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GREEK AND ROMAN MARINE RESOURCE EXPLOITATION IN THE NORTHERN BLACK SEA: THE ORIGIN AND DYNAMICS OF THE BOSPORAN FISH TRADE

As early as the fifth century BC salted fish were exported from the Black Sea to the cities of the Mediterranean. From the beginning of our era, Pontic fish-salters also produced *garum*, a sauce made from fermented fish. At some sites, production of salted fish and sauce continued well into the Byzantine period.

The evidence for Pontic fish processing is somewhat contradictory. On the one hand, literary texts such as the *Deipnosophistae* of Athenaeus (c. AD 200) attest to the importance of Black Sea salt-fish in the Mediterranean market, while finds of large-scale salting installations at several sites in the Crimea testify to the large volumes of fish that were processed into garum or salt-fish. On the other hand, finds of amphorae for the finished product are rare. Finds of Black Sea amphorae reported from sites along the Mediterranean by no means match the massive numbers of fish amphorae from the Iberian Peninsula which have been found on Roman sites.

Taking imports rather than exports as its starting point, this paper proposes a new model for the development and organization of fish exports from the Black Sea. The export trade was not primarily driven by the Aegean demand for processed fish, but by the demand for prestige goods among the Pontic elite. Exports generated the cash income required for the elite's consumption of imported prestige commodities such as oil and wine. As the supply of another export commodity – slaves – declined under the *pax Romana*, the volume of fish exports was increased. It is also proposed that fish products were not as a rule exported by the producers themselves. Rather, they were acquired in bulk at the production site by travelling wholesalers, who packed them in empty amphorae brought from the Mediterranean; hence traces of the Black Sea fish trade are almost invisible in the archaeological record.

Keywords: Crimea, Bosporan Kingdom, salt-fish, garum, trade, Athens

Introduction

Considering how closely the Mediterranean and the Black Sea are linked to one another, being separated only by the Sea of Marmara, the two seas are surprisingly different in nature. The clear waters of the Mediterranean are high

in salinity but low in nutrient content; those of the Black Sea enjoy a higher level of nutrients but a lower salinity, and below the shallow surface layer, its murky waters are lifeless and anoxic. The Mediterranean is home to a wide range of aquatic species, the number of species is much smaller in the Black Sea, but some of these are present in great abundance.

Much of the explanation for the contrast between the two seas lies in their geological history. Whereas the Mediterranean has existed for millions of years, the life story of the Black Sea is a short one. The sea as we now know it – as a large body of salt water – came into being less than 10,000 years ago, at the end of the last glaciation, when the waters of the Mediterranean overflowed the threshold at the Thracian Bosporus and spilled into the Black Sea basin (Kuprin, Sorokin 2007. P. 213–215; Yanko-Hombach, Mudie, Kadurin, Larchenko 2014. P. 116; Bekker-Nielsen 2016. P. 287–288). The salty incoming waters gradually raised the water level and increased the salinity of the Black Sea, but due to the constant replenishment with fresh river water, it has never reached the high salt content of the Mediterranean, whose freshwater inflow is balanced by surface evaporation.

Fogs and mists are a common occurrence, hence the epithet "dark" or "black" – *melas* in Greek, *чёрное* to Russian speakers, *kara* in Turkish, *axshainas* to ancient Persians. It seems that Greeks misheard the name as *axeinos*, "unwelcoming", which was later changed to the positive *euxeinos*, in the same manner that the Cape of Torments was renamed the Cape of Good Hope.

The Black Sea is indeed unwelcoming. To enter from the Aegean, a ship must first force its way through the Dardanelles, then through the Thracian Bosporus against a surface current running at 1½ to 5 knots. For sail-driven vessels this was a formidable obstacle, and ships might have to wait weeks or months for the tail wind that would take them through the straits.

The Black Sea is also unforgiving. Unlike the Aegean, whose islands form stepping-stones within sight of one another, the Black Sea has no more than a few offshore islets, and most of the voyage across to the Crimea is beyond sight of land. If his ship foundered in the Aegean, a traveller might still hope to find himself washed ashore on an island – a recurrent motif in ancient literature from Homer to Dio Chrysostom and beyond – whereas a shipwreck in the Black Sea left few chances of survival. Not without reason did the poet Posidippus in the epitaph of his drowned friend Dorus issue a warning: "do not be hasty to sail over the Euxine" (Austin, Bastianini 2002. P. 117, n. 91; Williams 2006. P. 117).

The rich aquatic resources of the Black Sea and its rivers were already being exploited on a local scale in the prehistoric period. The emergence of urban cultures along the coasts of the Mediterranean increased the demand

for fish and fish products and by the fifth century BC, Black Sea fish could be found in markets along the Aegean. Before transport, however, the fish had to be preserved by drying or salting. The resulting product, generically known as *tarichos*, was exported widely, even as far as Egypt (Bekker-Nielsen 2016. P. 291). Another fish derivative was *garum* (Greek *garos*), a fermented fish sauce which was very popular during the Roman period (Ejstrud 2005). Driven by the complementarity of the Mediterranean and the Black Sea ecosystems, the trade in Black Sea fish products expanded and reached its highest level under the early Roman Empire. The decline of east-west trade in late Antiquity affected the fish trade negatively, but marine resources still played a significant role in Byzantine times, to such an extent that their exploitation and marketing were regulated by imperial decree.

Research history

The systematic study of Black Sea fishing commenced nearly two centuries ago with the publication, in the Proceedings of the Saint Petersburg Academy of Sciences, of the seminal paper by H.E. von Köhler (1765–1838), *Tarichos, ou Recherches sur l'histoire et les antiquités des pêcheries de la Russie meridionale* (Köhler 1832). German by birth and education, Köhler chose a career in the Russian imperial service under Catherine the Great, who appointed him librarian at the Hermitage (Morgenstern 1839. P. 75–76). Over a period of forty years, Köhler published numerous scholarly papers in the fields of philology, epigraphy, archaeology and numismatics.

