

An underwater photograph of an archaeological site. In the foreground, a large, orange, textured object, possibly a piece of pottery or a large shell, is prominent. A small, striped fish is swimming near it. In the background, a diver with two blue and white scuba tanks is visible, working on the site. Various artifacts, including pottery fragments and a large, dark, cylindrical object, are scattered on the seabed. Some artifacts have white labels with numbers like '1119', '7400', and '092'. The water is clear and blue.

UNDER THE MEDITERRANEAN I

Studies in Maritime Archaeology

edited by

STELLA DEMESTICHA & LUCY BLUE

WITH KALLIOPI BAIKA, CARLO BELTRAME,
DAVID BLACKMAN, DEBORAH CVIKEL, HELEN FARR
& DORIT SIVAN



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- Inset: *Ma'agan Mikhael II* before being launched in Haifa, Israel (photo: A. Efremov)

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Aegean Navigation and the Shipwrecks of Fournoi

The archipelago in Context

Peter B. Campbell and George Koutsouflakis***

More than 50 shipwrecks have been identified in Greece's Fournoi archipelago, making it the Mediterranean's largest known concentration of ships lost while under way. This paper examines how these vessels came to sink in a relatively obscure location. It examines Aegean navigation and Fournoi's role in north-south and east-west sailing routes. The assemblage of wrecks is not the product of the usual processes discussed by maritime archaeology, such as ship traps, hazardous environment, or abandonments, but a function of the large volume of ship traffic that passed the islands as a result of the Aegean's navigational landscape.

Keywords: Aegean, shipwreck, navigation, maritime landscape, Greece, Mediterranean.

The Fournoi archipelago lies several miles to the south of the large eastern Aegean islands of Samos and Ikaria. Composed of 20 islands and islets within an area of 178 km² (69 sq miles), the archipelago has often been overlooked among the major city-states in its proximity. The islands were never home to settlements larger than villages; however, despite its relative anonymity, Fournoi is a significant part of the Aegean's navigational landscape.

A collaborative survey by the Hellenic Ephorate of Underwater Antiquities and RPM Nautical Foundation from 2015 to 2018 located more than 50 shipwrecks, and a considerable area remains to be surveyed. Based on the spatial distribution of the shipwrecks and their cargoes, it is evident that these ships were lost while under way since they do not display abandonment behaviours that commonly characterize large assemblages of wrecks (Richards, 2008). The Fournoi dataset represents the largest known concentration of shipwrecks lost while under way in the Mediterranean. The sites are still undergoing study; however, this article seeks to provide context for how such a large number of ships were lost by examining Fournoi's role in navigation.

Traditional navigation relies on a maritime landscape that combines landmarks and sea features. Several environmental factors limited the routes of sailing vessels, such as winds, currents, and the land (Morton, 2001). These factors forced vessels to follow certain routes, creating high-traffic areas. The Fournoi archipelago is one such area since it occupies a chokepoint created by the islands of Ikaria and Samos: this maritime constriction has not been previously noted by scholars. It is through understanding this navigational context that it is possible to interpret how more than 50 ships came to wreck at Fournoi.

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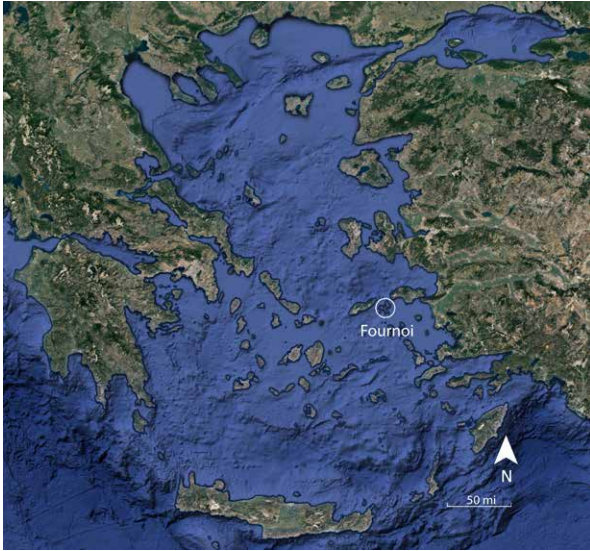
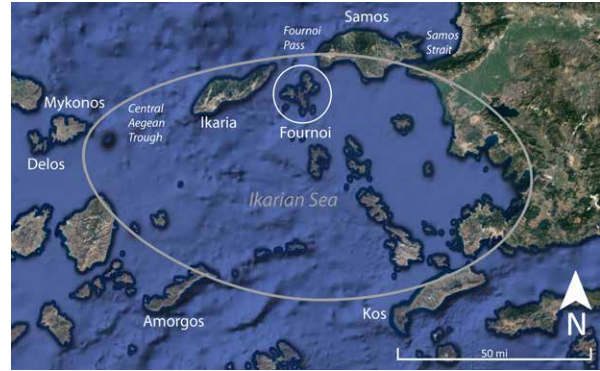


