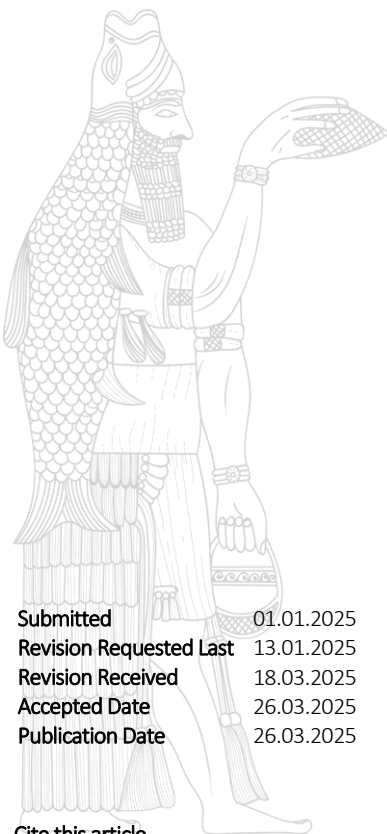


Fishing and Tuna Trade in Kyzikos

Hacer ÇORUH KURT  

Corresponding Author

Department of Archaeology, Harran
University, Faculty of Arts and Sciences,
Şanlıurfa, Türkiye.
hcoruh@harran.edu.tr



Submitted 01.01.2025
Revision Requested Last 13.01.2025
Revision Received 18.03.2025
Accepted Date 26.03.2025
Publication Date 26.03.2025

Cite this article

Çoruh Kurt, H. (2025). Fishing and tuna
trade in Kyzikos, *Oannes*, 7(1), March,
pp. 187-203.

Abstract

Located on the coast of Propontis, Kyzikos was colonized by Miletus. The most important factor in the colonization of the city was tuna fishing, which is understood to have been an important source of livelihood in the city. However, it is noteworthy that ancient sources have been silent on this issue.

During the migration season, tuna fish pass through the narrow passages of the Bosphorus and Hellespont in schools. This migration of tuna fish led to the development of large-scale fisheries in the region. Different from other fisheries, watchtowers were used in tuna fishing. Watchtowers made of wood were placed in places with clear visibility. The sharp lookouts placed here would guide the fishermen waiting in the boats toward the tuna.

It is understood that there were public fishing areas and saltpans in Kyzikos. Kyzikos demanded a fee from the fishermen who used these areas. Tuna was the most important industrial activity of the city. However, there are no traces of salting factories or salted fish amphorae in Kyzikos. Epigraphic sources reveal the existence of a guild belonging to fishermen in Kyzikos. Kyzikos is one of the centers where we know garum was produced. Kyzikos oysters have a great reputation as the highest quality oysters of antiquity.

Tuna fish, the source of wealth for Kyzikos, was chosen as the city symbol. The depiction of tuna was used on Kyzikos coins for centuries. The uninterrupted continuation of the depiction of tuna shows the importance of fishing in the social life of the city. The depiction of tuna is also found on many city coins. However, the oldest tuna coins were minted in Kyzikos. Kyzikos turned into a rich city by utilizing its fishing advantage due to its location.

In this article, data on the place of fish and fishing in the social and economic life of Kyzikos will be discussed based on ancient and modern sources, archaeological, epigraphic, archaeozoological, and numismatic data.

Keywords: Bluefin tuna, tunny, Cyzicus, Salted fish, Fishermen guild.



The content of this journal is licensed
under a Creative Commons Attribution-
Noncommercial 4.0 International License.

Geniştirilmiş Özet

Kyzikos Propontis'te stratejik bir konumda yer alan bir kenttir. Kent MÖ 7. yüzyılda Miletos tarafından kurulmuştur. Miletos kolonilerini kurarken balıkçılık için elverişli bölgeleri seçmektedir. Miletos'un en erken kolonilerinden biri olan Kyzikos'un konumu da balıkçılık açısından övgüye değerdir. Ton balıkları Bosphorus (İstanbul Boğazı) ve Hellespontos'un (Çanakkale Boğazı) dar geçitlerinden göç mevsiminde sürüler halinde geçmektedirler. Ton balıklarının göçü, bu bölgede büyük ölçekli balıkçılığın gelişmesine sebep olmuştur. Propontis ve Hellespontos'ta yapılan mevsimlik ton balığı avcılığı, Kyzikos'un kolonize edilmesinde en önemli etkenlerden biridir.

Antik Çağ'da ton balıkları Akdeniz için ekonomik anlamda büyük bir önem arz etmekteydi. Ton balıkları, Akdeniz boyunca uzanan yerleşmelerdeki insanlar için sabit bir protein kaynağıydı. Antik Çağ'da taze olarak tüketilen balık, salamura, isleme tekniği veya kurutma yöntemleri ile konserve edilmekteydi. Konserve balık, özellikle Pontus (Black Sea) ve Propontis kıyı kentlerinde endüstrileşmiştir. Kyzikos ton balığı avcılığı ile ünlenmiştir.

Ton balıkları Kyzikos yakınlarındaki dar Hellespontos boğazı, Sicilya ve İtalya arasındaki Messina Boğazı ile Atlantik'i Akdeniz'e bağlayan ve sıcak tuzlu sularından dolayı yumurtlamayı tercih ettikleri Cebelitarık Boğazı'ndaki göçleri sırasında yakalanmışlardır. Ton balığı avcılığında karşımıza, diğer balık avlarında uygulanmayan farklı bir yöntem çıkmaktadır. Denize bakan stratejik noktalarda gözetleme kuleleri inşa edilmiştir. Ahşap direklerden yapılan gözetleme kuleleri kıyı boyunca yerleştirilmiştir. Gözetleme kulelerine, keskin bakışlı gözcüler yerleştirilmiştir. Ton balıklarını yakalamak için en etkili yöntemlerden biri de, yarı kalıcı ağlar ve kıyı tuzaklarıydı. Kyzikos'ta ton balığı avının gece de sürdüğü ve meşaleler kullanıldığı düşünülmektedir. Antik dönemde insanların gıda ihtiyacını, çoğunlukla tuzlanmış, kurutulmuş ve salamura edilmiş balık karşılamıştır. Kyzikos'ta henüz balık tuzlama fabrikalarına ve kente özgü balık amforalarına rastlanmamıştır.

Ton balığı ticaretinin en önemli merkezi Kyzikos olup, ton balığı göçünün son noktası da Gades /Cadiz'dir. Antik Çağ'da balıkçılık oldukça organize bir endüstri dalıdır. Ton balıkçılığı, kayıklara, ağlara, incir yapraklarına, seramiğe ve tuza büyük bir talep oluşturmaktaydı. Kyzikos yakınlarında tuz kontrolünü Byzantion ile paylaştığı Dascylitis'ten (Manyas Gölü) elde edilmekteydi. Antik Çağ'da balık tutulan alanlar ve tuzlaların belediyelere ait olabildiğini görmekteyiz. Kyzikos bu konuda ilk örneklerinden biridir. Kentin belediyesi MÖ 1. yüzyılda balık tutulan alanlardan ücret talep etmekteydi. Kyzikos balıkçılarından bir gelir almakta ve Roma yönetimine bir vergi ödemekteydi. Yazıtlar, gözetleme kulelerinin kentler tarafından inşa ettirildiği ya da özel kişilerin mülkiyetinde bulunduklarından bahsetmektedir. Yalnızca özel şahıslar değil belediyelerinde gelir elde etmek için gözcüleri ve gözetleme kulelerini kiraladığı bilinmektedir. Göçmen balıkların rotaları üzerinde yer alan kentlerde balıkçılık önemli bir meslek haline gelmiştir. Birçok insan geçimini bu işten kazanmaya başlamıştır. Kyzikos ton balığından önemli bir gelir sağladığından balıkçıların organize olan balıkçıların kentte bir lonca kurdukları bilinmektedir. Kyzikos'tan ele geçen gelen geç Helenistik ve erken Roma yazıtları, kentin balıkçılık endüstrisi hakkında nadir bilgilerimizi oluşturmaktadır. Bu yazıtlar, gözetleme kulelerinin ve büyük ölçekli balıkçılık faaliyetlerinin varlığını kanıtlamaktadır. Ayrıca yazıtlardan kentlerin kıyının belirli kesimlerinde balık yakalama hakkını balıkçı loncalarına kiraladığı anlaşılmaktadır. Antik kaynaklarda Kyzikos'un balıkçılığına dair bilgilere rastlanmamaktadır.

Kyzikos'ta ki balıkçıların oluşturduğu birliği kanıtlayan yazıtlar bulunmaktadır. MÖ1. yüzyıla ait bir yazıt, kentteki balıkçıların topluluğu tarafından Poseidon ile Artemis/Aphrodite Pontia'ya adanmıştır. Diğer yazıt ise Roma İmparatorluk Dönemi'nden gelmektedir. Yazıt Kyzikos'ta, kendisi ve oğlu Claudius Demokritos için mezar yaptıran kişinin mezar taşıdır. Mezara başka bir ceset konulması veya mezarın ihlali gibi durumlarda ödenmesi gerekli bir ücretten bahsetmektedir. Bu cezanın alacaklısı olarak mezar sahibini koruyan bir balıkçıların birliğini topluluğunu görevlendirilmiştir. Yazıtlardan Kyzikos'ta kurulan loncaların, Anadolu'da bir çok yerde olduğu gibi üyelerinin mezarlarını koruma geleneğinin olduğu anlaşılmaktadır.

Ton balıkları ile ünlü olmuş Kyzikos, ton balığı ihraç eden önemli merkezlerden biridir. Bunun yanı sıra diğer deniz ürünlerinin de öne çıktığını bilmekteyiz. Anadolu'da büyük çapta üretimi yapılan garum, Kyzikos'ta da endüstrileşmişti. Antik kaynaklar Kyzikos'un denizkestanelerinin farklı olduğunu belirtmektedir. Bu denizkestaneleri fırtınayı ve denizin kabaracağını önceden tahmin edebilmekteydiler. Suriye valisi Licinius Mucianus, Kyzikos istirdiyelerine hayrandır. Mucianus MÖ 1. yüzyılda istirdiyelerin tam bir listesini sıralayarak birinciliği Kyzikos'unakilere vermiştir.