Already within Köhler's lifetime, his study of ancient fishing was acknowledged as a ground-breaking contribution and was probably the most widely read of his many works (Ibid. P. 101–102). Though outdated by present standards, it remains a testimony to the erudition of its author and the wide range of his reading. While his focus is on the fisheries of southern Russia, Köhler surveys the entire ancient literature pertaining to fishing or fish processing, from the earliest Greek authors to late antiquity (Köhler 1832. P. 435–475). Although he had conducted archaeological fieldwork in the Crimea on two occasions (Morgenstern 1839. P. 83; 94), Köhler rarely draws on the evidence of archaeology (Tunkina 2003. P. 313–314), save for brief discussions of amphora shapes (Köhler 1832. P. 379–381) and coin types (Ibid. P. 424–430).

During the decades following Köhler's death in 1838, history developed from antiquarianism into a scientific enquiry based on the systematic, comparative evaluation of the sources, and economic history emerged as a separate historical discipline. One of the pioneers in this new field was M.I. Rostovcev, also known as Rostovtzeff (1870–1952), professor of Latin at the University of Saint Petersburg until his emigration in 1918 and author of the *Social and*

Economic history of the Roman Empire (Rostovtzeff 1926, revised edition 1957) and *Social and Economic History of the Hellenistic World* (Rostovtzeff 1941).

According to Rostovcev, fish played an important role in the economy of the ancient Mediterranean world: "The Greek cities supplied their needs partly by extensive local fishing ... but in great part by the import of fish from the rich and flourishing fisheries of the Euxine, the straits, and the Propontis, and of the great northern rivers, the Danube, Dniester, Bug, Dnieper, Don and Kuban" (Ibid. P. 1177); "Salted, dried, and pickled fish, the staple food of the Greeks, was imported in large quantities into Greece, Egypt, and probably Syria from the Pontic regions and from Sicily ... The situation in this respect has not changed much in modern times, except that the Pontic territory is now replaced by Norway" (Ibid. P. 1254).

The comparison with Norway is telling. In Rostovcev's analysis, the economy of the Graeco-Roman world could be compared with that of his own time. That is not to say that he envisaged the ancient world as an open market economy; on the contrary, he highlighted the role of state control, for instance in the Bosporan kingdom during the reign of the Spartocid dynasty (Ibid. P. 595–596) or under the Roman Empire: "most of the merchants, who frequently were at the same time shipowners and owners of storehouses, worked on behalf of the emperor ... the imperial annona was the chief moving force in the inter-provincial trade" (Rostovtzeff 1957. P. 158–159).

The application of modern economic-historical analysis to antiquity rested on the implicit premise that ancient Greeks or Romans acted according to modern ideas of economic behaviour. The opposing view was that the economic outlook of the ancients differed fundamentally from that of the twentieth century. The latter was the standpoint of, among others, Karl Marx, Max Weber and Johannes Hasebroek. For Marx, the salient point distinguishing the "ancient mode of production" from later periods was the use of slave labour (Marx 1976–1981. P. 381–383; 415). While acknowledging the role of slavery, Weber (2006. P. 326–327) and Hasebroek also stressed the distinction between the modern 'market' economy and the restricted economic horizon, the "oikos economy" or "Hauswirtschaft" within most ancient production took place (Weber 2013. P. 485; Hasebroek 1928. P. VIII, 72–73). Their view was taken up by Moses I. Finley, whose highly influential book *The Ancient Economy* (Finley 1971) rejected the "modernist" analysis of Rostovcev and called for a sociological, rather than an economic, approach.

According to Finley, the ancients did not possess the analytical tools for systematic accounting and profit-or-loss calculation (Ibid. P. 19–20, 110–111), nor the modern interest in maximizing profits for profit's own sake (Ibid. P. 144–145). In a face-to-face society under the constant threat of famine, status in the eyes of one's peers (Ibid. P. 51) and short-term survival were more

important than returns on investment (Ibid. P. 117). The standpoint of the Finley or Cambridge school became known among ancient economic historians as "primitivism", as opposed to the "modernism" of Rostovcev.

Primitivism was taken to extremes by T.W. Gallant, who in *A Fisherman's Tale* (1985) claimed that fish was of no economic significance in the ancient world. Köhler's interpretation of the textual sources was dismissed as "naive" (Gallant 1985. P. 35) and Rostovcev's Social and Economic History of the Hellenistic World castigated for providing an "ill-conceived picture of the Pontic fisheries [which] has, unfortunately, found a wide audience" (Ibid. P. 35). The author concludes that "the role of fishing in the diet and in the economy would have been, on the whole, subordinate and supplementary .... its main function would have been to supply a source of sustinence during periods of food scarcity" (Ibid. P. 43–44).

A Fisherman's Tale fails, however, to take account of the archaeological evidence. The large fish-salting installations excavated in the USSR from the 1930s onwards (Zinko 2007. P. 835; Čechova 2014. P. 230) and in Morocco from the 1950s onwards (Trakadas 2004. P. 50–68) testify to a level of investment and planning that is clearly incompatible with Gallant's theory of fishing as an ad hoc activity in response to local food shortages. Extensive archaeological investigations carried out by Soviet archaeologists during the 'thirties were cut short by the war and much of the material remains unpublished, but the syntheses by V.F. Gajdukevič (1949; 1971), V.I. Kadeev (1970) and V.I. Vinokurov (1994) clearly demonstrated the central rôle of fish processing in the economy of the northern Black Sea during the Roman period. As A.L.L. Jacobsen (2005. P. 103–104) has demonstrated, Gallant's model was flawed from its inception, but *A Fisherman's Tale* is nonetheless cited in leading works of reference such as *Der Neue Pauly* and the *Oxford Classical Dictionary* (fourth edition 2012. P. 580).