Figure 1. Map of the Aegean, left, and the Ikarian Sea, right, with Fournoi indicated (Image courtesy of GoogleEarth: Landsat/Copernicus 12/31/2016).



Background

The Fournoi archipelago is located in a section of the Aegean known as the Ikarian Sea (Homer *Il.* 2.145; Herodotus 6.95; Pliny *NH* 4.51; Strabo 10.5.13), which is delineated by the islands of Samos and Ikaria to its north, the coast of Asia Minor to the east, the Cyclades to the west, and Kos to the south (Fig. 1). The Ikarian Sea was notorious for its dangers in antiquity (Homer *Il.* 2.140-45; Horace *Odes* 1.1.15). Nevertheless, a number of major cities lie in the vicinity of the sea, including Claros, Colophon, Corycus, Didyma, Ephesus, Erythrae, Heracleia, Iassus, Lebedos, Miletus, Notium, Priene, Samos, and Teos. Of the 12 city-states that formed the Ionian League, Fournoi lies within a day's sail of all but Clazomenae, Smyrna, and Phocaea. Ships sailing between the Ionian cities, or travelling west to the Greek mainland, would pass Fournoi.

The ancient name for the archipelago is *Korseai*, *Korsiai*, *Corassiae*, or *Corsia*. In *Geography*, Strabo writes of 'the *Corassiae*' on three occasions, indicating that the name refers to the island group (10.5.13), though spelling it *Corsia* on one occasion (14.1.13). Pliny mentions the archipelago on two occasions, likewise referring to 'the *Corassiae*' in the plural (4.23.2, 5.37.1). Stephanus of Byzantium, writing in the 6th century CE and drawing on a much older text by Hecataeus of the 6th/5th century BCE (FGrHist 1 F 143), calls the islands *Korseai* (Stephani Byzantii 173). Agathemerus also mentions the islands in his *Sketch of Geography* (2.479). Perhaps the most useful text is the *Stadiasmus Maris Magni*, a periplus dating to the 1st century CE that may contain sections that are considerably older (Arnaud, 2017: 17). The *Stadiasmus* gives an account of sailing the Aegean and includes instructions for the area around Fournoi. The archipelago is mentioned three times, and distances are given

between the archipelago and surrounding locations (*Stadiasmus* 281, 283, 284). The *Inscriptiones Graecae* provide 25 inscriptions found on Fournoi dating from the 4th century BCE to the 2nd century CE, including five that mention the islands by name (*IG XII* 6, 2, 1203, 1204, 1205, 1208, 1214).

Several ancient terrestrial sites have been identified on the islands, all of them relatively small in comparison with counterparts on the surrounding islands or Asia Minor. J. Theodore Bent visited Fournoi in the late 19th century and wrote:

There is a small group of islands called the Fournoi near Samos, the principal of which is now called Kroussae, the ancient Corassia, and on the hill close to the harbour are considerable remains of an Hellenic town built on a marble rock which has been much cut and adorned; under the highest point stood a colossal statue the holes for the feet of which are still visible with an inscription around the base so obliterated that scarcely any letters can be deciphered; this was the case too with numerous rock-cut inscriptions and ornamentations which covered this rock. On the coast of Corassia about 10 miles from the town is the base of an Hellenic marble temple with a well-preserved approach, but on the top two small Byzantine churches had been erected, and in digging here we failed to find any inscription or further trace of antiquity. (Bent, 1886: 143-144)

