

The Bountiful Sea: Fish processing and consumption in Mediterranean antiquity

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The Bountiful Sea

This special issue has its origins in an international conference entitled *The Bountiful Sea: Fish Processing and Consumption in Mediterranean Antiquity*, made possible by the generous support of Christian Levett, and The Craven Committee, Red Boat, Green Pastures, The Oxford Roman Economy Project, and the British School at Rome. The conference, held at the University of Oxford on 6–8 September 2017,¹ grew from an ambitious idea proposed by Andrew ‘Bone’ Jones, over dinner at the 2015 ICAZ Fish Remains Working Group meeting in Lisbon: to bring together archaeologists, archaeological scientists, ecologists, classicists, and culinary experts – groups who work in very different spheres, but who possess a shared interest in fishing and fish – to illuminate the evolution and significance of the exploitation of marine resources in the ancient Mediterranean and to identify areas where the past could inform the present. This event was to be a feast for body as well as mind, and an innovative culinary program led by Sally Grainger offered a tasting dinner of recreated recipes, with further opportunities to sample an array of contemporary processed fish products and artisanal fish sauces (see Mylona and Grainger *infra*). These opportunities to engage with fish and fish sauces on an experiential level offered far more than simply a conversation starter; they also raised questions about ancient versus modern taste preferences, the nutritional value of fish products, and traditional methods of production – questions which in many instances the modern producers present, *Red Boat* and *Green Pastures*, were able to address. *Red Boat* produces a fish sauce using only fish and salt following ancestral recipes; their insights into food safety, fish to salt ratios, pressing methods, and marine species present in catches for sauce production have direct relevance for study of ancient sauce production and residue analyses. *Green Pasture*’s innovative use of fermented fish oils as dietary supplements, offers an instructive case of resilience of traditional technology and adaptation to the changing needs of the consumers, a phenomenon very much relevant to the study of the ancient world.

This special issue aims to be as bountiful as the conference in the evidence and approaches it encompasses, to offer a cornucopia of research on fish and fish processing in Mediterranean antiquity

¹ For details on the conference academic program and activities see <http://oxrep.classics.ox.ac.uk/pages/thebountifulsea/>.

that extends geographically from East to West and thematically from sea to table. The contributions in this volume were originally presented as papers at this conference, although, unfortunately, inclusion of all the papers and posters was beyond the scope of a single issue and some presenters chose not to submit. As at the conference, the contributions published herein focus on classical antiquity in the Mediterranean as a defined region. The papers provide an update on the state of research into fish processing in Mediterranean antiquity from different vantage points: archaeological, historical, archaeometric, and gastronomic. Together, they unite different approaches, consider the value of sensory experience, and promote dialogue between scholars of the ancient and modern worlds. The scope of the papers invites discussion between specialists working in the Eastern and Western Mediterranean and fosters a new dialogue with researchers interested in contemporary Mediterranean fish policy and issues of sustainability (Koutrakis *infra.*). Finally, this issue captures a small part of one of the conference's most innovative aspects: the opportunity for a sensorial approach to processed fish, offered by a series of culinary events, including the lavish conference dinner of re-created dishes from antiquity, the "bring and share" processed fish buffet, and the live demonstrations by modern producers of contemporary processed fish products (Grainger and Mylona *infra.*).

Overview

Fish processing – and that of other elements of the marine world – is one of the most intensively researched aspects of the marine economy of ancient Mediterranean, due both to the abundance of identifiable remains of the industry, and to its far reaching implications for local and regional economies. Research on the nature and exploitation of marine resources in Mediterranean antiquity has blossomed over the last 30 years, reflecting not only the re-orientation of archaeological and historical research towards fields pertaining to the ancient economy and environment, but also the increasing tendency towards interdisciplinarity. The literature on the topic is vast. Ichthyo-archaeological studies from all over the Mediterranean have increased significantly in recent years, including research into classical and related periods (e.g. Çakırlar et al. 2016; Morales-Muñiz and Roselló-Izquierdo 2012). Research on fishing technology, an important but consistently understudied area, is currently gaining momentum (Ayodeji 2004; Bekker-Nielsen and Bernal Casasola 2010; Galili et al. 2013; Powell 1996). Regional comprehensive studies, with varying chronological focus, have demonstrated the potential of the extant archaeological and historical records and pointed towards future research directions (Bekker-Nielsen 2005; Mylona 2008; Costa and Fernández 2012; Marzano 2013; Moya-Cobos 2016). Attention on processing installations continues, from individual reports on excavated *cetariae* (fish processing plants) (Bernal-Casasola et al. 2016), to compilations of data (Trakadas 2015), and the creation of databases (RAMPPA²). As knowledge of ancient fishing has expanded, so has the dialogue between archaeologists and natural scientists, as better understanding of ecological history can lead to more informed decisions on contemporary management of resources (Boero 2016; Mazzoldi et al. 2018).