Most present-day economic historians would not conceptualize the Mediterranean economy as one unified system but as a more complex, multi-level pyramid incorporating elements of Rostovcev's capitalism as well as Finley's household economy. At the apex of the pyramid, we have a trade low in volume but high in value: prestige goods for the elite, durables such as fine pottery, valuable raw materials such as metals and purple dye. The base of the pyramid, the largest part, is taken up by the innumerable local and regional networks of production and exchange, only partly monetarized and serving a limited geographical area. Between these, we find the staple trade which revolved around the "big three": grain, wine and olive oil, commodities traded in large quantities and sometimes even in dedicated vessels such as the grain ships plying between Alexandria and Italy, or the wine tankers carrying Italian wine to the western provinces.

Textual and iconographic sources

References to Black Sea fish abound in literary texts from the Greek and Roman period (Köhler 1838. P. 435–475; Lund, Gabrielsen 2005. P. 165–166). The earliest example is a fragment of a lost comedy, "The Basket-Bearers" by Hermippus, written c. 425 BC:

> Tell now for me, Muses who have your home on Olympus, all the good things that Dionysus brought for people here, ever since he sailed as a trader over the wine-dark sea in his black ship. From Cyrene stalks of silphium and ox hides, from the Hellespont mackerel and salted fish of all sorts (Hermippus, fragment 63 = Athenaeus 2006. 1.27e = Storey 2011. P. 307–309).

In the fourth century, Demosthenes' courtroom speech Against Lacritus deals with the alleged loss of a ship during a coasting voyage along the Crimea. The vessel was carrying, among other items, wine, goatskins and jars of salted fish:

> Hippias, son of Athenippus, of Halicarnassus, deposes that he sailed with Hyblesius as supercargo of the ship, and that when the ship was sailing along the coast to Theodosia from Panticapaeum, Apollodorus put on board the ship one or two hampers of wool, eleven or twelve jars of salt fish, and goat-skins – two or three bundles – and nothing else (Demosthenes 1936. P. 300 = 35.34).

Two centuries later, the historian Polybius, who was born in Greece but spent most of his life in Rome, describes the flow of trade into and out of the Black Sea, as follows:

> It is generally known that the most important necessities of life, cattle and enslaved captives, are brought from the lands around the Black Sea (which offers them in the greatest quantity and the best quality), as well as luxuries: an abundance of honey, beeswax and salted fish, and in return they receive the things which abound in our part of the world, namely olive oil and every kind of wine. As for grain, the direction of trade varies: when circumstances permit, they export it, at other times they import (Polybius 2010. 4.38.4–5).

Fishing or fish processing in the Black Sea is also described in a poem *On fishing* ascribed to Ovid, who was exiled to the Black Sea coast by Augustus, in the *Geography* of Strabo, the *Natural History* of Pliny the Elder (first century A.D.) and in the *Halieutica* or manual of fishing by Oppian (second century A.D.). In his treatise *On the properties of foodstuffs*, the medical writer Galen (second century A.D.) discusses fish of various species and origins, including some from the Black Sea. In Lucian's dialogue *Toxaris, or on Friendship* (second century A.D.) the fictional Athenian interlocutor Mnesippus ironically compares Orestes' voyage to Tauris with Phoenician traders roaming the Black Sea in search of salted fish (Lucian 1936. P. 108–109 = Toxaris 4)[1].

[1] A.M. Harmon's translation has 'fishmongers', but ταριχοπώλης means a trader in salt-fish.

In the late second century AD, Athenaeus of Naucratis composed the *Deipnosophistae* (in English known as "The learned banqueters" or "The philosophers at dinner"), an account of a fictional banquet where a group of intellectuals discuss, among many other topics, the quality of salted fish products from various regions of the Roman empire, quoting the opinions of earlier writers. In total, salt-fish are mentioned forty times within a few pages. In twenty-one cases, the geographical origin of the fish in question is not given; in nineteen, it is. Of these nineteen references, nine are to fish from the Marmara, Black Sea or (in one case) the Sea of Azov; fish from Spain are mentioned five times, fish from Egypt four times. Only a single Aegean location, the Thracian city of Abdera, is mentioned as a source of salt-fish (Athenaeus 2006. P. 116–121). While one should not overstress the source value of his work – after all, Athenaeus was a writer of fiction, not a statistician – Black Sea salt-fish evidently played a considerable role in the Roman market, and some fisheries operated on a large scale. This is especially true of the tuna fishery, which required massive inputs of manpower at a given moment and needed to be backed up by processing facilities capable of handling large amounts of fresh fish rapidly.

The organization of a tuna fishery is described for us in detail by Aelian in his On the nature of animals (Aelian 1959. P. 212 = 15.5), and his description is corroborated by an inscription from Parium on the Hellespont, a dedication to Priapus by the members of a fishing collective comprising dozens of persons (Bekker-Nielsen 2016. P. 291). In general, however the epigraphic evidence is sparse. The Protogenes decree from Olbia of around 200 B.C. mentions, in passing, a fish market (IOSPE I^2, no. 32; Austin 1981. P. 172, n. 97), while a building inscription of the second century AD from Chersonesus records the construction of an opsopolis by Theagenes, son of Diogenes. Some authors have assumed that this structure was a specialized market for fish of fish sauce (Semenov-Zuser 1947; Kadeev 1971. P. 15) but it is more likely to have been a food market or macellum of a type found in many other cities of the Mediterranean world (Bekker-Nielsen 2007. P. 127–130).

From the Hellenistic and Roman periods, a number of graffiti depicting ships have been preserved, mainly from Panticapaeum (Peters 1981. P. 94–117) but none of these can be identified as fishing vessels. The potential contribution of the Pontic coinage was briefly touched upon by Köhler (Köhler 1838. P. 424–430), but his interpretations have not stood the test of time. It remains an open question to what extent fish images on coins of Carcinitis, Chersonesus and Panticapaeum can be taken as evidence of an active trade in fish (Stolba 2005a. P. 128–129). Attempts to relate fish motifs on amphora stamps to the fish trade have proven equally inconclusive (Conovici 1998. P. 193–194; Bekker-Nielsen 2016. P. 301–302).