The first settlement Bent mentions is today the main village on the island, named Fourni and identified as the ancient village of Korseai. It dates between the 3rd century BCE and 2nd or 3rd century CE (Dunst, 1974; Zapheirpoulou, 1981; 1983; 1988; Viglaki-Sophianou,

2006: 155). It includes a Hellenistic fortification dating to the same period as the watchtower at Drakano on Ikaria. The second settlement that Bent refers to is the northern village of Chrysomilia, which includes the foundations of a tower and temple (Rehm, 1929: 20). On the eastern side of the archipelago is the village of Kamari, which dates to the Roman period (Zapheiropoulou, 1988; Viglaki-Sophianou, 2006: 155). The island was a source of marble with the largest quarry located at Petrokopio (Lazzarini, 2000). This quarry was exploited possibly as early as the Archaic period (Cramer, 2004: 243) and through the 2nd century CE, mostly for use in Asia Minor (Rehm, 1929: 20; Viglaki-Sophianou, 2006: 155). Inscriptions from the islands were collected by Albert Rehm and published by Günter Dunst (Rehm, 1929; Dunst, 1974).

Based on the physical evidence from Korseai, Chrysomilia, and Kamari, as well as inscriptions, Fournoi was inhabited from the 4th century BCE through the Late Roman Period. However, Fick (1905: 54) argues the etymology of ‘Corassiai’ to be Carian, a reminder that the Carians controlled the area before the Ionian Greeks (Strabo 14.1.3; Thucydides 1.4-1.8), though no earlier settlement has been found. The archipelago would have had navigational significance in the Archaic period for ships sailing from Asia Minor to Black Sea colonies such as Miletus’ colony of Apollonia Pontica (Rehm, 1929: 20). It is therefore likely that the islands had garrisons to control the channel between Samos and Ikaria. Indeed, Korseai was likely a Milesian colony before Samos took control of the eastern Aegean as described by Herodotus (Haussoullier, 1902; Rehm, 1929). Herodotus (3.39) writes that ‘[Polycrates] had taken many of the islands, and many of the mainland cities’, which likely included Fournoi since that would have allowed them to control the north-south passages between Samos-Anatolia and Ikaria-Samos.

While evidence is sparse for most periods, the islands were likely inhabited – or at least exploited – since the Archaic period (Fick, 1905: 54; Cramer, 2004: 243), with the greatest population occurring during the Hellenistic and Roman periods. In the 3rd century BCE, during the period known as the Ptolemaic thalassocracy, Samos was a major naval station (Hauben, 2013: 39). The acropolis at Fourni and the watchtower at Chrysomilia were likely built at this time. The base for a statue of Augustus was found at the Korseai acropolis and indicates the inclusion of the islands in the Roman Empire (*IG XII*, 6 2: 1205). Roman interest in Fournoi – similar to Miletus, Samos, and the Ptolemies – likely related to control of the channel. According to the *Notitia Dignitatum*, which dates to c.395-413 CE (Dilke, 1987: 244), Fournoi was likely administrated under the Asianam VII region, which included Lycia, Caria, undefined ‘Insularum’ (*Notitia Dignitatum* 7.1). Samos took on new significance

in the Byzantine period when the Karabisianoï Theme was based there (Nesbitt and Oikonomides, 1994: 150). The flow of ships and goods to Samos appears to have increased traffic around Fournoi, and there may have been a garrison and signalling team on the islands at this time, though direct evidence is unavailable.

A new name for the archipelago, Φούρνοι (Fournoi), is first attested in the 10th century CE. The earliest-known source to use this name is the *Stadiodromikon* of the *De Ceremoniis*, likely dating to the failed Byzantine expedition to Crete in 949 CE (Huxley, 1976: 300). The new name – *Fournoi* in Greek, *Furnus* in Latin, and *Fornelli* in Italian – variously appears on subsequent maps. The name is typically translated by early modern visitors as ‘ovens’, but rather than a reference to cooking or heat, the name is, according to these visitors, a reference to the shape of the archipelago’s bays, which resemble traditional Mediterranean ovens. An 18th-century visitor explained, ‘all the Isles... are call’d Fourni, because the Greeks, as we said before, fancy their Ports, which are better than ordinary, to be shaped like an Oven’ (Tournefort, 2014: 302). The Byzantine Greek origin is still unclear, but certainly this later visitor interpreted the name to reflect the maritime significance of the archipelago and this information may have come from the local pilots.