The last decade has also seen greater consensus that fishing and fish processing was an economically important and profitable enterprise in Classical antiquity, especially in the Roman western Mediterranean – a topic which has generated great interest amongst Classical scholars (Kron 2008; Marzano 2007; Marzano 2015; Marzano and Brizzi 2009). The material wealth the industry could bring to an individual is beautifully illustrated in the mosaic floor that proudly adorns the house of Pompeian fish-sauce producer and merchant Aulus Umbricius Scaurus: at each corner of the shallow *impluvium* in the centre of the floor, a vessel for fish sauce is depicted, complete with descriptive label

² RAMPPA Atlantic-Mediterranean Excellence Network on Ancient Fishing Heritage. <http://ramppa.ddns.net/cetariae>.

(Curtis 1984). However, leaving aside some early works (e.g. Rostovtzev 1926; 1941) the attention given to fish production as an economically significant activity has only gained traction in recent decades. Previous studies (e.g. Gallant 1985) were much influenced by the work of authors like Moses Finley (1973), who held the view that the ancient economy was under developed, with fish playing a minor role in trade and manufacture.³ Fishing was perceived only in the sphere of subsistence. The current re-framing of our understanding of the significance of ancient marine exploitation goes hand-in-hand with current appreciation of the impact of contemporary low-level ‘artisanal’ fishing: there is now increasing realization of major consequences of recreational and semi-subsistence fisheries on fish stocks (Hyder et al. 2017; Pinnegar and Engelhard 2008).

This growing appreciation of the social and economic significance of ancient fish exploitation in Mediterranean antiquity has led to a proliferation of scholarly activity on the topic in the last decade, well represented by several international meetings dedicated to fish and fish processing in a Mediterranean context: *Sal, Pesca y Salazones Fenicios en Occidente*, Ibiza 2011 (Costa and Fernández 2012); *Fish and Ships*, Rome 2012 (Botte and Leitch 2014); the *International Workshop on the Ancient and Mediaeval Marine Eco-history and Environmental History of Greece and the Eastern Mediterranean*, Haifa 2014 (contributing to Bekker-Nielsen and Gertwagen 2016); and mostly recently a panel on ‘Salt, fish processing and amphorae production across the Mediterranean in the 1st millennium BC’ at AIAC 2018 organized by García-Vargas, García Fernandez and Sáez Romero. Other recent meetings have addressed marine taxa in a cultural sphere, such as the 2014 *Harvesting the Sea: Aegean societies and marine animals in context* (Theodoropoulou and Gallant forthcoming). The ICAZ Fish Remains Working Group and European research and network initiatives such as COST-Oceans Past Platform provide additional fora for relevant debate (e.g. Mazzoldi et al. 2018).

While the study of ancient fishing and fish processing now benefits from an abundance of literature on the topic, this wealth of research and publication brings with it particular challenges (Bernal-Casasola 2016). Ancient fishing can be approached from a range of specialist perspectives, from tax ledgers to preserved fish bones. Such studies may be published in equally specialist venues, and in diverse languages. To address this variety of perspectives, recent anthologies typically focus on a particular area within the wider region (west, east, Aegean, Adriatic, etc.); few works aim for a unified pan-Mediterranean perspective. Furthermore, a dichotomy remains between scholarship on fish production, focusing on archaeological installations and trade, and that concerned with the social and cultural context of fish consumption. Recent contributions have begun to break down these divisions through more interdisciplinary and integrated approaches (e.g. Marzano 2013 and for the North Sea region see papers in Barrett and Orton 2016), but few volumes follow a sea-to-table approach, beginning with fish ecology and fishing technology and extending to the taste preferences of man or women eating fish at home (such as Mylona 2008). This separation of data hampers engagement and knowledge exchange between researchers. It also hinders engagement with practitioners and experts outside the small sphere of ancient fish-centred scholarship, with whom much knowledge and insights can be exchanged – food historians, policy makers, biologists, and even modern producers.