Kyzikos'ta ton balığı kentin en önemli endüstri faaliyetini oluşturmaktaydı. Denizle çevrelenmiş olan Kyzikos, kent simgesi olarak ton balığını seçmiş ve yüzyıllar boyunca sikkeler üzerinde bu sembolü kullanmıştır. Elektron sikkeler ile başlayan ton balığı tasviri, ana tip ya da yardımcı tip olarak her zaman kullanılmıştır. Birçok kent hem resmi tanıtımı hem de ekonomik önemini vurgulamak amacıyla, ton balığı ya da baş kısmının yer aldığı sikkeler bastırmıştır. Ancak en erken ton balıklı sikkeler MÖ 6. yüzyılda Kyzikos'un bastığı sikkelerdir. Ton balığı avcılığının kent yaşamına yansımaları, kamu anıtlarında ve heykellerde de görmekteyiz. Antonia Tryphaena tarafından Poseidon'a ithaf edilen Balıktaş diye adlandırılmış bir heykel kaidesinde ton balığı ve diğer balıklarla birlikte, kayıklarıyla balıkçıların görülmektedir. Ayrıca kente adını veren Kral Kyzikos'a ait bir heykelde kral ton balığını hedef alır şekilde gösterilmiştir. Bir denizcilik kenti olarak Kyzikos'ta bazı ünlülerde yetişmiştir. Antik Çağ'ın önemli bir denizcisi olan Kyzikoslu Eudokos bunlardan biridir. Ayrıca balık ressamlarının babası olarak bilinen Androclydes'te Kyzikosludur.

Kyzikos'un ton balıklarıyla dolu bereketli suları ve konumu, kentin refahının temelini oluşturmıştır. Kyzikos balıkçılık sayesinde öne çıkarak zengin bir kente dönüşmüştür.

Introduction

In ancient times, it is thought that fish and fishing were small-scale or part-time individual activities aimed at providing a family's livelihood and did not have an important place in nutrition. Therefore, there is a general belief that fishing had no significant impact on the economy. Analysis of fish remains unearthed in archaeological excavations are not sufficient to refute this view (Bursa Sturtevant, 2016, p. 75). However, in recent years, studies have addressed fishing and seafood in a broader and more comprehensive manner. Ancient sources contain a variety of information about fish species, fishing, fish consumption, processed fish products, and fish trade (Aristoteles, *Historia Animalium*; Strabon, *Geographika*; Plinius, *Naturalis Historia*; Oppianus, *Halieutika*; Aelianus, *De Natura Animalium*; Athenios, *Deipnosophistai*). What is interesting is that there is no information about fishing in Kyzikos in ancient sources. Although it is a city that is prominent with its fishing, the ancient sources seem to have fallen silent. Our data on fishing in Cyzicus are limited to a few epigraphic sources and coins minted by the city. This article will attempt to reveal the importance of fishing since the foundation of Kyzikos, the fish trade, particularly tuna fishing, and the contributions of fishing to the city's economy and social life.

Located on the Propontis, Kyzikos is known as a city of merchants and sailors with its fertile lands, waters full of tuna fish, and convenient harbors (Habicht, 2013, p. 197). Ancient sources see the location and topography of Kyzikos as a sign that it was suited for a maritime destiny (Prêteux, 2008, p. 18). Diodorus describes the people of Kyzikos as "masters of the sea" in the sentences in which he describes the city's successful defense and salvation from the attack by Arrhidaïos in 321 BC (Prêteux, 2008, p. 14). Kyzikos is located on the southern coast of the Propontis, halfway between the Hellespontos and the Bosphorus. Its location on the Arktonnesos (Kapıdağ) peninsula (Koçhan, 2011: p. 11) has a strategic position in the Propontis. Kyzikos was colonized by Miletus, which had numerous colonies, in the 7th century BC (Hurter & Liewald, 2006, p. 7; Burstein, 2010, p. 137; Irby, 2021, p. 165). (Fig.1).

Fishing was the most important factor in the choice of the Pontus coasts by Greek colonists as early as the 7th century BC, or possibly earlier. When establishing its Miletus colonies, it selected regions that were particularly suitable for fishing and trade (Mansel, 1999, p. 168; Bursa, 2010, p. 36; Motor, 2010, p. 17). Fish moving in shoals from Pontus to Propontis attracted the attention of Greek colonists. Therefore, they began to establish colonies in Pontus for more abundant fish by advancing from Propontis (Bursa, 2007, p. 145). The location of Kyzikos, one of the first colonies of Miletus and especially famous for its tuna fish, is also commendable in terms of fishing (Greaves, 2003, p. 140).

Propontis is the most important center after Pontus in fishing (Bursa, 2007, p. 145). In fact, Propontis is a sea where no large rivers flow into. However, there are many salty, warm, and nutrient-rich lagoons and lakes that flow into Propontis and the Bosphorus (Istanbul Strait). Therefore, in addition to many fish, migratory fish such as tuna also thrive in Propontis (Bursa, 2010, p. 15). Seasonal tuna fishing in Propontis and Hellespontos is one of the most important factors in the colonization of Kyzikos (Roesti, 1966, p. 84). The city's location provides an ideal place for tuna fishing (Hurter & Liewald, 2006, p. 7).

Tuna fish are seen crossing the Strait of Gibraltar into the Mediterranean in May. At the end of the summer, they migrate in the opposite direction, from the Mediterranean to the Atlantic Ocean (Roesti, 1966:78). In the spring, schools of tuna fish pass through the Hellespontos, Propontis and Bosphorus and head towards Pontus. They spawn here from June to July. In September, the tuna fish are now in the Propontis. The fish, continuing their journey, head towards the Aegean Sea (Roesti, 1966: p. 78).

Tuna Trade in Kyzikos

In ancient times, tuna fish were among the most economically important fish for the Mediterranean (Roesti, 1966, p. 77; Friedell, 1999, p. 45). Tuna fish were a constant source of protein for people in settlements along the Mediterranean. In Greek times generally, the poor, slaves, soldiers, agricultural workers and soldiers preferred tuna because it was cheap and long-lasting (Roesti, 1966, p. 84; Bursa Sturtevant, 2016, p. 85).

Salted, dried, and pickled fish met the food needs of the majority of the Greek people (Gallant, 1985, p. 11; Friedell, 1999, p. 45). Tuna fish, which was in great demand, was exported either whole or cubed and pickled (King, 2004: p. 33). It is thought that among the products imported by ships in ancient times, salted fish was the most commonly found in amphorae after wheat, olive oil and wine (Bursa Sturtevant, 2016, p. 85). Large

quantities of tuna were imported from Sicily and Pontus to Syria, Egypt, and Greece (Gallant, 1985, p. 11). It is understood from the increasing number of archaeological data that processed fish became an industry in the Mediterranean world, especially during the Roman Empire. As a result, fish were sent to all corners of the empire through a large commercial network (Bursa Sturtevant, 2016: p. 75).

In ancient times, fish and fishing were a highly organized industry in terms of technology and economy. We know that this industry developed in Anatolia as well as in other regions during the Roman Imperial Period (Bursa, 2010, p. 36). Pickled fish was industrialized especially in the coastal cities of Pontus and Propontis (Delemen, 2003, p. 7). Even today, the tuna industry in this region continues.

From the 6th millennium BC onwards, there were hunting and fishing communities on the shores of the Propontis (Bursa, 2010, p. 13). In ancient times, the Hellespontos and Propontis regions had important fishing centers. Fish remains unearthed in Troy and nearby Beşik-Yassitepe prove that deep sea, river and lagoon fishing was intense in the region as early as the Bronze Age (Von den Driesch, 1999, p. 454 et al.; Van Neer & Uerpmann, 1998, p. 249 et al.). Archaeozoological data from Beşik-Yassitepe, 7 km southwest of Troy, show that tuna fishing had an important place in daily life in the early stages of the Bronze Age. In the Bronze Age, tuna fish were also known in Troy, which was located 5 km south of Hellespontos in a very convenient location for fishing (Bursa, 2010, pp. 5-6). It is understood that tuna was exploited in Troy and Beşiktepe during the Bronze Age (Çakırlar, 2016, p. 296).

In Anatolia, fishing was done on a small scale on the coasts and in some lakes and rivers. There were a few regions where large-scale coastal fishing was prominent. As is the case today, the migration of fish through the narrow passes of the Bosphorus and Hellespont in large numbers during the migration season led to the development of large-scale fishing in this region. A few cities, such as Byzantion, Kyzikos or Parion, benefited greatly from the seasonal migrations of fish, such as tuna, between the Aegean and Pontus (Walser, 2022, p. 87: Lytle, 2012, p. 31).

Parion, located on the migration route of fish in the Hellespont, was known for the delicious taste of tuna and mackerel. Ancient sources (Athenaeus, *Deipnosophistai*, I. 27e; Athenaeus, *Deipnosophistai*, III. 116c, 119b; Plinius, *Naturalis Historia*, XXXII.146) mention that the city was famous for salted tuna, especially during the Roman Empire. The tuna harvest in Propontis, Hellespontus and Bosphorus allowed Byzantion and Kyzikos in Bosphorus and Abydos, supported by Hellespontus, to stand out as export centres (Roesti, 1966: p. 82; Bekker-Nielsen, 2006: p. 93). Kyzikos and Byzantion gained great fame with tuna fishing (Bekker & Nielsen, 2006, p. 93). Coastal fishing, which was carried out at certain points in Kyzikos, constituted the most important part of the local industry (Lytle, 2006, p. 108). In the Archaic Period, tuna fishing and processing became the city's main source of income (Hurter & Liewald, 2006, p. 8). In his speech, Aristides praises this port city, which is located in the middle of the road between Gadira/Cadiz and Phasis (Georgia-Poti), which are the two ends of the trade (Ertüzün, 1998, p. 107: Diomidis, 2009, p. 132). The main center of tuna trade is Kyzikos and the final point of tuna migration is Gades/Cadiz (Bresson, 2015, p. 186).