The maritime cultural heritage of Fournoi

While Fournoi’s terrestrial archaeological sites show small-scale settlements of limited durations, the maritime archaeology reveals extensive connectivity in nearly every period. The survey conducted from 2015-2018 combined ethnographic sources, systematic diver-based survey, and remote sensing. Beginning with sites reported by sponge divers, fishermen, and free divers, the team began systematic diver surveys in the areas of the reported sites (Viglaki-Sophianou *et al.*, 2019: 146-225). These surveys confirmed a number of reported sites and located many additional ones. In 2017, a multibeam geophysics survey was conducted on the east side of the islands and a remotely operated vehicle (ROV) was used to inspect sites. The survey has documented shipwrecks, anchorages, and hundreds of isolated finds including a number of anchors.

Shipwrecks

Over the four seasons of survey in Fournoi, 58 shipwrecks were identified (Table 1; Fig. 2). Distributed throughout the islands, the largest concentration is located on the east side in the Ag. Menas Channel between the large island of Fourni and the small island of Aghios Menas (Fig. 2). The sites are typified

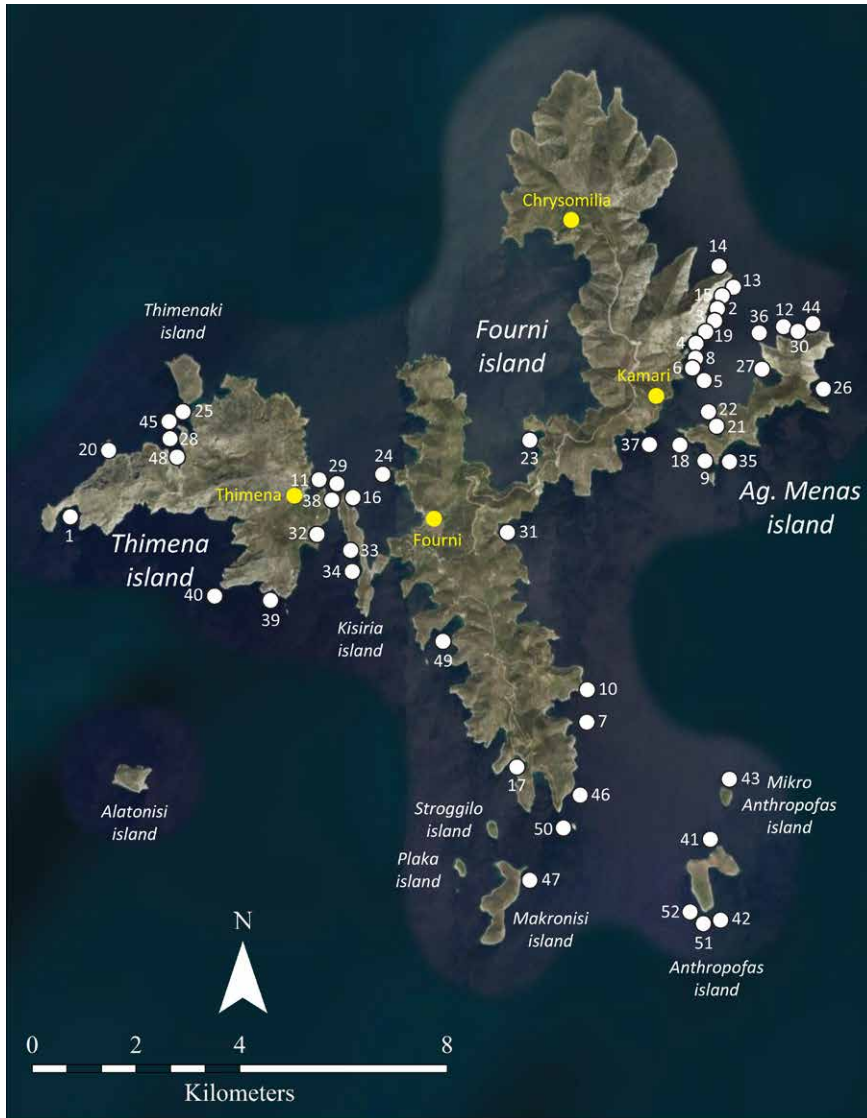


Figure 2. Map of the Fourni archipelago and the locations of the identified shipwrecks (Image courtesy of GoogleEarth: Landsat/Copernicus 12/31/2016).