Archaeology

There is archaeological evidence for fishing on the Black Sea and Sea of Azov as early as the fifth century BC (Gavriljuk 2005. P. 110–112). Much of our present knowledge of early fishing techniques derives from the excavation of the settlement at Elizavetovka by the river Don, published by Marčenko, Žitnikov & Kopylov (2000). Although located at the northern periphery of the Black Sea region, in the fifth to the third century B.C., Elizavetovka was an important trading settlement with far-reaching contacts, and the fishing strategies employed here may be taken to reflect conditions in the Black Sea region generally.

During the fifth century B.C., fishing at Elizavetovka was oriented towards the needs of the local economy, but in the fourth and third century, a "fishing boom" can be observed (Højte 2005. P. 142) which may reflect the integration of the local economy into a wider trading network that included Aegean Greece. A transition from subsistence to commercial fishing at this time can be observed at other sites in the region (Marčenko, Žitnikov & Kopylov 2000. P. 177). The importance of fishing in the economy of the Elizavtovka settelement is reflected in numerous deposits of fish scales and bones, both as layers of fish waste up to 20 cm thick and in refuse pits at the periphery of the settled area (Marčenko, Žitnikov & Kopylov 2000. P. 175–177). Most of this material presumably dates to the period when commercial fishing was flourishing at Elizavetovka, i.e., the fourth and third centuries B.C. Significant deposits of fish waste were also found at other sites in the region (Gajdukevič 1949. P. 110–111; Kadeev 1970. P. 6–7; Gajdukevič 1971. P. 124–126; Ivanova 1994).

The ancient fisherman had a wide range of equipment at his disposal: spears and tridents; hooks and lines; moveable nets and fixed nets (Bekker-Nielsen 2005. P. 89–93; 2010. P. 188–194; Alfaro Giner 2010; Marzano 2013. P. 28–38). Since lines and nets were typically produced from soft, organic materials such as hemp or flax, cork and wood, they are rarely preserved on land. Under normal conditions, archaeologists will find only artefacts made from inorganic materials: tips for fishing spears (metal), fishing hooks (metal), needles for mending nets (metal), net sinkers and weights for casting-nets (metal, stone, lead, pottery). Hooks and net sinkers are recorded from a number of sites in the Pontic region (Gajdukevič 1971. P. 411–412; Romančuk 2005. P. 99; Højte 2005. P. 135–136; Butyagin & Kasparov 2019. P. 110). Finds of large stocks of fishing hooks on individual sites imply that line fishing took place on a significant scale, possibly as long-lining, while quantities of small net-weights of equal size points to the use of hand-casting nets (amphiblêstra), either from shore or from boats. Larger net sinkers, typically of stone, were used to stabilize a stationary net (*peza*) or hold a seine (*sagênê*) suspended vertically from floats.

Masonry cisterns for fish processing, however, are not found before the Roman period (Vinokurov 1994). The most important salteries were at Tyritace (Gajdukevič 1949. P. 352–359; 1971. P. 378; Højte 2005. P. 142–148), Myrmecium (Gajdukevič 1959. P. 23–24; 1987; Højte 2005. P. 149–150) and Chersonesus (Kadeev 1970. P. 11–13; Højte 2005. P. 142–153; Romančuk 2005. P. 102–103; Čechová 2014), but salting also took place at other locations, e.g., Zolotoe (Vinokurov 1994. P. 154–161) and Salatčik (Vinokurov 1994. P. 167–169; Højte 2005. 154–155). The productive capacity of the fish-salting complexes at Tyritace and Chersonesus is difficult to estimate (Højte 2005. P. 150–152; Zinko 2007. P. 841; Bekker-Nielsen 2016. P. 299–300) but in terms of numbers or cubic volume, the salting vats of the Crimea are comparable with those of other well-known production regions such as Baetica, Lusitania and Mauretania (Trakadas 2005). At Tyritace alone, the excavators identified more than 60 fish-salting cisterns (Gajdukevič 1949. P. 354; 1971. P. 376; Zinko 2007. P. 836–838) and at Chersonesus more than 90 (Kadeev 1970. P. 12). Not all of these, however, will have been in use at the same time; according to the revised chronology of Romančuk (2005. P. 104–106), new cisterns were being constructed at Chersonesus as late as the seventh century AD (Čechova 2014. P. 231).

Evidently, *tarichos* production during the Classical and Hellenistic periods did not require fixed fish-salting cisterns. Their introduction is presumably linked with the transition to fish-sauce production. Fish-sauce, garum, was an important ingredient in Roman cuisine and consumed in great quantities across the empire (Ejstrud 2005; Curtis 2016). As Lytle points out, "in the Black Sea region the appearance of large-scale salting cisterns and installations corresponds not to the initial development of fish salting operations but rather to the reorganisation of production in order to meet new demand for garum" (Lytle 2018. P. 409).

Fish sauces require transport containers and in the case of the western Mediterranean and Atlantic fish-salting industry, the evidence of literary sources and excavated fish-processing installations is backed up by finds of amphorae and amphora fragments, which make it possible to follow the trail of Iberian or African garum from the production site to the point of consumption (Opait 2007. P. 101–103; Lowe 2016. P. 219–225).