Byzantium, which focused on bonito and tuna fishing, is referred to as the "metropolis of tuna" (Athenaeus, *Deipnosophistai*, 7.303e) in ancient sources. It is understood that tuna exports had an important place in the economy of Byzantium. The fish depictions on the city's coins also indicate this situation (Bursa Sturtevant, 2016, p. 76) (For more information on Byzantine fish and fishing, see: Tekin, 2010). We know from an inscription from the 5th century BC that tuna fishing was done in Halikarnassos (Bursa Sturtevant, 2016, p. 78).

Tuna fish became an important industrial material, especially for cities located on seasonal migration routes on the Black Sea and Eastern Mediterranean coasts (Bursa, 2007, p.7). Athenaeus mentions that (Athenaeus, *Deipnosophistai*, 7.304) tuna was an expensive delicacy in the Roman period and that those who consumed too much of it could go bankrupt. The tuna industry was quite profitable. Therefore, it enriched the coastal cities and the Roman authorities involved in this business (Irby, 2021, p. 143).

Tuna cannot stay fresh as long as other fish of similar size. It must be consumed or processed immediately after being caught. That is why tuna caught in the Aegean are quickly gutted, beheaded and drained of their blood (Fig.2). A large workforce and intensive effort are required to process the fish brought to shore in droves quickly. For the Greeks, tuna was the only fish suitable for sacrifice to the gods. In tuna festivals in Attica and the Argolid, the first tuna of the season was sacrificed to Poseidon (Mylona, 2021, p. 32). (Fig.3).

Fishermen were wrapping the pieces of tuna in fig leaves to prevent them from spoiling. These pieces were sent to Mediterranean cities by ship in ceramic vessels. The typology of these ceramic vessels varied from place to place. These vessels are an important find to follow the traces of the salted or smoked tuna trade in the Greek and Roman periods (Roesti 1966, p. 83). However, a large portion of organic and inorganic commercial goods cannot be detected in archaeological contexts today because they deteriorate and disappear over time (Dumankaya, 2018: p. 163). Archaeologically, solid evidence is needed to document tuna fishing: fish bones, chemical traces on pottery, and salting barrels and amphorae from the salted fish trade (Mylona, 2021, p. 24). Some of these amphorae bear inscriptions, mostly painted (*tituli picti*) and occasionally graffiti. The inscriptions usually provide information such as what type of fish product the amphorae contained, the name of the merchant, the quality, quantity and source of the product. However, it is not possible to talk about a standard pot form used in the fish trade (Bursa Sturtevant, 2016, p. 87). No stamped salted fish amphorae have been found in Kyzikos to date. This may be due to the fact that fish amphorae are rarely stamped. While providing information about the port of Kyzikos, Strabon mentions the large warehouses (McLaughlin, 2016, p. 117; Çoruh Kurt, 2022, p. 199) located on the coast. However, no traces of salting workshops have yet been found in the excavations in the city (Prêteux, 2008, p. 7).

Tuna fishing increased the demand for boats, nets, fig leaves, ceramics and salt (King, 2004, p. 32). Beyond its daily use, salt was an indispensable need for the preservation of fish (Walser, 2022, p. 87). In the region of Mysia, salt was extracted from Lake Dascylitis / Manyas (Lytle, 2012, p. 8), whose control was reported by Strabo to have been divided between the cities of Kyzikos and Byzantion (Arslan, 2010, p. 422).

Tuna fishing and fishermen's guild in kyzikos

During the Greek and Roman periods, hundreds of people on the Pontic coast were engaged in the economically profitable tuna fishing and processing business (Roesti, 1966, p. 82). The wealth of many fish import centers in the Mediterranean and Pontus was also due to successful tuna processing (Roesti, 1966, p. 83). Fishing became an important profession in the cities located on the routes of migratory fish (Bursa, 2007, p. 13).

Tuna was the most popular among many species caught in ancient times. The names of tuna fish do not exactly match today. Therefore, it is seen that bonito, tuna and bluefin tuna were caught as tuna (Irby, 2021, p. 143). Tuna fish were caught during their migrations in the narrow Hellespont Strait near Kyzikos, the Strait of Messina between Sicily and Italy and the Strait of Gibraltar, which connects the Atlantic to the Mediterranean and where they prefer to spawn due to its warm salty waters (Irby, 2021, p. 143). Every spring, tuna would enter the Propontis in schools to spawn; in the autumn they returned to the Mediterranean (Hurter- Liewald, 2006, p. 8).

Tuna consumption in the Mediterranean in Prehistoric times is understood from bone remains. As is known, tuna fishing and pickled had great economic and social importance for the Phoenicians, Greeks and Romans in historical times. Tuna fishing required complex organization and large-scale catching systems based on the use of nets. Ancient sources provide sufficient information about tuna consumption and the places where they were caught. However, our knowledge of catching methods is limited (Felici, 2017, p. 2).

Tuna fish were caught using advanced technology compared to daily fishing (Bursa, 2007, p. 7). Large scale equipment and capital were needed to catch tuna fish en masse during their migration. The short fishing season had to be successful in order to cover the expenses. Therefore, fishing groups came together and used large equipment that they had prepared in advance (Bursa, 2007, p. 13). Tuna fishing requires a great deal of organization as well as experience in when and how to catch the fish (Horejs, et al, 2015, p. 313).

In tuna fishing, we encounter a different method that is not applied in other fishing. The Phoenicians and Greeks developed the most effective tuna fishing techniques that are still valid today. The most effective of these are the spotters placed at strategic points overlooking the sea. In some places, watchtowers were built so that these spotters could see farther (Roesti, 1966, p. 79). Spotters on watchtowers built along the coast are to can detect the slightest change in the sea (Walser, 2022, p. 88). Watchtowers are built on the seashore or in an area with a wide and uninterrupted field of vision, using wooden poles (Bursa, 2007, p. 25; Felici, 2017, p. 2; Mylona, 2021, p. 32). (Fig. 4). The spotters would signal to the fishermen waiting in the boats and warn them in which direction to cast their nets or in which direction to row. Thus, the tuna, surrounded by the nets and exhausted, were caught with the help of the currents and narrow bays. It is known that the spotters could estimate the number of tuna in the shoal with great accuracy (Bursa, 2010, p. 11; Irby, 2021. P. 143). Oppian describes

(Oppian, *Halieutika*, 6.637-648) a tuna watcher on a high hill watching the approaching school, and the fish streaming towards the fixed nets like phalanx soldiers (Bekker-Nielsen, 2006, p. 93).

There is information in ancient sources that tuna fish can see better with their right eyes, that these fish enter the Black Sea by following the right shore, and that they follow the left shore when leaving (Bursa, 2007, p. 74). In fact, the reason for this is that when you go from Bosphorus to Pontus, the main current flows counterclockwise along the shore, that is, from right to left (Arslan, 2010, p. 413.dn.1701).

In the early 20th century, Greek and Turkish fishermen confirmed Aristotle's account, stating that bluefin tuna migrate by following the shore with their right eye and keeping it towards the shore. They reported that schools of tuna migrate counterclockwise along the coast. This observation is very important for estimating their presence in different places and also for the construction of tuna fishing equipment. They also observed that if a school of tuna is encountered in shallow coastal areas, it is more likely to be a large school. This is an important observation in terms of the location of tuna fishing in the region and fishing equipment (Mylona, 2021, p. 28).

The migrations of tuna fish to both ends of the Mediterranean have a predictable timetable (Roesti, 1966, p. 78). In tuna fishing, apart from the time of year and the location of fishing operations inshore or offshore, the moon phase is an important factor. It has been observed that the probability of catching tuna exhibits a periodicity that coincides with the lunar cycle. For this reason, fishermen in the Aegean call some rich catches the "full moon of May tuna" (Mylona, 2021, p. 27).

The function of tuna traps is based on the fact that schools of tuna tend to swim counterclockwise along the coast, very close to the shore, and due to their physiology they cannot turn back. Fishermen set up a system of poles and nets that form a kind of labyrinth in the shallow waters. These nets intercept the fish, driving them into a closed, controlled area where they are caught. Usually carried by boat, the nets are extended out to sea to extend the reach of the trap when schools of tuna approach. Watchtowers facilitate the accurate timing of this large-scale event (Mylona, 2021, p. 32).

One of the most effective methods for catching tuna was semi-permanent nets and coastal traps (Bekker - Nielsen, 2006, p. 93). The coasts of Propontis, Hellespontos and Bosphorus have a unique geology and ecology. The fishing technology in this region was coastal trap nets (Lytle, 2012, p. 31). (Fig. 5). Today, we see that the same watchtowers continue to be used on the Bosphorus. These systems, called *Dalyan*, are established at the end of March and the beginning of April. It is a system where rooms and corridors are created by stretching nets between piles driven into the seabed along the shore. Fish schools are directed to this system. Upon the signal of the watchman on the watchtower, the fishermen waiting in their boats close the entrance. In this way, the fish are trapped. The fishermen who approach them transfer the fish in the nets to the boats. It is a difficult task for the watchman who waits for hours in a small place on the tower and the fishermen who wait for a signal in the boat to wait for hours under the sun. These systems and equipment are removed when the *Anavaşa* is finished, that is, when the fish go north, for use and repair for the next time (Ertan, 2010, p. 45 et al). (Fig. 6).