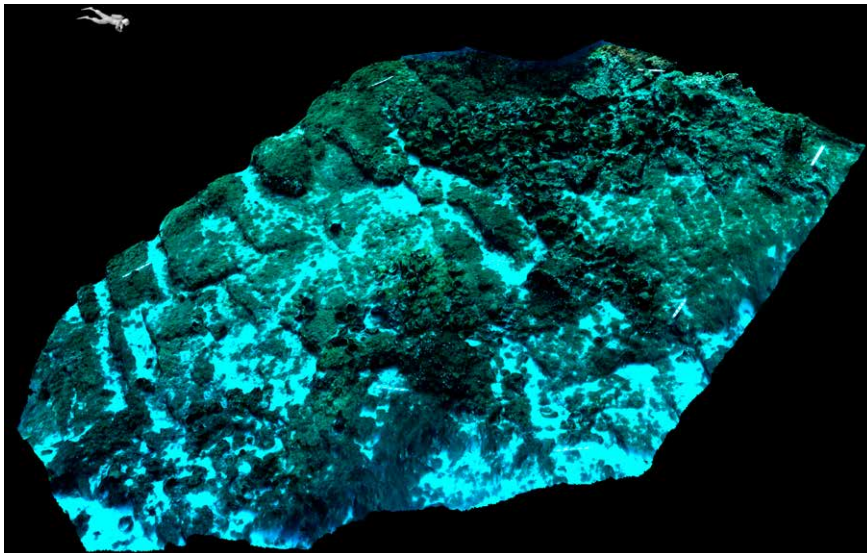


Figure 3. Wreck 4 is an example of a typical site found along the Fourni coast, with a main concentration of amphorae and scatter along the slope (Image courtesy of EUA/RPMNE; Kotaro Yamafune).