Strangely, the number of amphorae for Pontic fish products reported from archaeological sites by no means matches the vast amounts of Spanish fish-sauce amphorae (Opait 2001. P. 101). Various explanations have been proposed for this apparent absence. Possibly the amphorae have in fact been found but have been misinterpreted as containers for other commodities (Opait 2007. P. 106–107). Possibly fish products were primarily exported in baskets (Lytle 2018. P. 410–411) or wooden barrels (Marlière 2002), which would not sur-

vive in the archaeological record, or in discarded wine or oil amphorae which had been cleaned for re-use (Lund, Gabrielsen 2005. P. 164–165; Lytle 2016. P. 15). A similar situation has been observed in southwestern Sicily, where the export of Syracusan fish products is documented in other sources, whereas ceramic evidence seems to be lacking (Botte 2018. P. 378–380; see now, however, Bernal-Casasola et al. 2021. P. 514–518).

One way out of the conundrum is to assume that north Pontic fish-salters mainly produced *tarichos*, which could be packed in baskets (Lytle 2016. P. 14–18; Lytle 2018. P. 410)[2]. The deposition by Hippias of Halicarnassus (quoted above) is, however, very specific about the type of container: "eleven or twelve jars (*keramia*) of salt fish". Another objection to the basket hypothesis is that in the fish-salting vats at Myrmecium, dated to the second or third century A.D., remains of anchovy (*Engraulis encrasicolus*) were found (Gajdukevič 1971. P. 378); given their small size, salted anchovies would hardly lend themselves to transport in baskets, but could easily be packed in amphorae. Alternately, the anchovies could have been used in the production of garum.

Another line of reasoning is followed by Andrei Opait, who concludes that "most Pontic amphorae are more suited to a content of salted fish" (Opait 2007. P. 119) than to fish sauce. This may well be true for types such as Zeest 75 and its variants, with their wide, slightly conical necks (Ibid. P. 108–111). On the other hand, types Zeest 83 & 89 have a cylindrical neck that is no wider in relation to the body than the necks of Dressel types 7 or 14B, both which are attested as fish sauce containers in the western Mediterranean (Lowe 2016. P. 220–221). Amphorae of Zeest types 83 & 89 have been found at the two most important fish processing sites in the eastern Crimea, Tyritace and Myrmecium (Opait 2007. P. 114–115).

Balancing imports and exports

As Rostovcev saw it, the growth of the Black Sea trade was driven by the demand of the Aegean cities for Pontic products, above all for grain and fish:

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[2] Romančuk 2005. P. 102–103 and Čechova 2014. P. 231 assume that since the salting cisterns at Tyritace were shallower than those at Chersonesus, they were used for producing high quality *tarichos*, not *garum*. Gajdukevič gives the depth of the vats at Tyritace as 1,8 m (Gajdukevič 1949. P. 356; 1971. P. 377), similar to the group of vats at Myrmecium (Gajdukevic 1971. P. 378) but shallower than those at Chersonesus (Čechova 2014. P. 231). A group of three exceptionally deep vats (3,8 m) was discovered at Tyritace in 2004 (Zinko 2007. P. 838). For comparison, the cisterns at Troia, Portugal (Vaz Pinto, Magalhaes, Brum 2018. P. 147) are between 1,38 and 2,3 deep, those at Tipasa, Algeria (Amraoui 2014. P. 93) 1,10 m. Of the 45 fish-salting vats excavated at Algeciras, Spain (Bernal-Casasola, Jiménez-Camino Alvarez 2018. P. 184, 214), none were deeper than 1,9 m. At another large Spanish fish processing site, Baelo Claudia, most depths fall within the range 1,5 to 2,5 m, but some vats are shallower (Arévalo, Bernal-Casasola 2007. P. 111, 124, 149, 168).

> It is common knowledge that the steppes of South Russia ... were the main sources of supply of grain, and the south Russian rivers were one of the sources of supply of fish, for the Greek world, particularly for Athens, in the second half of the fifth and in the fourth century. ... The volume of this trade inevitably declined. But the extent of the decline must not be exaggerated. Pontic fish had no rival, and the demand for it was in fact increasing rather than decreasing (Rostovtcev 1941. P. 105–106; 587).

Rostovcev provides no explanation for the further expansion of Pontic fish processing during the Roman period. When the *Social and Economic history of the Roman Empire* was first published in 1926, the Crimean and Moroccan fish-salting plants had not yet been systematically excavated, and the importance of the fish-sauce industry in the economy of the Roman Empire was not fully appreciated. Rostovcev seemed to consider fish-sauce as a Pompeian luxury product (Rostovtzeff 1957. P. 73) though for the second edition, a note was added referencing remains of fish-salting installations in France and Portugal (Ibid. P. 690, n. 100; Tchernia 2014. P. 13).

While Rostovcev correctly observed that trade flows through the Hellespont and the Thracian Bosporus were reciprocal, and that an outflow of Pontic exports must have been balanced by an equivalent value in imports – "it follows that Greece must have exported in return a large quantity of its own goods" (Rostovtzeff 1941. P. 196) – he assumed that the demand for grain and fish in the urban markets of the Aegean, and above all in Athens, were the prime movers of the Black Sea trade. The idea of the Athenian market as the locomotive pulling the economy of the Black Sea was in line with an Athenocentric approach that dominated ancient history for much of the twentieth century but in recent decades, this model has been called into question (Tsetskhladze 1998. P. 54–63; Braund 2007), and the alternative hypothesis – that the trade was driven by demand in the Black Sea region – deserves to be considered.

Diodorus of Sicily tells us, probably quoting Posidonius, that wine was among the first commodities exported to barbarian Europe, and that for a single amphora, the merchant received a slave as payment:

> With their typical eye for a quick profit, Italian traders find the fondness of the Gauls for wine a chance not to be missed. They carry the wine in boats along the navigable rivers and on carts across the plains, and in return they receive an incredible price; for one jar of wine they receive a slave, a servant in return for the drink (Diodorus 1939. P. 166. 5.26.3).

Wine was imported into the northern Black Sea region by Greek traders as early as the seventh century BC (Gavriljuk 2007. P. 634) and no doubt slaves were received as payment along with gold – the famed Scythian gold (Avram 2007. P. 239–241). Slaves figure prominently in Polybius' list of Pontic ex-

ports, quoted above, where the Greek wording literally means "persons who have been forced into slavery": prisoners of war and victims of slave-hunters. The story of Jason and his Argonauts retells, in mythical form, the story of an early Greek journey to the Black Sea in search of gold (the Golden Fleece) and captives (Medea).