We know that large-scale fishing, where commercially valuable species such as tuna were caught, involved night fishing and the use of fire. Lytle states that (Harland, 2014, p. 104; Lytle, 2018, p. 80) this was also the case at Kyzikos. Torches were used to attract schools of tuna to the nets. In addition, the presence of a lighthouse (Benjamin, 1880, p. 43; Çoruh Kurt, 2022, p. 203) at Kyzikos may have contributed to this environment.

It is known that during the Roman period, city municipalities also had fishing areas and salt pans. Kyzikos is one of the first examples. According to Strabo, in the 1st century BC, in order to develop fish farming, they demanded a fee from the areas where fish were caught (McCann, 2017, p. 37). Kyzikos and Byzantion, which we know received income from their fishermen, paid a tax to Rome (Curtis, 1991, p. 151). It is understood from ancient sources that watchtowers were built by cities or were owned by private individuals. Inscriptions reveal that not only private individuals but also municipalities rented watchtowers and watchtowers to generate income. It is understood that this situation was valid in Kyzikos in the 1st century BC (Vargas - Del Corral, 2007, p. 211; Marzano, 2013, p. 77). We learn from Strabon (Strabon. XI.2.4.) that there were watchtowers belonging to the city of Klazomenai on the shores of the Sea of Azov. From an inscription belonging to the city of Kos, we learn that the city sold the right to collect taxes from the watchtowers. It is understood that these towers, which are owned by the state or private individuals, are rented to fishermen during migration seasons, and both the fishermen and the property owners make a lot of profit (Bursa Sturtevant, 2016, p. 78).

In Aelianus' narratives, a watchtower is a place where a net is tied after a fish is seen. It is understood that a watchtower consists of two poles made of pine timber leaning towards the sea. Wooden towers of this type are known everywhere in the Mediterranean in the Byzantine, Middle Ages and Modern periods. However, the fact that the watchtower in Kyzikos belonged to the municipality and was rented by the fishermen's guild suggests that this tower cannot be a simple wooden frame (Vargas and Del Corral, 2007: p. 211).

Kyzikos was getting a significant income from tuna fish. As a reflection of this, we see that fishermen came together and established a fishermen's guild in Kyzikos (Hasluck, 1910: p. 258; Corcoran, 1963, p. 98; McCann, 2017, p. 41; Motor, 2010, p. 189; Irby, 2021, p. 148). Several late Hellenistic and early Roman inscriptions from Kyzikos and Parion provide rare information about the fishing industry in this region. The inscriptions attest to the existence of watchtowers and large-scale fishing operations. It appears that during this period the municipalities of the city leased the right to catch fish on certain parts of the coast to fishermen's associations for income (Lytle, 2012, p. 31; Walser, 2022, p. 87). An inscription from Parion, dated to the 1st or 2nd century AD, provides important information about tuna fishing. It attests to the renting of a fishing watchtower, a partnership of more than thirty people, and that the fishing and its duties were similar to those of modern tuna fishing (Marzona, 2018, p. 444). The inscriptions from Kyzikos confirm that the same conditions applied to Kyzikos.

The first epigraphic evidence of fishing activities in Kyzikos is found on a stele from the Hellenistic Period. The inscription, dating back to the 1st century BC, was dedicated to Poseidon and Artemis/Aphrodite Pontia by the fishermen in the city (Bursa, 2007, p. 20, 138; Marzona, 2013, p. 42; Felic, 2017, p. 3; Harland- Last, 2020, p. 95).

Aphrodite was worshipped as the goddess of the sea in Kyzikos (Zajac, 2023, p. 114), and Poseidon was also highly respected in the city surrounded by the sea (Ertüzün, 1998, p. 67). Although the inscription states that it was dedicated to Poseidon and Aphrodite, we encounter an interesting situation on the stele. The depictions do not reflect Poseidon and Aphrodite, but Kybele and Apollo. This suggests that they may have been mixed up in the workshop. Kybele is sitting on her throne, with a tympanum next to her. Apollo is opposite her. Below this, there is a slave making a presentation in front of an altar (Harland, 2014, p. 105. Vermaseren, 2015, p. 92; Watson, 2016, p. 77).

The inscription mentions roles related to fishing (such as fish watchers, boatmen, net pullers) (Felic, 2017, p. 3, 9). It is understood from the inscription that eleven people came together and made a partnership agreement to share the financial responsibility for tuna fishing activities (Marzona, 2013, p. 80). The inscription mentions the existence of a rented tuna watchtower. It is understood that the partners were managed by an archon and that there were two people responsible for the treasury of this community (Marzona, 2013, p. 42). It is thought that those on the dedication were from a tax-paying business. This tax is related to some fishing and maritime rights. This inscription is associated with inscriptions attesting to the fishermen's guild in Kallipolis (Gelibolu) and Parion (Bursa, 2010, p. 38).

A second inscription that proves the union of fishermen in Kyzikos comes from the Roman Imperial Period (Harland, 2014, p. 104; Robert, 1950, p. 94 et al.). Unlike the previous inscription that refers to the hiring of tuna spotters and proves business partnerships, this inscription points to a specific professional union (Marzona, 2013, p. 46). The inscription is the tombstone of a person who had a tomb built for himself and his son Claudius Demokritos in Kyzikos. It mentions a fee that must be paid in cases such as the placement of another body in the grave or the violation of the grave. A fishermen's union that protected the owner of the tomb was assigned as the creditor of this penalty (Lytle, 2006, p. 79; Marzona, 2013, p. 46; Harland, 2014, p. 103). This inscription, which dates to a later period than our previous inscription, shows that fishing activities, which constituted an important part of the economy of Kyzikos, continued in the 2nd century AD (Marzona, 2013, p. 46).

Another tomb inscription unearthed in recent excavations in Kyzikos proves the existence of a maritime guild and that the guilds took on the task of guarding tombs in Kyzikos. The inscription from the family tomb of Aelius Marcus Diogenianus, dating back to the 2nd century AD, states that if anyone else were buried in the tomb, a fine of 1,500 drachmi would be imposed on those who "protected the harbor" (Koçhan, 2018, p. 16-17). The inscriptions constitute the few documents about fishing activities in the city. There is no

information about the city's fishing in ancient source (Bursa, 2007, p. 93). In Kyzikos, along with the fishermen's guild, there were also fullers (Harland, 2014:103) and clothing- cleaners (Harland- Last, 2020, p. 116) guilds as recipients of penalties for violations of tombs. The inscriptions show that the fishermen worked in a highly organized manner and formed a professional union/guild among themselves. It is understood that these guilds had duties such as protecting the graves of their members within the social life of the city. This tradition, which was widespread in Kyzikos and its surroundings, is seen elsewhere in Anatolia (Harland, 2014, p. 103).

Kyzikos seafood

Some cities on the Propontis coast have come to the fore with the deliciousness of their fish and the income they earn from fishing (Bursa, 2010, p. 13). Kyzikos is a city famous for its tuna fish. However, we know that other seafood products were also prominent. Fishing in Lake Daskylitis near Kyzikos was a Byzantine monopoly. This situation caused disagreements between the two cities (Dumont, 1976, p. 113).

John dory (Zeus faber)

John Dory are common near Kyzikos in Propontis. The fish, which attract attention with their ugly appearance, have very tasty meat. Sometimes consumed salted, the fish is one of the delicacies of Cadiz (Dalby, 2003, p. 186).

Louvar

It is one of the fish depicted together with tuna on Kyzikos coins (Fig. 7a) but not mentioned in publications. This fish, which we encounter on the coins of Kyzikos (Hurter & Liewald, 2006, p. 9 Taf.1.3), is rarely seen in the world. The first data regarding the occurrence of this species in Hellespontus belongs to 2005. The fish found on the coast of Çanakkale is today preserved in the Çanakkale University Piri Reis Marine Museum (Fig.7b.) (Irmak & Alparslan, 2008, p. 507).

Additionally, fish identified as Squid (Fig.8) and Eel (Fig.9) are seen on the coins, although they are not included in the publications.

Garum

One of the most important goods that brought in international trade was a type of fish sauce that the Romans called garum. To obtain garum, overly salted fish were fermented and the resulting liquid was strained. Everyone flavored their meals with garum (Casson, 2002, p. 111). Tuna, sturgeon and mackerel were added to the garum sauce. The sauce, to which wine and spices were added, was left to ferment for a month (Friedell, 1999, p. 46). Garum, which was produced on a large scale in Anatolia, had become an industry in the regions of Kyzikos, Klazomenai (Bursa, 2010, p. 43) and Bithynia (Yıldırım, 2010, p. 38: Bursa, 2007, p. 40). One of the most well-known and famous garum centers was Kyzikos and the other was Byzantion (Di Natali, 2014, p. 2830). However, no traces of garum production have been found in Kyzikos so far.

Sea urchins

Ancient sources state that the sea urchins of Kyzikos and Byzantion were different. These sea urchins could predict storms and sea swells. They would even calculate the direction and strength of the waves and stick to the nearest rocks. In this way, they would not be uprooted by the waves and swells and would remain balanced with the weight of the rock they were stuck to (Arslan, 2010, p. 411 dn 1692).

Oysters

During the Roman period, pools were built to easily obtain some of the favorite fish, especially oysters, and other seafood (Delemen, 2003, p. 23). One of the areas famous for oyster beds during the Roman period was Kyzikos (Marzano, 2013, p. 174). Kyzikos was considered rich in terms of oyster beds along the Propontis coast (Dalby, 2002, p. 159, 165).

The oysters of Kyzikos were quite famous in antiquity. Pliny (N.H. XXXII 21, 62-65) compares them with those of various regions and states that the oysters of Kyzikos were superior to them (Sevin, 2016, p. 64). Pliny, on the other hand, seems to have taken Mucianus' assessments literally (Ash, 2007, p. 13; Hamilton, 2012, p. 103; Marzano, 2013, p. 174). When Licinius Mucianus was sent to the East as governor of Syria during the reign of Nero, he stopped by Kyzikos. He is known for his fondness for the oysters of Kyzikos that he tasted there (Birley, 2013, p. 162; Caldwell, 2015, p. 76, 83).