Site	Location	Amphora type or cargo	Approximate date	Coherence	Depth (m)
1	Thimena	Benghazi Late Roman 1 and 2	5-7th CE	Scattered	5-9
2	Fourni	Benghazi Late Roman 1, 2, and 10	5-6th CE	Scattered	10-25
3	Fourni	Sinope Type C III-2	4-6th CE	Concentrated	23-25
4	Fourni	Benghazi Late Roman 13	6-8th CE	Concentrated	13-20
5	Fourni	Benghazi Late Roman 1 and 2	5-7th CE	Scattered	5-8
6	Fourni	Benghazi Late Roman 1 and 2	5-7th CE	Scattered	5-8
7	Fourni	Chian amphorae, pithoi, and Iouterion	4th BCE	Scattered	34-37
8	Fourni	Benghazi Late Roman 1 and 2	6-7th CE	Scattered	6-40
9	Ag. Menas	Benghazi Late Roman 3 and 4	4-6th CE	Scattered	12-13
10	Fourni	Benghazi Late Roman 1 and 2	5-6th CE	Scattered	6-25
11	Thimena	Benghazi Late Roman 1	4-5th CE	Concentrated	12-15
12	Ag. Menas	Zeest 104, Zeest 91b, Torone III, and unidentified Pontic	3-4th CE	Scattered	15-50
13	Fourni	Samian/Klasomenian and Lesbian	6th BCE	Intact	34-39
14	Fourni	Benghazi Late Roman 1	5-6th CE	Scattered	16-28
15	Fourni	Zeest 72, Zeest 104, Zeest 91b, Kapitän 2	3-4th CE	Intact	44-50
16	Kisiria	Benghazi Middle Roman 18	1-3rd CE	Scattered	12-15
17	Fourni	Fineware, lamps, and glassware	1st CE	Concentrated	4-7
18	Ag. Menas	Koan	1st-2nd CE	Scattered	28-35
19	Fourni	Benghazi Late Roman 1	5-7th CE	Scattered	8-13
20	Thimena	Günsenin 16	11-12th CE	Concentrated	47-52
21	Ag. Menas	Koan	1st BCE	Intact	40
22	Ag. Menas	Glazed plates	18-19th CE	Scattered	10-20
23	Fourni	Historic wooden vessel with stone cargo	18-19th CE	Intact	36
24	Fourni	Phocean Red Slip Ware plates	5-6th CE	Scattered	5-20
25	Thimena	Unidentified E Mediterranean amphora type	4-5th CE	Scattered	12-37
26	Ag. Menas	Koan and fineware	3-2nd BCE	Scattered	12-30
27	Ag. Menas	Rhodian, Koan, Knidian, and Greaco-Italic	3-2nd BCE	Scattered	26-44
28	Thimena	Koan and Nikandros group	2nd BCE	Concentrated	12-34
29	Kisiria	Günsenin 1	10-12th CE	Scattered	17-23
30	Ag. Menas	Koan	1st BCE	Concentrated	35-50
31	Fourni	Cooking pots	1-3rd CE	Scattered	38-42
32	Thimena	Roof tiles and bricks	17-18th CE	Intact	6-8
33	Kisiria	Mendeian	5-4th BCE	Scattered	6-10
34	Kisiria	Globular	7-8th CE	Scattered	28-44
35	Ag. Menas	Benghazi Late Roman 1	4-5th CE	Scattered	18-30
36	Ag. Menas	Stone	4-7th CE	Concentrated	23-24
37	Fourni	North Aegean	6-5th BCE	Scattered	4-9
38	Kisiria	Knidian	2-1st BCE	Scattered	16-22
39	Thimena	Milesian	6th BCE	Scattered	28-39
40	Thimena	Chian and Knidian	3-2nd BCE	Scattered	12-25
41	Anthropofas	Günsenin 11	10-11 CE	Concentrated	32-39
42	Anthropofas	San Lorenzo 7	3-4th CE	Scattered	36-44
43	Mikro Anthropofas	Benghazi Middle Roman 18	1-3rd CE	Scattered	10-25
44	Ag. Menas	Benghazi Late Roman 1	5-6th CE	Scattered	11-18
45	Thimena	Africana IIIA and Almagro 51C	3-4th CE	Intact	57-64
46	Fourni	Globular, Benghazi Late Roman 2 and 13	7-8th CE	Scattered	15-40
47	Makronisi	Unidentified Late Roman	4-7th CE	Scattered	15-35
48	Thimena	Cretan, Agora M 94, and miniature Dressel 5	2-3rd CE	Scattered	15-33
49	Fourni	Historic wooden vessel	20th CE	Intact	38
50	Fourni	Chian	4th BCE	Scattered	12-38
51	Anthropofas	Pithoi, hydriae, and tableware	4-2nd BCE	Concentrated	15-25
52	Anthropofas	Dressel 38	1-2nd CE	Scattered	17-35
53	Ag. Menas	Benghazi Late Roman 1	5-6th CE	Intact	31-34
54	Thimena	Phoenician and Aegean	4th BCE	Scattered	16-50
55	Fourni	Knidian	2-1st BCE	Scattered	8-22
56	Thimena	Benghazi Late Roman 1	5-6th CE	Scattered	23-30
57	Fourni	Granite	Early Modern	Concentrated	2-4
58	Thimena	Bricks	10-14th CE	Scattered	4-17

Table 1. Sites located during the Fourni Underwater Survey.

by amphora scatters down the cliffs of the island (Fig. 3). The sites date from the late Archaic period (550-480 BCE) to the 19th century CE. For comparison to other Aegean islands and navigational passages, the 58 shipwrecks represent 23% of the known shipwrecks in Greek waters, based on Ephorate of Underwater Antiquities records. However, the Aegean is lacking systematic survey in many areas, so the full context of the Fournoi statistics is not known at this time.

