis, 2000); Sebastiano Cacciaguerra, "Introduction," in *Vie d'acqua e cultura del territorio*, (Milano: Franco angeli, 1991).

¹⁵ Stefano Medas, "Le Imbarcazioni Monossili: Letteratura Antica e Archeologia," in *Atti del Convegno di Archeologia Subacquea AIASub*, 271-272 (Bari: Edipuglia, 1997).

¹⁶ Alessandro Asta, "Le imbarcazioni monossili italiane: stato degli studi e prospettive di ricerca per un catalogo Nazionale," in *Atti del III Convegno Nazionale di Archeologia Subacquea*, 84-85 (Bari: Edipuglia, 2015); Nicoletta Martinelli, Alexander Cherkinsky, "Absolute dating of monoxyllous boats from northern Italy," in *Radiocarbon*, n. 51, 2, (2009): 413-414; Ottavio Cornaggia Castiglioni, Giulio Calegari, "Le Piroghe Monossili Italiane. Nuova Tassonomia. Aggiornamenti. Iconografia," in *Preistoria Alpina*, n. 14 (1978): 165-66.

logboats in the past and the fragmentation of conservation duties, we do not have a systematic study on the subject. In Italy, unlike other countries, there is not a catalogue of these findings. Past attempts are incomplete, while recent works are still unpublished.¹⁷

In short, through a more thorough examination of these boats, we can now hope to improve our knowledge of river navigation. Moreover, by studying the qualities and performances of these vessels, we can perhaps increase our knowledge of river transport between the 6th and the 10th century. Indeed, these vessels seem to play a consistent part of river life - from a numeric viewpoint - at a time when we do not have other evidence of boats in the same environment.¹⁸

SOURCES AND METHODOLOGY

The unpublished artefacts preserved in the area of study will be recorded to draw more information from the logboats, and a new set of radiocarbon and archaeobotanical analyses will be promoted. Radiocarbon analysis will be used to reinforce quantitative studies while expectations from archaeobotanical data are to improve a qualitative knowledge of the boats and, indirectly, of their environment. To achieve these results, a collaboration with the *Soprintendenza archeologia, belle arti e paesaggio per le province di Como, Lecco, Monza e Brianza, Pavia, Sondrio e Varese*; the *Soprintendenza Archeologia, Belle Arti e Paesaggio Per le Province di Cremona, Lodi e Mantova* and the *Soprintendenza Archeologia, Belle Arti e Paesaggio Per le Province di Bergamo e Brescia* has been started. This is a group of local ministerial departments in charge of preserving and enhancing the archaeological heritage of the Lombard area.¹⁹ This region is the one with the highest number of findings. This collaboration aims at analysing the records of restoration activities and producing a list of identifiable artefacts suitable for radiocarbon analysis and wood anatomical identification. For each boat, data

¹⁷ For some examples of catalogues see Sean McGrail, "Logboats of England and Wales with Comparative Material from European and Other Countries," in *British Archaeological Reports*, 51, (Oxford: BAR, 1978); Bèat Arnold, "Pirogues monoxyles d'Europe centrale. Construction, typologie, evolution," I-II, (Neuchâtel: Musée cantonal d'archéologie, 1996). A partial list is in Marco Bonino, "Le Imbarcazioni Monossili in Italia," in *Bollettino Del Museo Civico Di Padova*, n. 72, (1983):51-77; for unpublished works, I'm referring to the thesis of Alessandro Asta, "Le Piroghe italiane. Catalogo e studio per una nuova archeologia navale delle origini," (Master degree thesis, University of Padova, 2002-2003); and the regional census commissioned to the restorer Ilaria Peticucci by the Soprintendeza della Lombardia, this census was the base for others papers, see Fabiana Barbaglio, "Le imbarcazioni monossili: la storia, gli studi, le scoperte archeologiche," in *Insula fulcheria*, XXXVII, (2007):156.

¹⁸ Gelichi, "Societies at the Edge," 297.