During the Archaic period, many Greek colonies were established on the northern Black Sea coast, and in these colonies, prestige was associated with the Greek lifestyle that was the mark of the upper classes. Archaeological finds reveal a steady flow of Aegean imports into the Black Sea (e.g., to Tyritace: Matera 2014. P. 115–126) but over time, Greek craftsmen also settled in the northern Black Sea region to supply the local market with "Greek" goods (Gajdukevič 1949. P. 83–84). Two key elements of the Greek lifestyle were olive oil and wine, associated with two key institutions, the *gymnasion* and the *symposion*. Olives would not flourish in the Crimea, but oil could be obtained from the southern Black Sea coast, for instance from Sinope. From the third century BC onwards, the Bosporan cities produced significant quantities of wine for their home market (Gajdukevič 1966; Butyagin, Kasparov 2019. P. 109–110), but it was not exported (Gajdukevič 1971. P. 120). At all times, the best oil and the best wine was imported from the Aegean (Opait 2010).

To pay for Aegean imports, other goods had to be exported. The northern Black Sea steppe is good grain country, and in Rostovcev's own time, the Ukraine had been the breadbasket of Europe. But ancient wheat and barley harvests were unpredictable and as Polybius notes, the grain trade through the Hellespont went in both directions, depending on circumstances. Even in a major grain-growing city-state such as Chersonesus (modern Sevastopol) in the Crimea, grain shortages could occur from time to time, as evidenced by the civic oath of the city expressly forbidding the export of grain (IOSPE I^2 401; Lines 47–49; Stolba 2005b. P. 301–302).

Furthermore, even where ample supplies of grain were available, it might still be impossible to export them. Grain prices were a highly charged issue in the ancient world, as in more recent periods. In his study of bread riots in eighteenth- and nineteenth-century Britain, the historian E.P. Thompson developed the concept of the "moral economy" (Thompson 1991. P. 185–361) and highlighted the near-constant fear of grain shortage and famine that spurred local populations to violent attacks on grain traders. That a similar "moral economy" operated in the ancient Black Sea region is attested by the Chersonesus oath, and the mere suspicion that wealthy landowners were hoarding grain or profiteering could lead to riots. When the citizens of Prusa, a middle-sized town in Bithynia, suspected one of their wealthy compatriots of hoarding grain, they attempted to burn his house down (Dio Chrysostom 1946. P. 240. Or. 46.13).

In order to pay for Aegean imports, slaves, gold and grain would not suffice; a wider palette of export goods was required which came to include salted fish, hides, nuts and timber (Mehl 1987. P. 110–115; Hannestad 2007; Güney 2014. P. 610–612). With the imposition of the *pax Romana*, opportunities for warfare and slave-raiding were reduced, leaving a deficit which had to be made up by exports of other commodities. For that purpose, fish sauce was ideal. It had a high value-to-weight ratio, there was a steady demand in the Roman market, and it could be produced on a large scale without depleting resources on which the local inhabitants depended for their subsistence – in other words, without violating the rules of the moral economy (Fig. 1).

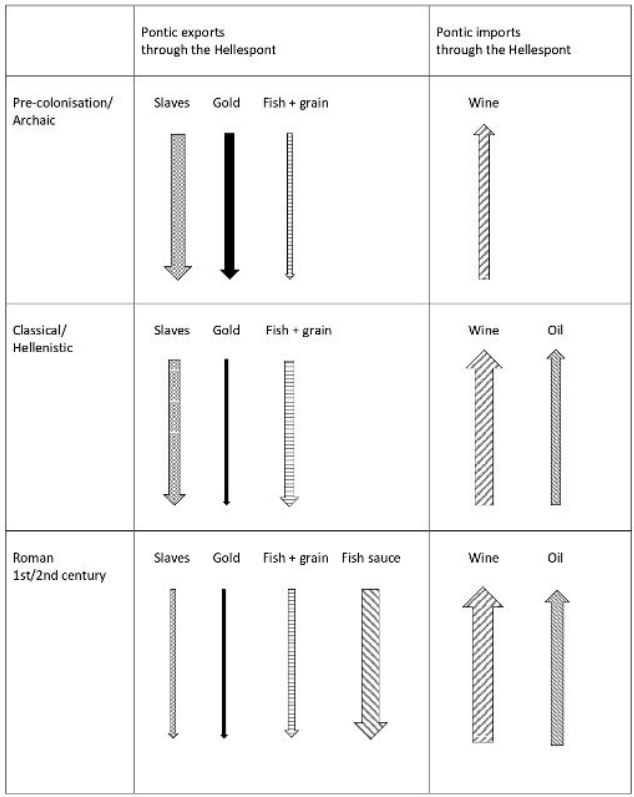

Fig. 1. Hypothetical reconstruction of trade flows through the Hellespont, from the Archaic to the Roman period.

Production and marketing

On the Mediterranean coast, salt is a ubiquitous resource that can be obtained simply and cheaply by evaporating seawater, but the Black Sea waters are brackish and on the north coast, summer temperatures are significantly lower than in the Mediterranean basin. In consequence, salt-pans can only operate in locations where the natural conditions are favourable. Ancient authors mention salt extraction in the lagoon near Chersonesus (Strabo 1924. P. 246. 7.4.7; Kadeev 1970. C. 20–23; Romančuk 2005. P. 100–101) and at the mouth of the Borysthenes, where many Scythians came to buy salt (Herodotus 1921. P. 252. 4.53; Rybakov 1979. C. 37–38; Dion 2003. P. 28. 36.3; Carusi 2008. P. 70–72), but salt could also be extracted elsewhere, e.g., in the marshes around Perekop or on the coast near Kerch (Baladié 1994. P. 151–155; Ivanova 2014. P. 7–9). While the ready availability of salt may have contributed to the concentration of fish-salting activities at specific locations on the northern Black Sea coast, there is no evidence that salt production and fish-salting were integrated with one another. It needs to be remembered that salt was employed for many other purposes beside fish processing; the rural economy consumed prodigious amounts of salt and the itinerant salt merchant with his train of pack animals will have been a familiar sight (Bekker-Nielsen 2013. P. 15).