Perhaps because of the focused nature of the discipline and the degree of expertise needed to interpret many of the data (as well as the ever-decreasing amount of time researchers have at their disposal), it is difficult to take a step back to assess the broad view that is generally agreed to be so important. A

³ For a recent historiography of scholarship on ancient economy see Flohr and Wilson (2016). For a review of the scholarship on the economic significance of fishing in antiquity see Mylona (2008: 5-15), and Marzano (2013) for discussion of marine exploitation in the context of studies on the ancient economy.

sound understanding of fish biology and past ecological conditions is widely recognised as central to the study of marine exploitation in antiquity, and some recent works have begun to aim for a broad and interdisciplinary view in relation to fish production and environmental change (e.g. Bekker-Nielsen and Gertwagen 2016; Mazzoldi et al. 2018); however, to what extent is cultural or experiential knowledge relevant? Should scholars of ancient fish sauces have tasted *garum* (or at least something close to it)? Should we know the texture of the flesh of different fish or their cooking or preservation properties? These are questions that merit further consideration.

The Bountiful Sea conference and the papers that are published in this volume reflect in many ways the state of the art in the research on fish processing in ancient Mediterranean. At the same time they point, explicitly or more subtly, to future areas of enquiry and research. The papers are broadly ordered by three themes: fish and fish products in their cultural context; archaeological evidence in the western and eastern Mediterranean; and the logistical and social organization of production of processed fish and associated materials (salt). The volume also includes an editorial on the role of food at the conference, and a postscript from the perspective of a modern biologist on the current state and future directions of Mediterranean fish exploitation, with thoughts on the relevance of archaeological and historical research on the issue.

Eating fish: fish products in their cultural context

Deliberation on the importance of consumers' demand for fish products and of culinary tastes and preferences, as well as on the multitude of ways in which fish products acquired certain meanings in different cultural contexts formed an important part of the conference, and this is reflected by several papers in this volume. Fish were not only a mode of generating profit – a vehicle for economic gain – but also medicine and food for gods and men. Consideration of fish consumption, particularly from historical evidence, allows us to access personal attitudes towards fish, so elusive in the archaeological record. Wilkins's paper, which is based on the author's keynote speech to the conference, takes a rather unusual stand and "considers the topic from an ancient perspective". Based on literary evidence he explores how fish, fresh and processed, were embedded in the life of Greeks and Romans through their role as food. Issues of cooking, taste, pleasure and health are explored, offering a variety of possible incentives for the production and trade in processed fish. This paper alerts the readers to significance of intangible aspects of past cultures that could be forceful intensives for economic developments. In the same field, Weingarten's paper discusses dietary rules and taboos around the cooking and consumption of processed fish the ancient Levant, as revealed by Talmudic texts in conjunction with archaeology. In contrast to Graeco-Roman sources, evidence for marine exploitation and consumption in the Talmudic literature has not been extensively explored. This under-utilized source provides rich evidence for on non-elite and quotidian concerns, as well as the long-distance trade of fish products from as far away as Spain. Marzano also considers some of the more intangible aspects of fish products, through her analysis of the different social values ascribed to fresh and processed fish in the Roman world – social value which in turn impacted a product's market value.

Grainger brings new insight into how Romans considered and referred to their fish sauces. Grainger integrates her experience of experimental fish sauce production with a meticulous lexicographic exploration of iconic terms for fish sauces to trace the development of these products over time and in different cultural environments. She highlights the role of the consumers and culinary tastes in shaping the terminology of fish sauces. This analysis challenges researchers of ancient fish sauce to be specific in their terminology, with understanding of the significant differences in production

behind *garum* and *liquamen*, and emphasizes the need for contextual awareness on the part of researchers when discussing fish processing.

Nicholson and colleagues offer an alternative, archaeological view on the same issues. The exceptional deposit from the Herculaneum sewer has been discussed elsewhere (Rowan 2014; Rowan 2017), but Nicholson, who identified the fish remains, and J. Robinson, who analyzed the molluscs, provide a more in-depth consideration of the faunal material. These remains represent repeated, everyday food consumption of the non-elite population of the town, and they illustrate a number of choices and preferences on the part of those people, as well as the actual fishing processes applied in the area. Furthermore, this study provides some background to the rest of the discussions on fish processing within this volume, by highlighting the type of fresh fish consumption that was probably quite typical in coastal locations of the Mediterranean (Mylona 2008; Rose 1994). It also highlights the difficulties encountered in trying to distinguish processed from unprocessed fish in a mixed collection of small bones. Such assemblages also present inspiring opportunities for the application of ZooMS, a method of collagen protein fingerprinting (Buckley 2018) that can identify even tiny fragmented fish bones to species (Richter et al. 2011).