Mucianus, a statesman, writer, soldier and tastemaker, speaks with admiration of the quality of the oysters of Kyzikos in the 1st century AD. (Lovell, 1867, p. 69; Elsner & Rutherford, 2005, p. 232; Tillie, 2017, p. 36). Mucianus, in Roman times, ranks oysters according to their quality and praises them by comparing them with those of Kyzikos. Mucianus states that they are "larger than those of Lake Lucrinus, fresher than those of the British coast, sweeter than those of Medulla, more delicious than those of Ephesus, fuller than the Illicians in Spain, less slimy than those of Coryphan, softer than those of Istria, whiter than those of Circeii" (Pilinius, 32.62)" (Lovell, 1867, p. 70; Elsner & Rutherford, 2005, p. 251 dn.29; Marzano, 2013, p. 174). This list, in which Kyzikos won the victory among all oysters (Ash, 2007, p. 13; Marzano, 2013, p. 174), is important in terms of showing the spread of the Roman oyster trade (Livie, 2014, p. 20).

Reflection of Tuna on Coins and Urban Life

In ancient times, cities put symbols on their coins that expressed their identity. Therefore, coins are decorated with depictions that refer to the main source of wealth or fame of a city, its patron god or mythological elements. Kyzikos is one of the best known examples in this regard and included tuna in its coin designs. Tuna, one of the sources of wealth of Kyzikos, was featured on coins as a symbol of the city's wealth or as a distinct product of its economy (Robinson & Blegen, 1935, p. 389; Aldrete & Aldrete, 2019, p. 34; Morrisson, 2002, p. 46) (For Kyzikos coins see; Motor, 2010).

Kyzikos electrum coins have been called the most interesting coins of all times and places (Mildenberg, 1995, p.1; Motor, 2010, p. 7). There was no need to test the weights of Cyzicus electrum coins in a very wide geography where they were valid. Since it is well known that the weight of Kyzikos electrums does not change, it was enough for the customer to see the tuna symbol on the coin (Kraay, 1976, p. 261; Motor, 2010, p. 63). Sellers and buyers found Kyzikos coins reliable because they are a three hundred year old traditional coin (Mildenberg, 1995, p. 4; Motor, 2010, p. 63). It is a matter of curiosity why and how such an important trade coin emerged in a small city and continued to be used for centuries (Mildenberg, 1995; Motor, 2010, p. 54).

The tuna emblem has always been used as a promotional emblem on Kyzikos coins (Carradice & Price, 2001, p. 83; Motor, 2010, p. 92). The depiction on the coins is not coincidental due to its huge imports (Bresson, 2015:186). The tuna on the earliest electrum coins is the symbol of the city and has a meaning that reveals the importance of the fish trade, which was the city's main industry (Prêteux, 2008, p. 7,18; Psoma, 2016, p. 93). As an emporion, the tuna symbol on Kyzikos coins symbolizes that it was a fishing city (Motor, 2010, p. 17) (For the depiction of tuna on Kyzikos coins, see Fig.10).

The tuna depiction was also included in the smallest coin units. The tail or head of the tuna was featured on the coins. The entire fish was included on large-denomination coins. The constant use of tuna and its presence even in the smallest units shows that they had an urban symbol function (Skinner, 2012, p. 135). The tuna depiction, which began with electrum coins, was used for centuries as the main type or auxiliary type, although the types changed every year (Carradice & Price, 2001, p. 62; Hansen & Nielsen, 2004, p. 986).

Many cities are known for their coins depicting a full ton or the head of a tuna fish as a symbol of their economic importance. In addition to Kyzikos, we come across coins depicting tuna fish in Gades, Sexti, Abdera, Rome, Soluntum, Acanthaia, Istria, Olbia, Chersonesus, Panticapaeum, Phanagoria, Sinope, Chalcedon, Lampsacus, Methymna, Clazomenae, Teius, Chius, Samos, Lycia, and Tarsus. In addition, cities such as Chalcedon, Lampsakos, Sinope and Olbia, Chersonesus, Pantikapaion, Phanagoria, and Istria from the Black Sea used tuna fish on their coins (Roesti 1966, p. 84; Motor, 2010, p. 97).

The tuna coins prove that bluefin tuna first became of significant economic importance in the eastern part of the Mediterranean basin, in the Bosphorus, Propontis and Aegean, and later in the central part (Sicily and Calabria). Kyzikos first minted tuna coins in electrum. The tuna coins of other cities were of silver or bronze (Di Natali, 2014, p. 2832). Tuna coins seem to have been concentrated in Kyzikos, Sicily and Gades, where the tuna industry was developed. (Gades used the tuna symbol later than Kyzikos Morrison, 2002, p. 46; Motor, 2010, p. 97, 102). The cities of Gades, Sexi, Salacia, Abdera, Itucci and Malaca in the Iberian peninsula were also famous for their tuna wealth (Güney, 2012, p. 193).

Most tuna coins were minted in the 3rd and 2nd centuries BC. The earliest tuna coins are those of Kyzikos in the 6th century BC (Di Natali, 2014, p. 2831).

The electrum coins of Kyzikos depicting tuna fish enjoyed great fame in antiquity. There were more than two hundred types on the obverse of the coins (Motor, 2010, p. 91). Thousands of tuna coins were minted at Kyzikos over three centuries (600-300 BC). Kyzikos tuna coins feature terrestrial predators, including wild boars, a lioness attacking a fish, a panther standing on a tuna, and birds such as Zeus' eagle with a fish in its claws. Hunters are shown hunting fish or gods with tuna. The mythological water creatures and ship prows on the coins are a reference to the fact that watercraft were a fundamental aspect of the fishing industry (Irby, 2021, p. 169).

We can interpret the depictions of tuna on coins as a reference to the annual migration of tuna between Pontus and the Mediterranean. It was an important and highly profitable activity for coastal cities. These migrations caused a great increase in fishing activities. In addition, the easy availability of highly demanded fish caused changes in eating habits (Skinner, 2012, p. 135). The importance of the fishing industry, even for a city with a large area such as Kyzikos, is evidenced by the depiction of a tuna on its official emblem (Walser, 2022, p. 88).

One of the few valuable studies that trace tuna fish, Di Natali states that (Di Natali, 2014, p. 2832) based on the distribution of coins, the high economic importance of bluefin tuna fishing and trade in the western Mediterranean and adjacent to the Atlantic Ocean during the Phoenician and Roman periods was confirmed. Fishermen were catching bluefin tuna at that time.

Propontis and Bosphorus were important trading areas from the earliest periods, at least from the 4th century BC. Kyzikos was the most important trade center for bluefin tuna for several centuries. Byzantion became the main center a few centuries later and maintained its importance during the Ottoman period (Di Natali, 2014, p. 2832). The fact that tuna was continuously minted on Kyzikos coins from the 6th century BC to the 3rd century AD shows the importance of fishing in the social life of the city (Bursa, 2010, p. 19; Bursa, 2007, p. 93).

The importance of tuna fishing in city life is seen not only on coins but also on public monuments and statues. The source of the city's wealth is also reflected in a public monument dedicated to Poseidon by Antonia Tryphaena in the 1st century AD (Lytle, 2018, p. 85; Çoruh Kurt, 2022, p. 200). We come across traces of fishing on a monument thought to have been built in the city's harbor. Dolphins, bonitos and small fish are depicted on a statue base called Balıktaş, which is lost today. On the pedestal there is a trident, a boat and fishermen, which are the symbols of Poseidon (Çoruh Kurt, 2022, p. 200).

It is also possible to see traces of tuna fish on a statue of King Kyzikos, who gave his name to the city. In the statue of Kyzikos in the British Museum, the king is shown with a trident in his hand, aiming at a tuna fish (Robinson & Blegen, 1935, p. 389; Motor, 2010, p. 103).

As a sea city, Kyzikos also produced famous people related to the sea. Edudoxos from Kyzikos was the greatest sailor of the ancient period (Ertüzün, 1998, p. 95-96; Koçhan, 2011, p. 43; Cunliffe, 2017, pp. 322-323; Roller, 2004, p. 230; Çoruh Kurt, 2022, p. 202). Androcydes, who had a great reputation in the ancient period and was considered the father of fish painters, was from Kyzikos. Androcydes became famous with his painting of Scylla, which has various fish around it (Peirano, 2009, p. 192.dn.27).

Conclusion

In ancient times, water shaped people's lives, myths and rituals. Water also influenced the expression of urban identity, which distinguished coastal and island cities. Maritime imagery on coins of urban identity emphasizes the relationship and origins of many Greeks, who were founded on waves or became rich and powerful thanks to the sea, with water.

The fact that tuna was used as an indispensable type on Kyzikos coins from early times also reveals the importance of tuna in the life of the city. The depiction of tuna was not intended merely as an artistic choice. This depiction also reflects the economic and ecological contexts of Kyzikos. Its location on the tuna migration route played an important role in the foundation of Kyzikos. It is possible to interpret the tuna depictions on Kyzikos coins as a reference to the annual migration of fish and a sign of fish trade. The city, which has been involved in tuna trade since its foundation, has been the main center of this trade. The city maintained its importance for centuries as the main center of the tuna trade, but eventually lost its leadership to Byzantium.

One of the most famous and longest-lasting coins of antiquity were the Kyzikos coins. One of the facts underlying this situation is the tuna trade that has been carried out in Kyzikos for centuries. The fact that Kyzikos minted the earliest tuna coins and used this type for centuries is evidence that the city was the oldest and main centre of the tuna trade. The silence of ancient sources on this issue can perhaps be explained by the fact that people have been familiar with this situation for centuries. New archaeological findings will allow us to increase our knowledge of Kyzikos fishing.