¹⁹ There are also some contacts with the *Soprintendeza Archeologia, Belle Arti e Paesaggio per l'area metropolitana di Venezia e le province di Belluno, Padova e Treviso*.

recording includes the main measurements, integrity, the presence of a stern/bow, the presence of holes or composite elements, the identification of wood species (where present), C14 and dendrological analyses, details of the disposal site and past restoration activities. A database managed with a *Geographical Information System* (GIS) will collect all the data. Then, the use of Early Medieval logboats in a trade context will be examined. The work will be accomplished by making a 3D photogrammetry of selected artefacts (*Agisoft PhotoScan*), a digital Model (*Rhinoceros*) and lastly a 3D cargo and sailing simulation (*Orca 3d*).²⁰ For the photogrammetry, I decided to select three logboats with different lengths and shapes. The Ponte di Piave boat, i.e. a small, well-shaped boat with a below-average length; one of the two boats from Valle Isola, the longest logboats in Italy that conserve both a stern and a bow, and the Montodine logboat, a well-preserved logboat with average measurements, discovered in the Serio river.²¹ Depending on the remaining time, I may study the photogrammetry of Boretto's Logboat, an asymmetric monoxylon boat in good condition, probably part of a double logboat.²²

At the end of the research, I will focus on spatial analyses to try to connect, through GIS, both logboats and docks along the Po valley, comparing mentions of ports from early medieval written sources with the geographical position of archaeological findings. I will pay specific attention to the complex formation processes of archaeological records in the alluvial environment and the distribution of markers of Early Medieval trade in the area, used as secondary evidence for tracing the traffic of ships (soapstone, glass ingots and globular amphorae). Through careful analysis of the distribution of all data, I will put forward some hypotheses on the positions of inner harbours. I will do this by building some "cluster areas" of ships where I will analyse the morphology of the land, river movements and known settlements to create a database for future research on the subject.²³ In this research, I will also pay attention to other

²⁰ Elisa Costa, Elisabetta Baletti, Carlo Beltrame, Francesco Guerra, Paolo Vernier, "Digital Survey Techniques For The Documentation Of Wooden Shipwrecks," in *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLI-B5, 237-242 (Prague: ISPRS, 2016); Nigel Nayling, Toby Jones, "The Newport Medieval Ship," in *International Journal of Nautical Archaeology*, 43, (2014): 227-231.

²¹ The logboats of Montodine are actually unpublished while for Ponte di Piave logboat see Maria Pezzo, Gianluca Quarta, Stefano Medas, Stefano Marconi, Jasmine Rizzi, Lucio Calcagnile, Marisa D'Elia, "Datazione assoluta della piroga monossile di Ponte di Piave (TV). Analisi dendrocronologiche e radiocarboniche," in *Annali del Museo Civico di Rovereto: Sezione: Archeologia, Storia, Scienze Naturali*, 25 (2010): 91-101.

²² Stefano Medas, "La piroga rinvenuta nel fiume Po presso Boretto (Reggio Emilia)," in *NAVIS 5. Archeologia, Storia, Etnologia Navale. Atti del II Convegno Nazionale, Cesenatico, Museo della Marina, 13-14 aprile 2012*, 141-147 (Padova: Libreriauniversitaria.it edizioni, 2014).

²³ Michael McCormick, "Comparing and connecting: Comacchio and the early medieval trading towns," in *From One Sea to Another. Trading Places in the European and Mediterranean Early*

features of medieval water landscapes revealed in written sources, such as bridges, dykes, mills and - of course - movements of riverbeds, to discover the paths of floated boats, but also to consider other uses of these objects. Recently, many uses of these logboats based on an ethnographic comparison have been proposed; e.g. some scholars suggested their uses in water mills or in the construction of boat bridges. Unfortunately, these suggestions have found precise terms of comparison neither in our context nor in the analysis of boat characteristics. This work, however, due to the emergence of many different logboat shapes and features, does not completely exclude that few vessels could be used in ways that differ from mere navigation.²⁴

SEMI-PROCESSED DATA, PROVISIONAL HYPOTHESIS AND CONCLUSIONS

Data accessible from published works reveals that there are 80 conserved logboats in Northern Italy. Many more logboats are recorded to have been sighted in reports, while others - well recorded by pictures and drawings of the past - were destroyed (*Tab.1*).²⁵ On this first census, 38% of the logboats were the object of scientific dating. The 2% concerned dates based on associated materials or particular morphology, the majority still lacks a chronology. Most dating analyses are carried out using the radiocarbon method, while dendrochronology was used on only two boats (*Tab.2*). In radiocarbon results, there is a massive difference in terms of laboratory errors between analyses carried out before 1978 and more recent ones.²⁶ It is possible to partially improve the old radiocarbon results using the latest calibration curve, which more precisely analyses the variation of C14 over time, but errors linked to the lab's instruments will persist, leaving us to cope with large chronological intervals when

Middle Ages (Turnoht: Brepols, 2010) 492-93; Gelichi, "Societie at the Edge", 292-297; Teigelake, "Tracing Ship Traffic without Ships", 155.