The shipwreck sites are defined by: 1) being located in a discrete area; and 2) containing a coherent assemblage of more than a dozen artefacts. A 'discrete area' is defined as an area the size of a vessel on a flat, sandy bottom or an area consistent with impact scatter on rocky cliffs. A 'coherent assemblage' refers to a homogeneous type of cargo (such as Ottoman roof tiles or Late Roman 1 amphorae) or a mixture that is consistent with a cargo in date and type (such as one-third Late Roman 1 amphorae and two-thirds Late Roman 2 amphorae). While an interpretation is necessary to determine both discrete areas and coherent assemblages, these criteria distinguish wrecks from other types of sites, such as anchorages. Anchorages have large quantities of amphora fragments scattered over a broad area, but these do not provide a coherent assemblage since they contain a mixture of types not commonly transported together and range in date over many centuries. In contrast, wreck-sites contain intact and fragmentary amphorae of the same date range. Some scatters located during the survey have not been included in the wreck tally since they do not meet these definitions or the threshold.

Each site is documented using photomosaics and photogrammetry. A representative sample of amphorae or other artefacts has been raised from each site for study, and these are undergoing conservation in Athens. The authors are currently preparing a journal article that will present an overview of each shipwreck.

*Anchorage*s

Fournoi's many bays, promontories, and islands offer protection in various conditions; however, six areas identified by the survey show repeated use as anchorages. These anchorages are typified by assemblages of ceramics of different types and time periods that have been discarded from ships at anchor. The locations of the anchorages suggest that they were used to wait out unfavourable winds at various times of year – either the Etesian (NW) or a southerly wind. A number of anchors have been found, with dates spanning the Archaic period to the modern day. Of particular note are three Archaic stone anchor stocks, including two that are approximately 1.9 m in length. The survey located dozens of anchors lying off the coast of Kamari that date from the Roman period through to the Early Modern period, suggest-

ing it was the major anchorage on the east side of the archipelago.

Kamari offers protection from the Etesian wind, as do the cliffs of Asprokavos on the east coast of Fourni main island, the bay on the west side of Fourni main island south of the modern town named Kambi Fournon, and the southernmost bay, Vlychadha Bay. During fieldwork from 2015-2018, the authors witnessed vessels putting into these anchorages during periods of foul weather. Besides the evidence of anchorage, Asprokavos includes six shipwrecks that appear to have been caught in contrary winds, either at anchor or in transit.

Protection from the southerly wind is found in two bays on the north coast of Thimena across from Thimenaki, Ag. Agridhio and Ag. Nikolaos, as well as in Pighadhi Bay on Ag. Menas island. Pighadhi Bay was used as protection from the southerly wind by three vessels in Tournefort's account, though one was wrecked and the other two attempted to double Samos once the gale reached a certain strength (Tournefort, 1718: 332). The interior of the bay includes a Hellenistic shipwreck of Koan amphorae, and a stone Archaic anchor stock was found on the southern side of the bay. The promontory to the south includes two wrecks of vessels that may have been trying to get into Pighadhi Bay but struck the promontory before they could turn into the shelter.

Many of the other bays have isolated finds, but not the sustained finds from a wide timeframe that these six locations demonstrate. Toponyms of bays requiring further survey, such as Tourkolimnionas – which translates as Turkish Harbour – suggest that more anchorages may be identified as the project continues.

In addition to these anchorages, the settlements on Fournoi occupy excellent anchorages, typically one north-facing and one south-facing to provide two harbours for protection from the winds. The villages of Fourni, Chrysomilia, and Kamari each have two harbours (Fig. 4). In fact, Fourni may have three if one includes the anchorage of Kambi Fournon, located in walking distance over a ridge, which provides access to the southern part of the island. The village of Thimena might be considered to have two harbours as well, if one counts both Thimena Bay and Keramidou Bay, though transfer between the two by sea requires travel through a narrow channel separating the islands of Fourni and Thimena. It is therefore unsurprising that the three anchorages first mentioned are those with evidence of ancient settlements.

While **Fourni** and **Chrysomilia** appear to have been important during the Classical and Roman periods, **Kamari** – also inhabited during these periods – appears to have had its peak during the Late Roman Period.