The central location of Kyzikos on the Propontis and its wealth in the sea formed the basis of the city's prosperity. Tuna fishing on its shores became the city's main source of income. Tuna fishing and its fishermen contributed to the prosperity of their city. This way, Kyzikos became a rich city, standing out from other cities. Kyzikos had a glorious past with the presence of the sea surrounding it.

Ethics Committee Approval: Ethics committee approval is not required.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author has no conflicts of interest to declare.

Financial Disclosure: The author declared that this study has no financial support.

Figures

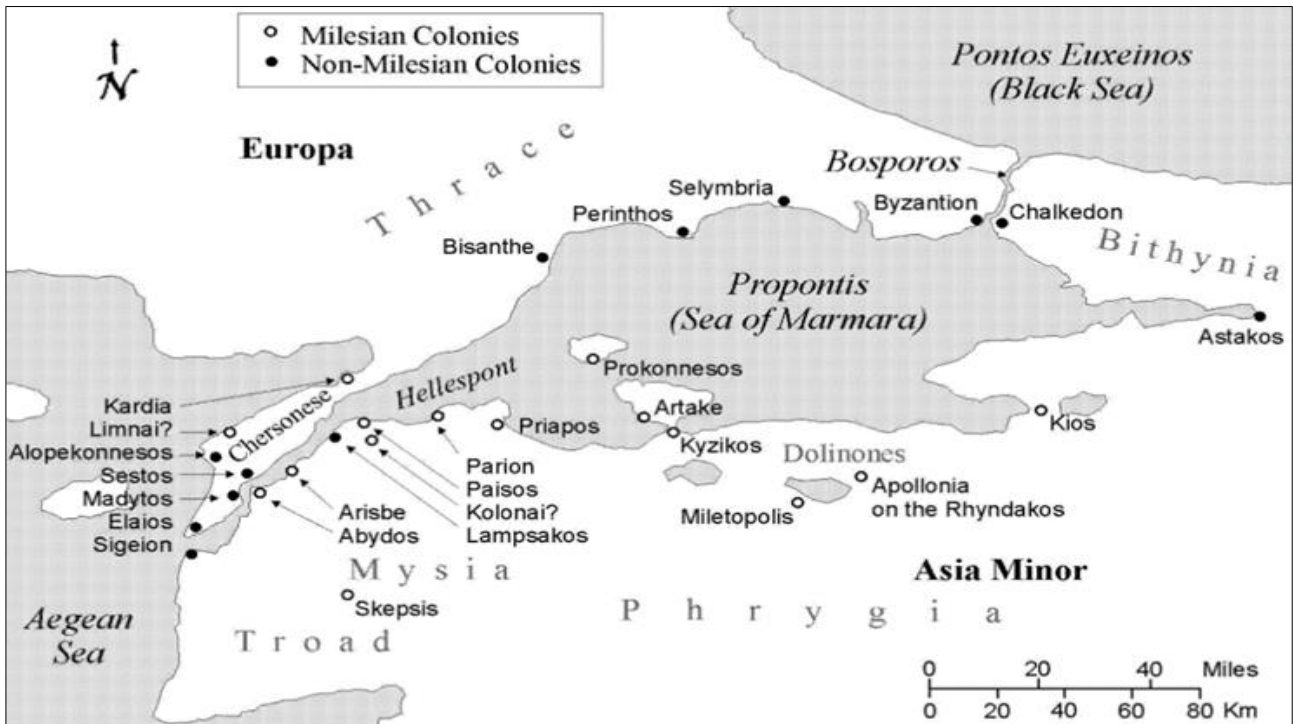


Fig.1. Hellespont, propontis ve bosphoros: Gorman, 2001, p. 285 map.6



Fig. 2. Image of a bluefin tuna vendor on a "Siciliota" pottery from the IV century B.C. at the Mandralisca Museum in Cefalù (Sicily, Italy).
<https://artsupp.com/it/artisti/anonimo/cratere-del-venditore-di-tonno>



Fig. 3. Cutting a bluefin tuna before a ceremony or a feast. Black figures painted on a reddish background and decorating a Greek wine pitcher of VI b.C. at the State Museum in Berlin (Germany).
<https://kosmosociety.org/wp-content/uploads/2021/06/Tuna-sacrifice.jpg>

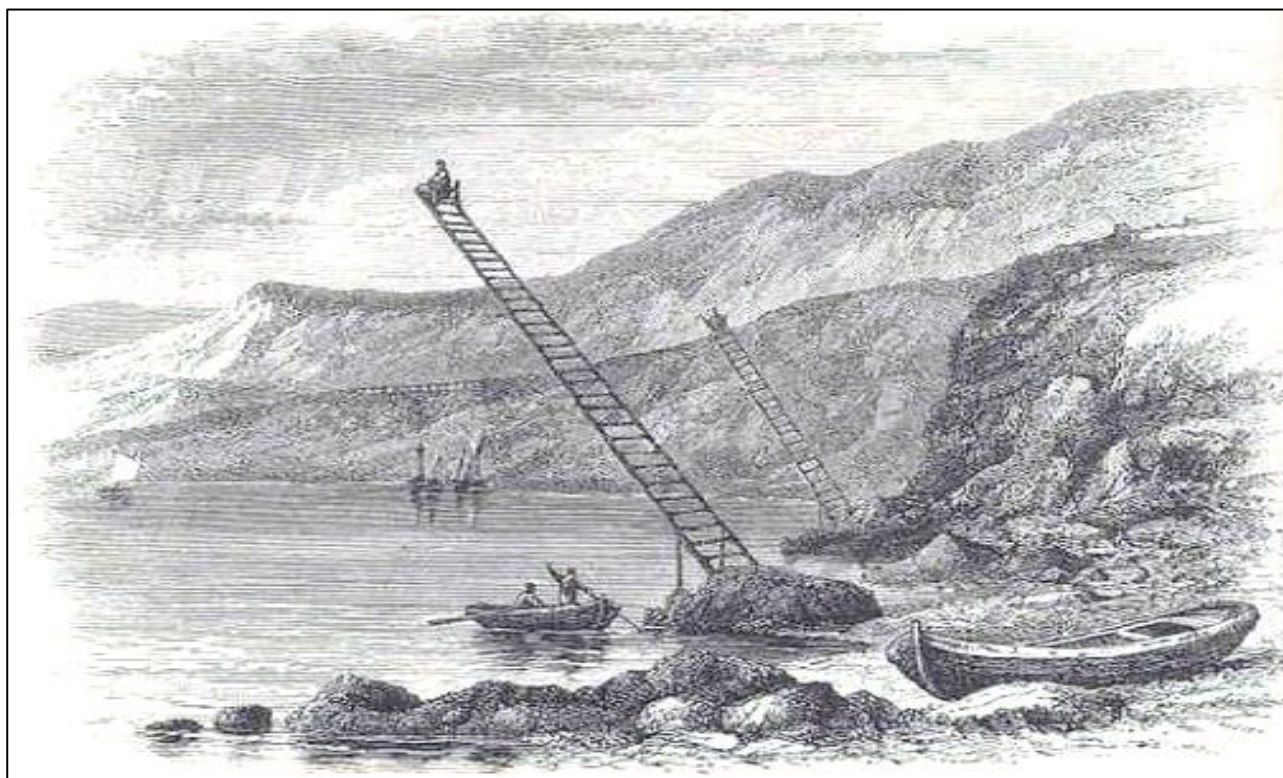


Fig.4: Tuna watchtower. Gallant, 1985, Plate 14.

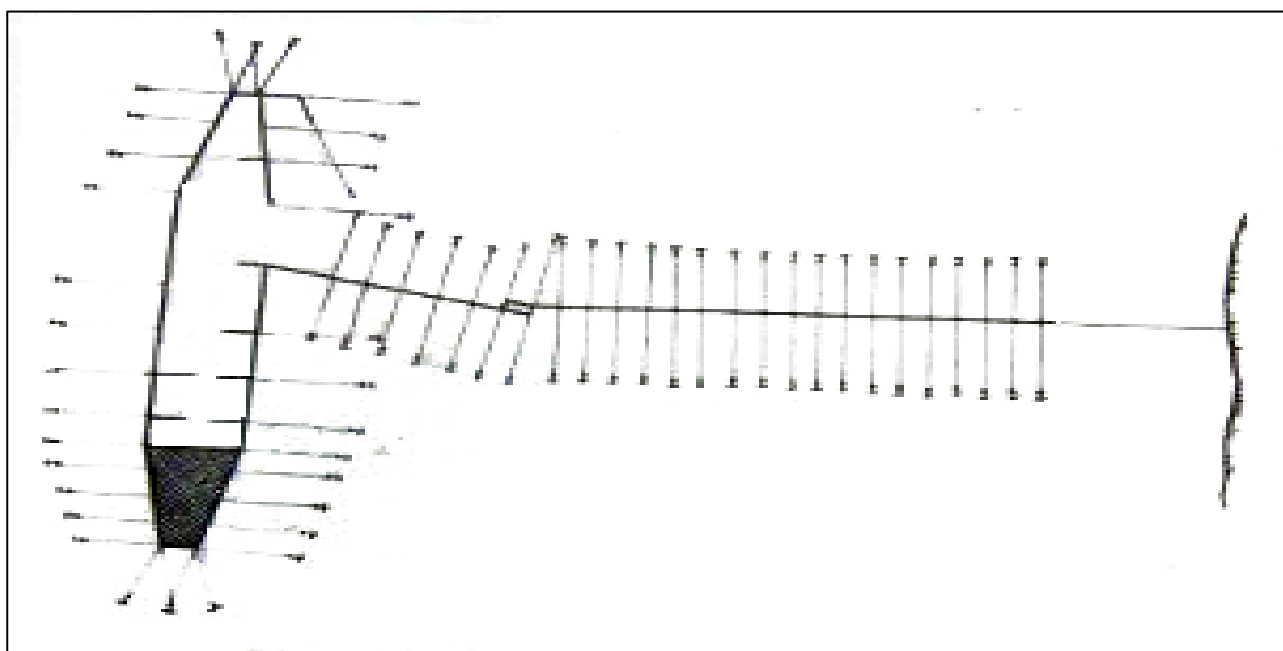


Fig. 5. Tuna trap. Gallant, 1985:Plate 12.