²⁴ Some different hypotheses were recently expressed but there still little evidence that can support them, see Angela Allini, Alessandro Asta, Stefano Medas, Monica Miari, "Due piroghe rinvenute nel fiume Po presso

Monticelli d' Ongina (PC) e Spinadesco (CR)" *Archeologia Storia Etnologia Navale*, Atti del II convegno nazionale Cesenatico – Museo della Marineria (13-14 aprile 2012), 121-122 (Padova: Libreriauniversitaria.it edizioni, 2014).

²⁵ For the census's sources, see, Ottavio Cornaggia Castiglioni, "Le Piroghe Preistoriche Italiane: Problematiche Ed Inventario Dei Reperti," in *Natura*, 58, no. I (1967): 5-48; Federica Sacchetti, "Imbarcazioni monossili e trasporti fluviali sul fiume Oglio. Problemi di cronologia e aspetti tecnici," in *Orizzonti. Rassegna di Archeologia II*, (2002): 111-126; Tea Ravasi, Fabiana Barbaglio, "Merci e persone sui fiumi. Le imbarcazioni monossili conservate presso il Museo Civico di Crema e del Cremasco," in *Archaeotrade. Antichi commerci nella Lombardia orientale. Catalogo della mostra*, 37-61, (Milano: Edizioni ET, 2008).

²⁶For laboratory error I intend the "standard error" derived by limits of physical instrumentation and techniques that usually follow the data given by labs and express in "Before Present"

For this reason, the inaccurate results as Monate's and Valle Isola's were excluded from table 3 and 4. For radiocarbon result see Cornaggia Castiglioni, Calegari. "Le Piroghe Monossili Italiane," 165-66.

dealing with old analyses.²⁷ These intervals can sometimes cover more than a century and make a division in periods more difficult. The group of recent results seems to be more precise in terms of approximation and in the procedure of sample selection. Each sample came from a single recorded boat.

Most of the pirogues analysed in the past seem to belong to medieval times, i.e. 63% of the results for a total of 17 logboats (*Tab.3*). The more significant part of dated logboats has a chronological interval which starts or ends in the early Middle Ages or Late Antiquity (10) while the other seven cases lie between the 12th and the 13th century. Since the standard deviation of the radiocarbon results is still substantial after calibration, it is not possible to determine if the boats dated as artefacts from a period of time comprising the 10th century were, in fact, from this century or from a later period. Thus, as far as can be assumed, for now, the logboats' phenomenon seems to have relevance both in the Early Middle Ages and in the High Medieval period (*Tab.4*). Perhaps the interpretation of new radiocarbon results and a future cross-query of data will reveal distinctive properties on the use of logboats in this broad chronology.²⁸

Radiocarbon remains the safest way of creating periodisation. The limited number of one hundred logboats, mostly undated, is still an irrelevant sample to judge styles, morphologies and construction modalities. This becomes apparent when we compare our field with other material culture studies. In ancient pottery studies, chronotypologies are often possible because there are innumerable shreds coming from many different stratigraphical contexts. However, at the end of the project, it will be possible to highlight the emergence of significant construction features in a precise period, comparing the analyses of various hulls with radiocarbon results.

At the moment, radiocarbon results seem to show some diversity from other European countries, where pirogues also belong to the early modern age (Germany). A remarkable

²⁷ Christopher Bronk Ramsey, "Radiocarbon Calibration and Analysis of Stratigraphy: The OxCal Program." *Radiocarbon* 37, no. 2 (1995): 425–30; Paula Reimer, Edouard Bard, Alex Bayliss, Beck Warren, Paul Blackwell, Christopher Bronk Ramsey, Caitlin Buck, et al. "IntCal13 And Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years Cal BP," in *Radiocarbon* 55, no. 4 (2013): 1869–87.