Analyses of stable carbon and nitrogen isotopes from bone collagen, which offer a means of comparing the contribution of marine foods to ancient diets, are logically at the center of current discussion of fish consumption. As a result, research projects on dietary habits, using these isotopes, are becoming increasingly common throughout the Mediterranean. Italy is one of the most investigated regions with data representing populations in Rome (Killgrove and Tykot 2013; Prowse et al. 2004; Prowse et al. 2005; Rutgers et al. 2009), Gabii (Killgrove and Tykot 2018), and Herculaneum (Martyn et al. 2018). A growing number of analyses relate to other areas: Spain (Rissech et al. 2016; Salazar-García et al. 2016), Greece (Petrousa and Manolis 2010; Vika 2011; Nafplioti 2016; McConnan Borstad et al. 2018) and the Black Sea (Keenleyside et al. 2006). Especially interesting are intra-population differences, related to gender and occupation (Crowe et al. 2010; Martyn et al. 2018). These methods have huge potential to inform on ancient fish consumption, but we must remain aware of their complications and limitations. Overlap between isotopic values from marine and terrestrial resources may obscure certain forms of fish consumption (Vika and Theodoropoulou 2012), and caution must be exercised when selecting modern reference materials (Roffet-Salque et al. 2017).

West and East

Archaeological and historical work concerning fish processing has been undertaken all around the Mediterranean; however the material evidence for fish processing is not equally distributed. The substantial archaeological evidence for impressive processing installations, well known along the Iberian (e.g. Baelo Claudia, Troia) and northern African coasts (Sabratha, Cotta) are not similarly documented across the Adriatic and eastern Mediterranean. Research in the western Mediterranean (including the northwest coast of Africa) already has several decades of scholarship behind it, permitting comprehensive syntheses and nuanced interpretations which are solidly based on good quality archaeological evidence, as illustrated in this volume. Following recent excavations of new fish-salting factories at well-known halieutic site of Baelo Claudia, Bernal-Casasola, Expósito and Díaz present the first synthesis of archaeological research relevant to the initial stages of the production cycle. Their contribution offers a comprehensive and current picture of the fish processing industry at the site, through discussion of marine resources, fishing equipment, processing facilities and food products. Similarly, Trakadas presents the many sources of data for marine resource exploitation along the coasts of north western Africa, from archaeological finds to ethnographic

evidence, in order to present a nuanced look at fish processing in Lixus, a coastal site in Morocco. Her robust methodological approach highlights the importance of understanding the environmental context in which fishing occurred, as well as the need to consider multiple lines of evidence, including by necessity suboptimal data, when reconstructing production activities. Garnier and colleagues engage chemistry to contribute to the multitude of approaches to past fish processing, explain the methodology and highlight certain important findings. They were able to detect the presence of fish sauces in the walls of fish-salting vats located along the Atlantic coast (Marsa, Baelo Claudia, Troia, Kerlaz, and Etel) using a combination of experimental archaeology and organic residue analysis. Analysis of samples from the vats, when compared with actual *garum* sauces made from mackerel, sardines, and/or oysters, revealed the presence of common markers of fermented fish-based products and, significantly, demonstrated the addition of molluscs and fruits to the sauce.

Fish processing in the central Mediterranean is also documented by archaeological and historical sources, but research in this region has been comparatively less intense. The quantity of reported finds and number of research projects demonstrate this lower level of attention, despite the area's role in the dispersal of the fish-processing industry throughout the Mediterranean during its formative centuries, and as a region of intense consumption of processed fish, at least in the Roman period (Botte 2009; Marzano 2013). The situation in the later first millennium BC is less clear. The short contribution by Botte focuses on fish processing in Sicily and Italy from the pre-Roman period to post-second century AD. which departs from his previous research (Botte 2009) by instead focusing on certain puzzling aspects of fish processing. The morphological and technical differentiation between the earlier salting vats in areas of Greek and Phoenician cultural influence in Sicily and the intriguing apparent absence of specialised containers for fish sauces and salted fish in the Greek area of Sicily and Magna Grecia are considered. Although focused on southern Italy, this discussion of economic activity versus taphonomic factors is equally relevant to other parts of the central Mediterranean where archaeological evidence for processing installations is absent (e.g. Busana 2018).