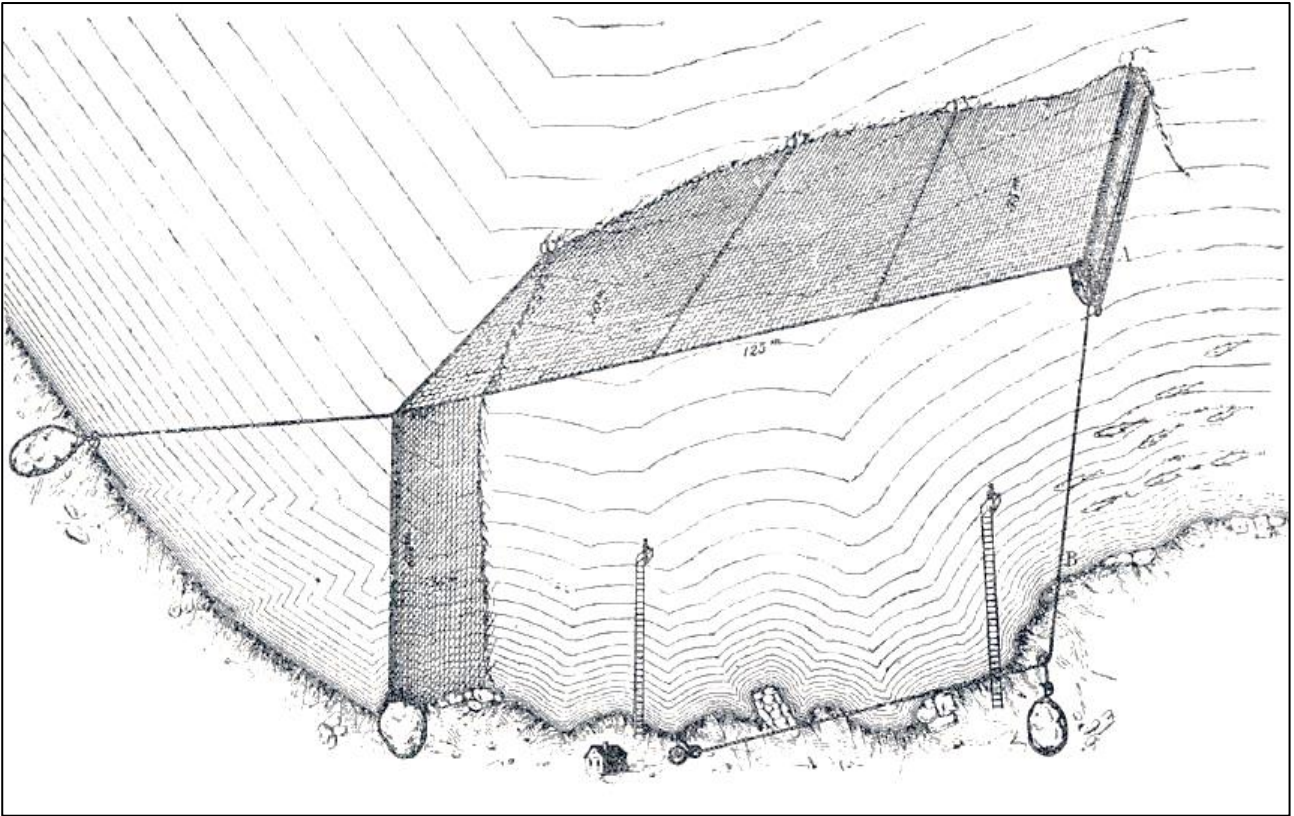


Fig. 6. Portable tuna trap. Gallant, 1985, Plate 13.



Fig.7a. Louvar and Tuna.

www.acsearch.info/search.html?id=12796536



Fig.7b. Louvar. Irmak- Alparslan, 2008, Fig. 2.



Fig.8. Tuna and Squid.

www.acsearch.info/search.html?id=11725700



Fig.9. Tuna and Eel.

www.acsearch.info/search.html?id=3594266

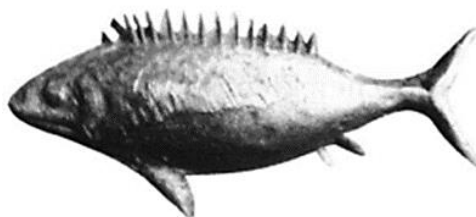


Fig.10. The tuna on a Kyzikos electrum coin from about 520 BC. Hurter- Liewald, 2006:6.

References

- Aldrete, G. S. & Aldrete, A. (2019). *The long shadow of antiquity: What have the Greeks and Romans done for us?* Bloomsbury Academic.
- Arnold, P. (2020). Polysemy, epigraphic habit and social legibility of maritime shippers: navicularii, naukleroi, naucleri, nauculari, nauclari (pp. 367-423), Arnaud, P., & Keay, S. (Eds.). *Roman Port Societies*. Cambridge University Press.
- Arslan, M. (2010). *İstanbul'un antik çağ tarihi, arkaik ve klasik dönemler*. Odin Yayıncılık.
- Ash, R., (2007). The Wonderful World of Mucianus (pp. 1–17). *Bulletin of the Institute of Classical Studies*. 50. Issue Supplement 100: *Vita Vigilia Est: Essays in Honour of Barbara Levick*. Oxford University Press. <https://doi.org/10.1111/j.2041-5370.2007.tb02461.x>
- Bekker Nielsen, T. (2006). *Ancient fishing and fish processing in the black sea region*. Aarhus University Press.
- Benjamin, S. G. W. (1880). The light-houses of old, *The Art Journal* (1875-1887). New Series. 6. 41-45.
- Birley, A. R. (2013). *Hadrian: the restless emperor*. Routledge.
- Bresson, A. (2015). *The making of the ancient Greek economy: institutions, markets, and growth in the city-states*. Princeton University Press.
- Bursa, P. (2007). *Antik çağ'da Anadolu'da balık ve balıkçılık*. [Doctoral dissertation, İstanbul University].
- Bursa, P. (2010). *Antik çağ'da Anadolu'da balık ve balıkçılık*. Türk Eskiçağ Bilimleri Enstitüsü Yayınları.
- Bursa Sturtevant, P. (2016). Eskiçağ'da anadolu'nun güney ve batısında yer alan bölgelerde balık ve balıkçılık, *Adalya*, No. XIX / 201, 75-94.
- Burstein, S.M. (2010). *The Greek cities of the Black Sea, a companion to the classical Greek world*. Kinzl, K. H. (Ed.). Blackwell Publishing.
- Caldwell, T. F. (2015). *The career of Icinus mucianus*, [MA dissertation, University of Melbourne].
- Carradice, I. & Price, M., (2001). *Helen dünyasında sikke*. Homer Kitabevi.
- Casson, L. (2002). *Antik çağda denizcilik ve gemiler*, Homer Kitabevi.
- Corcoran, T. H. (1963). Roman fishermen. *The Classical World*. 56(4). 97-102.
- Curtis, R. I. (1991). *Garum and salsamenta: production and commerce in materia medica*. Brill.
- Çakırlar, C. (2016). Early bronze age foodways in the Aegean: social archaeozoology on the eastern side. In E. Pernicka, S. Ünlüsoy, & S.W.E. Blum (Eds.). *Early bronze age Troy: chronology, cultural development and interregional contacts* (pp. 291–304). *Proceedings of an International Conference held at the University of Tübingen*.
- Çoruh Kurt, H. (2022). Kyzikos'un denizcilik yaşantısından izler. Bayyığıt, M., Özkan, M. et al. (Eds.). *Geçmişten Günümüze Balıkesir'in Kültürel Mirası- 2* (pp.198-208). Palet Yayınları.
- Cunliffe, B. W. (2017). *On the ocean: the Mediterranean and the Atlantic from prehistory to ad 1500*. Oxford University Press.
- Dalby, A. (2002). *Empire of Pleasures: Luxury and indulgence in the Roman World*, Routledge.
- Dalby, A. (2003). *Food in the Ancient World from A to Z*. Routledge.
- Delemen, İ. (2003). *Antik dönemde beslenme*. Türk Eskiçağ Bilimleri Enstitüsü Yayınları, İstanbul.
- Di Natali, A. (2014). The ancient distribution of bluefin tuna fishery: how coins can improve our knowledge. *Collect. Vol. Sci. Pap. ICCAT*. 70(6). 2828-2844.
- Diomidis, A. P. (2009). The body in the landscape: Aristides' corpus in light of the sacred tales. W. V. Harris (Ed.). *Brooke Holmes, Aelius Aristides between Greece, Rome, and the Gods*. Brill.
- Dumankaya, O. (2018). Antikçağ Anadolu'sunda su ürünleri tüketimi ve ticareti-I: paleolitik çağ'dan tunç çağı'na. L. G. Gökçek, E. Yıldırım & O. Pekşen (Eds.). *Anadolu'nun eski çağlarında iktisadi ve zirai hayat* (pp. 153- 186). Değişim Yayınları.
- Dumont, J. (1976). La pêche du thon à byzance à l'époque hellénistique, *Revue des Études Anciennes*, Tome 78-79, No:1-4, 96-119.
- Elsner, J. & Rutherford, I. (2005). *Pilgrimage in Graeco-Roman and early Christian antiquity: seeing the gods*, Oxford University Press.
- Ertan, A. (2010). *İstanbul boğazı'nda balıkçılık*. Arkeoloji ve Sanat Yayınları.
- Ertüzün, R. M. (1998). *Kapıdağı yarımadası ve çevresindeki adalar, tarihi ve arkeolojisi üzerinde araştırmalar*. Ozan Sanatevi.
- Felici, di E. (2017). Le tonnare antiche, *Semestrale di archeologia subacque navale* Anno XXIII, 66 n.s.2, 2-21.
- Friedell, E. (1999). *Antik yunan'ın kültür tarihi*. Dost Yayınevi.
- Gallant, T. W. (1985). *A fisherman tale's:an analysis the potential productivity of fishing in the ancient World*. Belgian Archaeological Mission.
- Gorman, V. B. (2001). *Miletos, the ornament of ionia: a history of the city to 400 b.c.e*. University of Michigan Press.
- Greaves, A.M. (2003). *Miletos bir tarih*. Homer Kitabevi.
- Gündem, C. Y. (2010). *Animal based economy in Troia and the Troas during the maritime troy culture (c. 3000-2200 bc.) and a general summary for west Anatolia*. [Doctoral dissertation, Eberhard Karls Universität, Tübingen].
- Güney, H. (2012). *The reosurces and economy of roman Nicomedia*, [Doctoral dissertation, University of Exeter].