²⁸ For this presentation, I've selected, as a sample, logboats that were previously analyzed and are still existing. The charts are based on the first sigma of published results, where there was not, I used the program Oxcal to reach a data's calibration. For radiocarbon result see Cornaggia Castiglioni, Calegari. "Le Piroghe Monossili Italiane.", 165–66. Martinelli, Cherkinsky "Absolute dating of monoxylous boats," 418; Claudio Balista, Fede Berti "Carotaggi geoarcheologici e scavi nei pressi della Chiesa di Santa Maria in Padovetere anni 2006 e 2008," in *Atti dell'Accademia delle Scienze di Ferrara*, 194, 127 (Ferrara: Accademia delle Scienze di Ferrara, 2017); Alessandro Asta, Mauro Bon, Valentina Girotto, Stefano Medas, Paolo Reggiani, "Reperti archeologici provenienti dai sedimenti del canale del Cornio (Campagna lupia, laguna di Venezia): analisi degli scafi monossili ed evidenze faunistiche," in *Bollettino del Museo storico naturale di Venezia*, 65, (2014): 237–252.

fact is also the presence of a logboat in chestnut wood (*Castanea Sativa*) found near Lodi. This logboat does not match the more frequent use of oakwood (*Quercus sp.*) in the medieval period. In nature, the growth of the chestnut tree is limited to some specific areas. This finding could open up a new perspective on the provenance of the boat or suggest some particular anthropic modifications of the local wood environment.²⁹