Problems with the archaeological visibility of fish processing plants are not confined to the central and western Mediterranean. The dearth of concrete archaeological evidence for large-scale fish processing in the eastern Mediterranean has previously been noted (e.g. Botte 2009; Wilson 2006), despite written evidence for production in the region (Curtis 2016). Several of the papers in this volume attempt to tackle this issue from different vantage points, offering a range of perspectives. Theodoropoulou provides a diachronic overview of (mostly) archaeo-ichthyological evidence on fish processing in the Aegean over the *longue durée*, discussing the nature of the archaeological evidence and its consequences in research. She incorporates faunal remains with the wider discourse on fish processing to address how the scale of production can impact evidence from the Aegean, and highlights the connection between long-distance trade and local production. Lytle focuses on the Classical and Hellenistic periods in the same geographical area and explores the economic aspects of fish processing. His analysis of literary and epigraphic sources from the Aegean concludes that the absence of evidence for fish processing in the region is indeed evidence for its absence. He argues that local conditions – both institutional and environmental – constrained production beyond a household scale. The third paper in this group, by Mylona, examines the paradox of the scarcity of archaeological evidence in contrast to the literary references to fish products in the eastern Mediterranean, adopting a broader geographical perspective. It revisits some of the basic themes in relevant research (e.g. development of fish processing technology, resource availability, geographical location, market demand) and highlights the effects of different archaeological agendas on the visibility of fish processing along the coasts of Mediterranean. It is argued that focused research is

necessary before we can firmly establish the importance of fish processing in the area, an observation shared by other contributions in the volume.

Logistical and social organization of fish production

The social organization of salted fish and fish sauce production, as well as technical and logistical aspects underlying these processes, are topics that are subject to a growing body of research (e.g. Bekker-Nielsen and Bernal Casasola 2010; Botte and Leitch 2014; Marzano 2013). Salt has been the subject of considerable attention (Carusi 2008; Harding 2013; Marzano 2013), due to its central importance to fish preservation, alongside its role in general food preservation, human/animal health, and industrial processes. Carusi, in her concise review, expands on the topic by discussing the conditions that supported long distance trade in salt as opposed to local production and consumption. Fish processing on an industrial scale provided the impetus for such a trade. Within this context, Lowe's consideration of the logistics of fish salting – through the lens of *Astronomica*, a poem by Roman writer Marcus Manilius – combines literary and archaeological evidence to offer insights into the salting process and its close relationship with salt production. These papers highlight the need for, and rewards of, an inclusive approach to the study of ancient fish processing that incorporates complementary activities. Sánchez López's (2018) recent analysis of water-related structures in Roman halieutic plants (presented as a poster at the conference and published as a separate paper) is another welcome contribution to this trend.

Marzano also considers fish-salting, but through a more human lens. Her contribution offers a rich exploration of the social context of fish consumption and considers the relationship between fish-salting establishments and the fishermen who provided the fish. Ragia investigates the social organization of fish production/consumption in the eastern Mediterranean by confronting the traditional dichotomy between producers and consumer-buyers in Byzantium. Many more groups than typically considered were involved in the supply and distribution of fish products: when products distributed by military, administrative, and religious institutions are included, the pool of fish consumers is also much larger than previously recognized, with significant economic implications. These contributions on the social framework of fish processing remind us of the many agents involved in fish production and acquisition, and they help flesh out a lucrative industry which impacted a large range of individuals beyond fisherman and market shoppers.

Ancient fish and future directions

Study of marine exploitation in antiquity is gaining an increasingly important role in modern marine sciences and fisheries policy at a European and at a global level (Schwerdtner Máñez et al. 2014). As issues of sustainability become more urgent, there is increasing realization that lessons can be drawn from the past to inform present strategies (MacKenzie and Mariani 2012). However, despite institutional support from organizations that promote interdisciplinary dialogue (e.g. Mazzoldi et al. 2018), opportunities for discussion between those who study ancient fish/fishing and contemporary biologists and policy makers are still very few. The gulf between antiquity scholars and physical scientists and officials is perhaps sustained by a lack of mutual understanding of the research undertaken by both groups; while there is general positive feeling towards interdisciplinary dialogue, finding the time and avenues to initiate it is more challenging, as is developing useful, measureable outcomes (which require a sustained discussion). In this context, Koutrakis's contribution to this volume, in the form of a postscript, represents an important step towards the cross-fertilization of ancient and modern studies. Better understanding of past potential can lead to better informed decisions on future management of Mediterranean resources (Boero 2016), and, as Koutrakis points

out, such intervention is badly needed if over-fishing and habitat depletion are to be sustainably addressed. It is clear that there is much scope for more focused joined structured dialogue between the practitioners of both historical and natural sciences and it is hoped that the papers in this volume can provide a starting point for future dialogue.

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