- Habicht, C. (2013). Eudoxus of Kyzikos ptolemaic explanation of the sea route to India. K. Buraselis, M. Stefanou, D.J. Thompson, (Eds.). *The ptolemies, the sea and the Nile: studies in waterborne power* (pp. 197–206). Cambridge University Press.
- Hansen, H. M. & Nielsen, T. H., (2004). *An inventory of archaic and classical poleis*. Oxford University Press.
- Hamilton, W. J. (2012). *Researches in Asia Minor, Pontus, and Armenia: with some account of their antiquities and geology*. 2. Cambridge University Press.
- Harland, P. A. (2013). *Associations, synagogues, and congregations: claiming a place in ancient Mediterranean society*. Kitchener.
- Harland, P. A. (2014). *Greco-Roman associations: texts, translation and commentary, north coast of the Black Sea, Asia Minor*. Walter de Gruyter GmbH.
- Harland, P. A. & Last, R. (2020). *Group survival in the ancient Mediterranean: rethinking material conditions*. Bloomsbury Publishing.
- Hasluck, F. W. (1910). *Kyzikos*. Cambridge.
- Horejs, B., Milić, B., Ostmann, F., Thanheiser, U., Weninger, B. & Galik, A. (2015). The Aegean in the early 7th millennium BC: maritime networks and colonization. *Journal of World Prehistory*. 28/4. 289-330.
- Hurter, S.M. & Liewald, H.J. (2006). Die frühesten Typen der Elektronprägung von Kyzikos, Thunfische, Thunfischköpfe und – hinterhältigen. *Schweizerische numismatische Rundschau* Schweizerische. Numismatische Gesellschaft. 85. 5-17, Tafeln 1-4.
- Irby, G. L. (2021). *Using and conquering the watery world in Greco-Roman antiquity*. Bloomsbury Publishing.
- Irmak, E. & Alparslan, M. (2008). A new record for Çanakkale (Turkey) strait: *luvarus imperialis rafinesque*, 1810 (pisces: *luvaridae*), *Journal of Fisheries Sciences*. 2(3). 506-509.
- King, C. (2004). *The Black Sea: A History*. Ashford Colour Press.
- Kroll, J., H., (2018). Two fifth-century lead weights of Kyzikos on the commercial standard of Athens, *Second International Congress on the History of Money and Numismatics in the Mediterranean World – Proceedings*. 85-90. Oksijen Basım ve Matbaacılık.
- Koçhan, N. (2011). *Kyzikos tarihi ve mimari kalıntıları* Renkvizyon Ofset Form Matbaacılık.
- Koçhan, N. (2018). Kyzikos nekropolünden bir taş örgü mezarı ve buluntularının değerlendirilmesi. *Akademik Sosyal Araştırmalar Dergisi*. 6(70). 14-32.
- Kraay, C. M. (1976). *Archaic and classical Greek coins*. Methuen.
- Leblanc, T. (2021). Poids et mesure en propontide hellénistique: le cas de Cyzique. *Bulletin De La Société Française De Numismatique*. 76(04). 137-143.
- Livie, K. (2014). *Chesapeake oysters: the bay's foundation and future, American palata*. The United States.
- Lovell, M. S. (1867). *The edible mollusks of Great Britain and Ireland*. London.
- Lytle, E. (2006). *Fisheries and the ancient Greek economy*. [Doctoral dissertation, Duke University].
- Lytle, E. (2012). Fishermen, the sea, and the limits of ancient Greek regulatory reach. *Classical Antiquity*. 31. 1–55.
- Lytle, E. (2018). Fishing with fire: technology, economy and two Greek inscriptions. *Historia*. 67/1. 61–102.
- Mansel, A.M. (1999). *Ege ve Yunan tarihi*. Türk Tarih Kurumu.
- Marzano, A. (2013). *Harvesting the sea: the exploitation of marine resources in the Roman Mediterranean*. Oxford University Press,
- Marzano, A. (2018). Fish and fishing in the Roman world. *Journal of Maritime Archaeology*. 13. 437–447.
- Mccann, A. M. (2017). *The Roman port and fishery of Cosa: a center of ancient trade*. Princeton University Press.
- Mclaughlin, R. (2016). *The Roman empire and the silk routes: the ancient world economy & the empires of Parthia, central Asia & han China*. Pen and Sword Books.
- Mildenberg, L. (1995). The cyzicenes: a reappraisal. *American Journal of Numismatics*. Second Series 5-6 (1993-1994). 1-12. Plate 1-2.
- Morrisson, C. (2002). *Antik sikkeler bilimi numismatik genel bir bakış*. Arkeoloji ve Sanat Yayınları.
- Motor, H. (2010). Bursa, Balıkesir ve Bandırma müzelerindeki Kyzikos sikkeleri. [Doctoral dissertation, Atatürk University].
- Mytona, D. (2021). Catching tuna in the Aegean: biological background of tuna fisheries and the archaeological implications, *Anthropozoologica*. 56(2). 23-37.
- Peirano, I. (2009). Mutati artus: scylla, philomela and the end of silenus' song in virgil "eclogue" 6. *The Classical Quarterly*. 59(1). 187-195.
- Prêteux, F. (2008). Le commerce de Cyzique au IV^e siècle, dans J. NAPOLI (dir.), *Ressources et activités maritimes des peuples de l'antiquité, actes du colloque international de boulogne-sur-mer, mai 2005*. Les Cahiers du Littoral. 2(6). 353-368.
- Psoma, S. E. (2016). Choosing and changing monetary standards in the Greek world during the archaic and the classical periods. E. M. Harris, D. M. Lewis & M. Woolmer (Eds.). *The ancient Greek economy: markets, households and city-states* (pp. 90- 115). Cambridge University Press.
- Robert, L. (1950). Inscriptions de l'héllespont et de la propontide. *Hellenica IX*. 78-97.

- Robinson, D. M. & Blegen, E. P. (1935). Archaeological news and discussions. *AJA* 39(3). 378-411.
- Roesti, R. M. (1966). The declining economic role of the mediterranean tuna fishery. *AJHS*. 25(1). 77-90.
- Roller, D.W. (2004). *The world of Juba II and Kleopatra Selene: royal scholarship on Rome's African frontier*. Routledge.
- Sevin, V. (2016). *Anadolu'nun tarihi coğrafyası I*. Türk Tarih Kurumu.
- Skinner, J. E. (2012). *The invention of Greek ethnography: from Homer to Herodotus*. Oxford University Press.
- Tekin, O. (2010). *Eskiçağ'da İstanbul'da balık ve balıkçılık*. Arkeoloji ve Sanat Yayınları.
- Tekin, O. (2013a). Weights of Cyzicus in Athens numismatic museum. *Anatolia Antiqua*, 21, 167–173.
- Tekin, O. (2013 b). Two Hellenistic weights of Cyzicus from dascylium. *Anadolu/Anatolia*. 39. 121–127.
- Tillie, C. (2017). *Oyster: a global history*. Reaktion Books.
- Van neer, W. & Uerpmann, M. (1998). Fish remains from the new excavations at Troy. H. Buitenhuis, L. Bartosiewicz & A. M. Choyke (Eds.), *Archaeozoology of the near east iii. proceedings of the third international symposium on the archaeozoology of southwestern Asia and adjacent areas* (pp. 243-254). ARC-Publication.
- Vargas, E. G. & Del Corral, D. F. (2007). The origin and development of tuna fishing nets (almadrabas), In T. Bekker-Nielsen, & D. B. Casasola (Eds.), *Ancient nets and fishing gear proceedings of the international workshop on "nets and fishing gear in classical antiquity: a first approach"* (pp. 205-228).
- Von Den Driesch, A. (1999). Archäozoologische untersuchungen an tierknochen aus dem dritten und ersten vorchristlichen jahrtausend vom Beşik-Yassitepe, West Türkei. *Studia Troica* 9. 439-474.
- Vermaseren, M. J. (2015). *Corpus cultus cybelae attidisque (CCCA), I: Asia minör*. Brill.
- Walser, A.V. (2022). Asia Minor. S. Reden (Ed.). *The cambridge companion to the ancient Greek economy* (pp. 77–93). Cambridge University Press.
- Watson, D. F. (2016). Paul and boasting. J. P. Sampley (Ed.). *Paul in the Greco-Roman world: a handbook: I* (pp. 77–100). Bloomsbury Publishing.
- Yıldırım, Y. S. (2010). *Metropolis buluntuları ışığında Batı Anadolu'daki Hellenistik Roma dönemi mutfak kültürü*. [Doctoral dissertation, Dokuz Eylül University].
- Zajac, B. (2023). *Between roman culture and local tradition: Roman Provincial Coinage of Bithynia and Pontus during the Reign of Trajan (98-117 AD)*. Archaeopress Publishing Ltd.