As far as we know from past studies on cargo capacities, there is a strong probability that logboats, especially the bigger ones between 10 and 16 meters long, were capable of carrying large quantities of loads. However, only a meticulous reconstruction of exemplary cases, paying attention to the many variables of the context, will give us some answers on this topic.³⁰

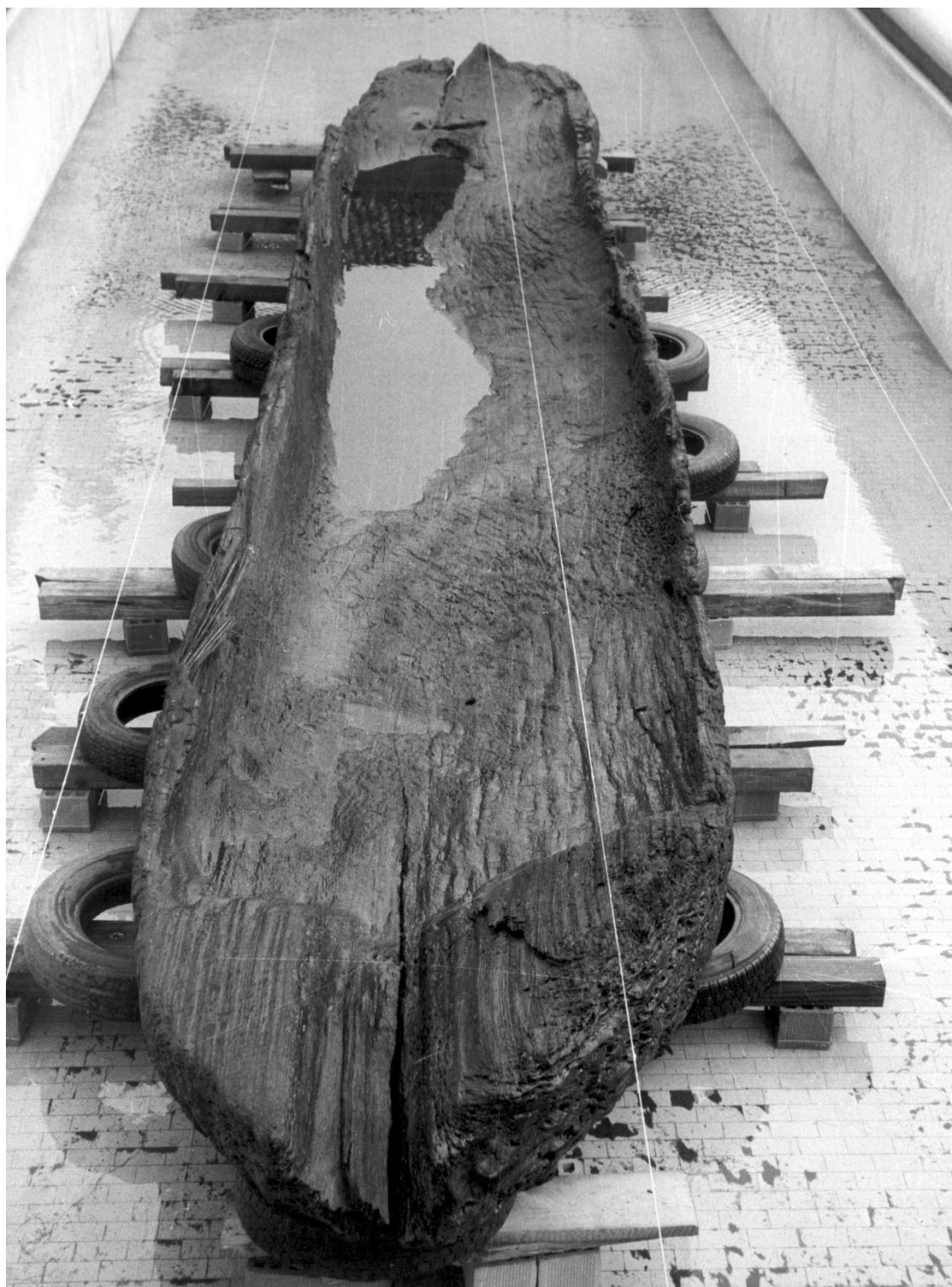
Rivers such as the Adda and the Oglio seem particularly rich in findings, but some logboats are also present in the Po River, far from the deltas of its tributaries. Other concentrations are visible near the Comacchio valleys and in the rivers close to the Venetian Lagoon. The chronology of these findings, where present, seems to follow the development of nearby emporia centres. These concentrations will be used in the future to focus on exports from this area and on the possible involvement of pirogues in carriage. A possible outcome of this research is to prove, based on the study of the performance of logboats, that these boats were not only items for local production activities but also a means of transport for small payloads and part of an organised trade network in Early Medieval times. A trade that, perhaps, mixed local with long-distance demands, taking advantage of the Po valley's system of streams, nearby coast channels and wetlands.³¹