Producing *tarichos* requires a minimum of equipment and leaves few archaeological traces. The fish can be hung on wooden racks or simply laid out on the rocks to dry (the Scandinavian word *klipfisk*, from which Russian клипфиш is derived, literally means “rock-fish”). Making fish sauce (garum) is a more demanding process, since it involves a prolonged period of fermentation. In principle, this could take place in wooden tubs or ceramic jars (*dolia*), but most fish sauce was produced in masonry vats sunk into the ground, either round or, more often, rectangular in plan.

Investing in a fixed fish-processing installation employing masonry cisterns was beyond the financial capacity of individual fishermen. Assuming that the salting complexes were not under state ownership – for which there is no evidence in the sources – we should look for their proprietors among the wealthy landowning elite. But what was the exact nature of their involvement? Were they active, entrepreneurial capitalists as envisaged by Rostovtcev, or were they passive investors, what Max Weber called ‘rentier capitalists’ (*Besitzrentner*, Weber 2013. P. 272)?

Over and above the financial outlay, the commercialization of a specialized high-value product like garum in a distant Roman market required skills and contacts that a Pontic landowner was unlikely to possess. In any case, trade was generally considered below the dignity of well-to-do Romans. A plausible working hypothesis is that the owners confined themselves to the actual production, leaving the packing and transport to middlemen, in the same way

that aristocratic landowners in nineteenth-century Italy did not deign to involve themselves in the day-to-day operation of their estates, which they left in the hands of farm contractors, the so-called *mercanti di campagna*. The scheme, which is described in a classic study by the German economist Werner Sombart (Sombart 1888. P. 60–70), was not particularly efficient in economic terms, but it secured the landowner a steady income with a minimum of involvement. In a similar manner, during the early nineteenth century, wine growers in the Moselle valley confined themselves to tending, harvesting and pressing the grapes. The ageing, bottling and marketing was left to travelling wholesale traders who acquired the wine in bulk soon after the end of the harvest (Meyer 1926. P. 23–25; 187–188).

If the Black Sea fish trade operated in a comparable manner, who were these travelling merchants? In a recent paper, Ephraim Lytle has put forward the theory that the salt-fish merchant Chaerephilus, who obtained Athenian citizenship in the fourth century BC, was of Scythian extraction (Lytle 2016a. P. 9–13). References to Chaerephilus and his descendants in the sources are numerous, but scattered, and Chaerephilus himself remains a somewhat elusive figure. There is some circumstantial evidence in favour of Lytle's theory, but definite proof is lacking. If Chaerephilus were in fact of Pontic descent, he would be an exception to the rule. In all other literary references to Black Sea trade – from the mythical voyage of the *Argo* through the shipwreck epigrams of Posidippus to the Phoenician fish traders in Lucian's dialogue – it is Mediterranean sailors who sail the Black Sea, not vice versa.

The question of his extraction apart, Chaerephilus' base of operations was clearly Athens, since that is where he applied for citizenship. In Lytle's analysis, Chaerephilus was the head of a family firm that controlled the production, transport and marketing of salt fish, an example of 'vertical economic integration' in antiquity (Lytle 2016a. P. 18–19), but he could equally well have been an entrepreneurial wholesaler purchasing salt-fish in bulk on the Black Sea shores and transporting it to Athens.

For Aegean wholesalers who spent only a short part of the summer sailing season in the northern Black Sea; it would have been impractical to set up pottery kilns on the northern steppes, and more convenient to bring the amphorae from the Mediterranean, either new amphorae or amphorae which had been cleaned for re-use. Only that part of the year's production which was destined for the local market would then be packed in locally produced amphorae – such as the Zeest 83 & 89 found in quantity in the eastern Crimea, but rarely outside the region. The larger part would be packed in amphorae produced elsewhere, finds of which would not reveal the Pontic origin of their contents.

While empty amphorae are often found employed for secondary purposes, e.g., as water containers or urinals, their re-use as transport containers does

not appear to have been a normal practice in the Greek or Roman world, but conditions in the Black Sea trade were not normal. Most of the goods coming down the Hellespont were staples with a low value per unit of weight or volume when compared to incoming goods such as oil or high-quality wine. Assuming that the trade was evenly balanced in terms of value, the volume going up would always be less than that coming down. (For a similar situation in the Roman seaborne trade with India, see Cobb 2015. P. 193–193). Ships sailing up the Dardanelles would have vacant cargo space in their holds and need to take on ballast unless something heavy – such as empty amphorae – could be found to fill that space.

As a parallel from modern history, the tile factories of Marseille exported millions of machine-made ceramic roof tiles to Australia, a sea voyage of more than 17,000 km. Shipping cheap building materials halfway around the globe makes little economic sense when viewed in isolation, but the sailing vessels carrying Australian grain to Europe took the tiles as a cargo for the return voyage. The meagre revenue to be gained from carrying tiles was still preferable to travelling in ballast and earning nothing at all.

Concluding remarks

The dynamic expansion of the north Pontic fish-processing industry in the first centuries of the Roman empire, attested by several hundred fish-salting cisterns, is a remarkable phenomenon in ancient economic history that defies easy explanation. Part of the background is obviously the integration of the north Pontic region into the economy of the Roman empire at a time when demand for fish sauce – garum – was on the increase. The western provinces of the Empire were well served with fish sauce from their own salteries, but there will also have been a market for processed fish and fish derivatives in the eastern Mediterranean.