²⁹ Alfio Cortonesi, "I paesaggi dell'albero nell'Italia medievale (secoli XII-XIV)," in *Norba. Revista de Historia*, 25-26, (2012-2013): 154-158

³⁰ Sean McGrail, "Assessing the performance of an ancient boat-The Hasholme logboat," in *Oxford Journal of Archaeology*, 7, (1988): 35-46

³¹ Gelichi, "Societies at the Edge," 297-299.

ANEXOS



Picture 1 – Logboats from Canarazzo, publishing allowed by *Ministero per i Beni e le Attività Culturali e per il Turismo SABAP-CO-LC*, All Rights Reserved.



Picture 2 – Rescue of a Logboat in Oglio's River, publishing allowed by *Ministero per i Beni e le Attività Culturali e per il Turismo SABAP-MN*, All Rights Reserved.

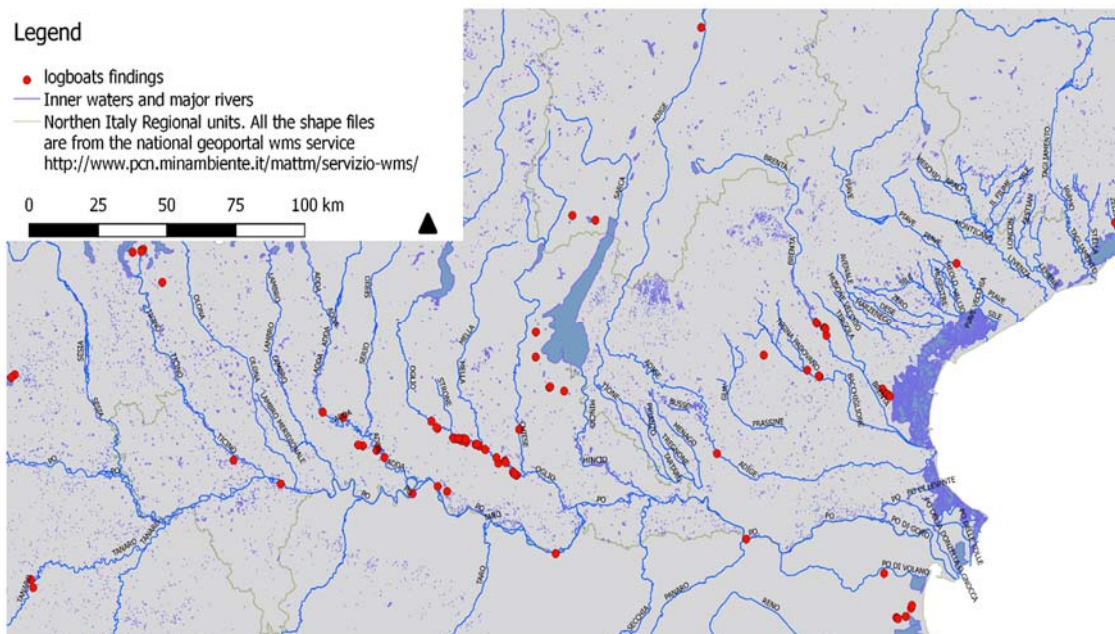


Table 1 – Map of the Logboats findings.

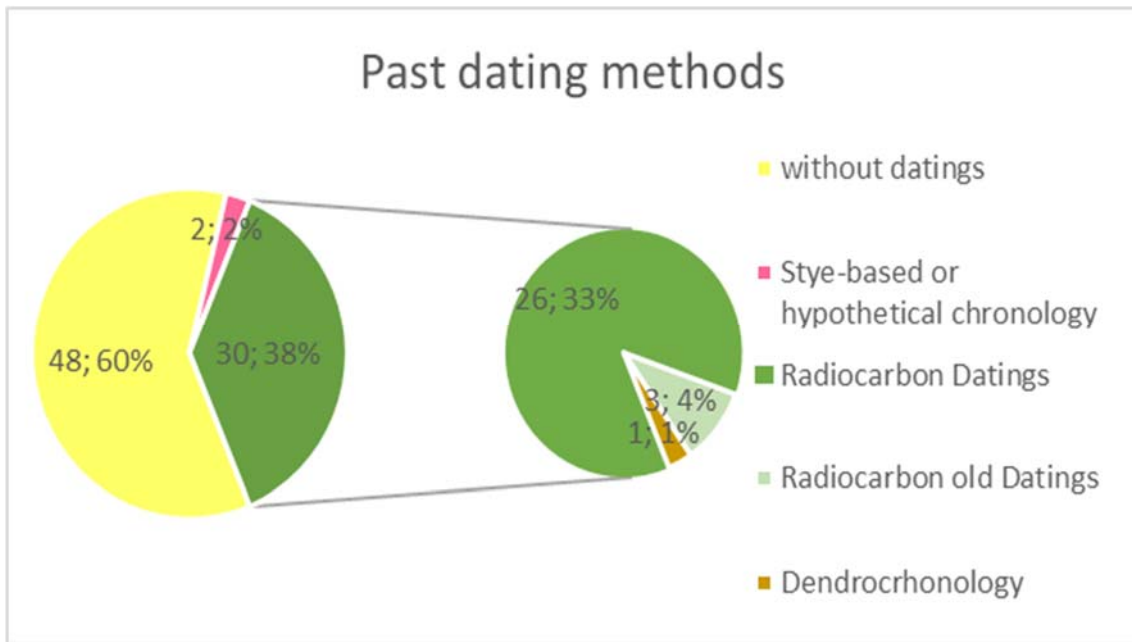


Table 2 – Past Dating Methods.

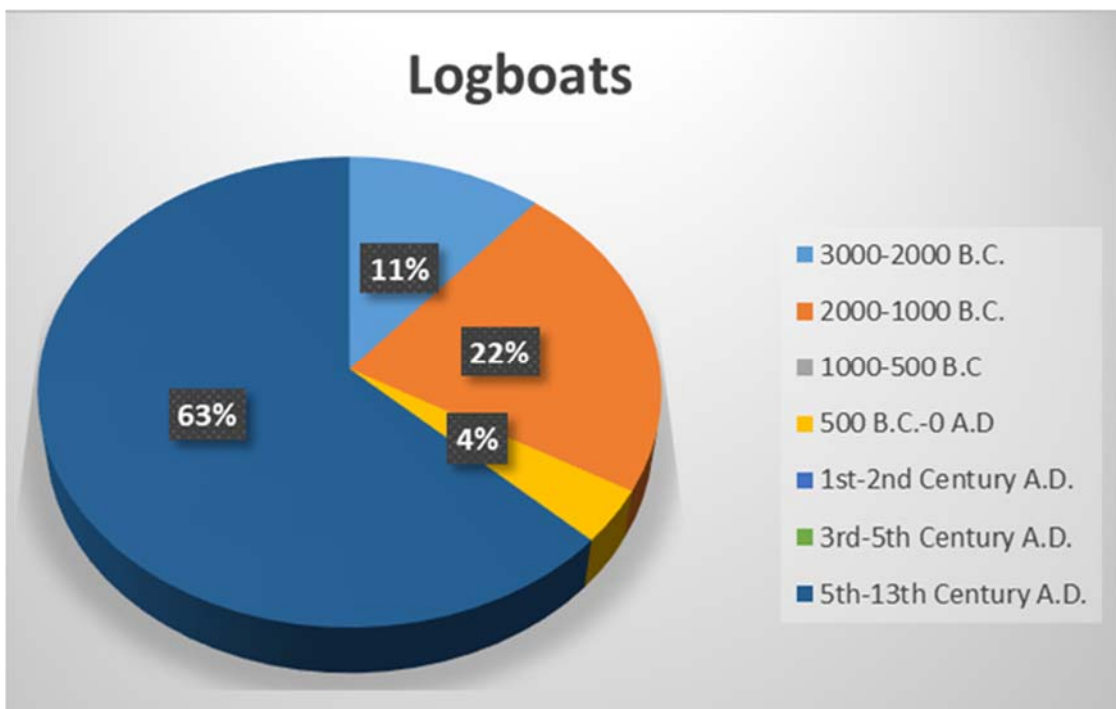


Table 3 – Chronologies of Po's Valley Logboats.

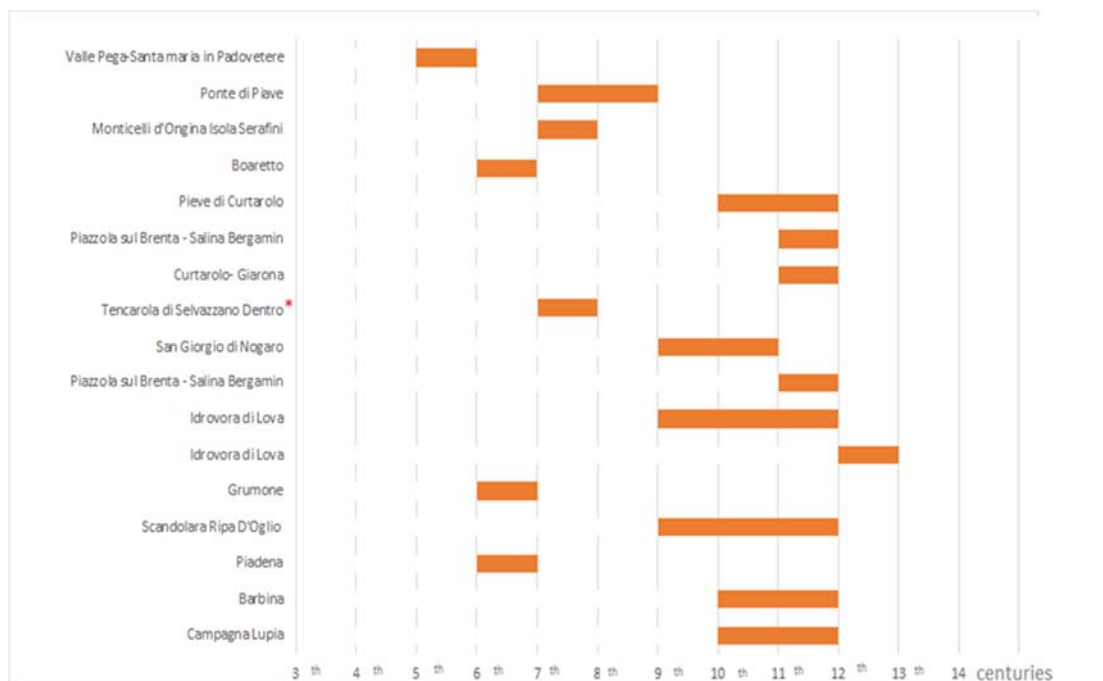


Table 4 – Medieval Logboats Chronology, graphical representation of dating results by century, *= approximation of the dendrochronology result.