Remarkably few fish tanks have been found along the Aegean coast or in the Levant, and many of these should probably be interpreted as holding tanks for live fish, not as *cetariae* (Theodoropoulou 2018). As noted above, Aegean salt-fish is only mentioned once in the *Deipnosphostai* of Athenaios. If Aegean entrepreneurs tried to exploit the demand for processed fish and fish derivatives in their home markets, then their efforts have left few traces in the historical record (Lytle 2018. P. 411).

Possibly Aegean fish-salters were simply unable to compete with their Pontic colleagues. Whereas fish were abundant on the Black Sea shores, in the Aegean cities, fresh fish were much in demand and fetched high prices. For a rich citizen to buy large quantities of fish for salting – and driving the market price up even further – would have been a provocation, a violation of the unwritten rules of the moral economy. In Byzantine Constantinople, fish

dealers were specifically prohibited from selling their wares to fish-salters before the market had closed for the day (Koder 1991. P. 127 = Leo the wise, 17.2). Thus, with a few exceptions, fish-processing in the Aegean region could not transcend the limitations of the polis or the oikos and gain a foothold the wider Mediterranean market.

According to the model proposed here, the owners of Pontic salting factories were only involved in the first stages of the 'halieutic cycle' (fig. 2), whereas the subsequent stages – packaging, transport and marketing – were controlled by wholesalers based in Athens or elsewhere in the Aegean. Chaerephilus may have been one such entrepreneur, the devious Lacritus (known to us from Demosthenes' oration 35) may have been another. The model is consistent with the meagre literary evidence and, more importantly, with the archaeological non-evidence, since it will explain the rarity of dedicated amphorae for Pontic fish sauce.

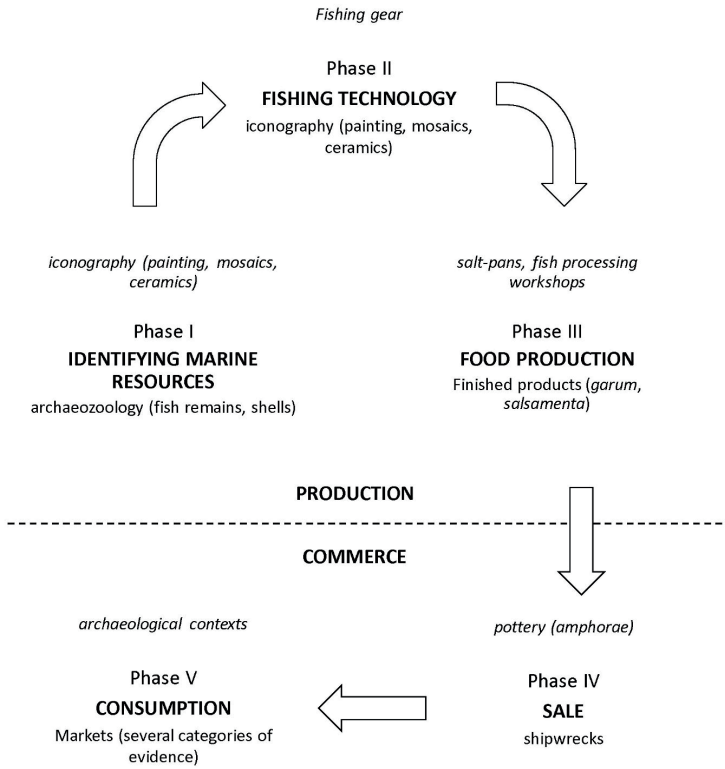

Fig. 2. The 'halieutic cycle', after Bernal-Casasola 2016. P. 190.

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ГРЕКО-РИМСКАЯ ЭКСПЛУАТАЦИЯ МОРСКИХ РЕСУРСОВ В СЕВЕРНОМ ПРИЧЕРНОМОРЬЕ: ВОЗНИКНОВЕНИЕ И РАЗВИТИЕ БОСПОРСКОЙ ТОРГОВЛИ РЫБОЙ

Уже в V в. до н.э. соленая рыба экспортировалась из Причерноморья в города Средиземноморья. С начала нашей эры известны использовавшиеся там устройства для производства рыбного соуса (garum). В некоторых местностях производство соленой рыбы и соуса продолжалось и в византийский период.

Сведения о черноморском рыбном производстве несколько противоречивы. С одной стороны, такие литературные тексты, как «Пир мудрецов» Афинея (ок. 200 г. до н.э.) подтверждают значение черноморской переработанной рыбы на средиземноморском рынке, а находки множества устройств для засолки рыбы в нескольких местностях Крыма свидетельствуют о крупных партиях рыбы, перерабатываемых в соус или в соленую рыбу. С другой стороны, находки амфор для готового продукта редки. Находки причерноморских амфор, известные по раскопкам вдоль побережья Средиземного моря, нисколько не превышают огромное количество рыбных амфор с Иберийского полуострова, найденных в римских раскопах.

Принимая за исходный пункт не экспорт, а импорт, автор этой работы предлагает новую модель развития и организации экспорта рыбы из Причерноморья. Что касается экспорта, предполагается, что главной причиной вывоза рыбной продукции из Причерноморья был не спрос среди греков на переработанную рыбу, а спрос на престижные товары со стороны причерноморской элиты. Экспорт давал наличные деньги, необходимые для расчетов за ввозимые оливковое масло и вина, а также чтобы компенсировать упадок экспорта рабов по условиям pax Romana, и потому вывоз черноморской соленой рыбы возрос. Также высказывается предположение, что рыбная продукция, как правило, не вывозилась местными (черноморскими) купцами, а закупалась оптом средиземноморскими оптовыми торговцами на месте производства. Вот почему следы причерноморской рыбной торговли почти незаметны среди местных археологических находок.

Ключевые слова: Крым, Боспорское царство, соленая рыба, garum, торговля, Афины

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