The term 'harbour' should be used cautiously in this context, as these are unlikely to have been areas of exchange. Instead, these were most likely anchorages

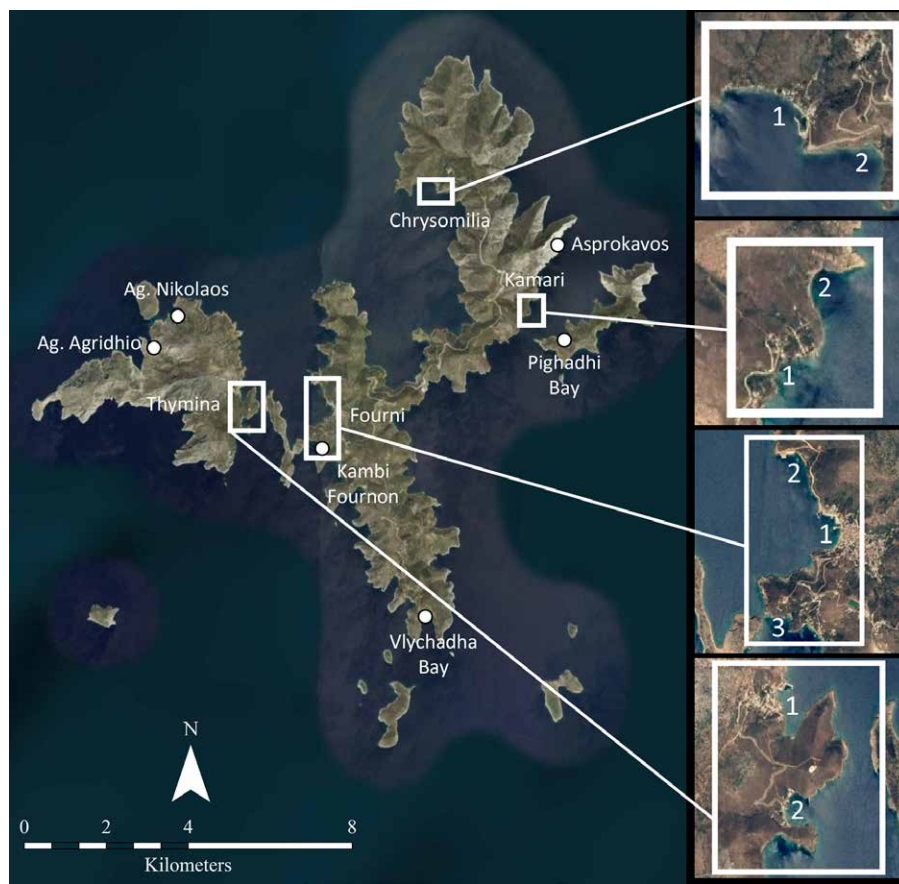


Figure 4. Map of the locations of the four villages with double harbours indicated by squares and the six anchorages identified during survey indicated by points (Image courtesy of GoogleEarth: Landsat/Copernicus 12/31/2016; CNES/Airbus 6/28/2016).

for respite from the winds during passage through the region; however, the presence of the villages indicates that some small-scale exchange may have occurred. A single harbour exposed for a significant portion of the year to a dangerous wind would not make a location suitable for a long-term settlement: it was the availability of two harbours for protection for vessels that determined the locations of villages.

Navigation in the Aegean

The quantity of wrecks found at Fournoi is best understood through the significance of the Fournoi Pass maritime chokepoint. A 18th-century account by Joseph Tournefort summarizes it, stating:

All the Ships coming down from *Constantinople* into *Syria* and *Egypt*, after resting at *Scio* [Chios], are obliged to pass through one of these Straits. The same must they do, that go up from *Egypt* to *Constantinople*. Here they meet with good Harbours, and it would be too long a Course for 'em to pass toward *Mycone* and *Naxia*: so that these Boghas [straits] are very proper places for the Corsairs to spy what Ships pass to and fro. (Tournefont, 2014: 306)

The landscape of the Aegean is such that Fournoi straddles a maritime chokepoint and ships are, as Tournefort puts it, obliged to pass the archipelago. Historical sources, maps, interviews with traditional mariners, and environmental data provide the context for navigation around Fournoi.

The islands of Samos and Ikaria divide the eastern Aegean in two, forming the basin known as the Ikarian Sea (Fig. 5). The maritime chokepoint they create is most easily navigable through the strait known today as Stenon Fournon or Fournoi Pass (National Geospatial Intelligence Agency, 2011: 233). In the past it was known by a variety of names such as the Grande Borghas or Great Samos Strait (Tournefort, 1718: 306; Sonnini, 1801: 307), distinguishing it from the small strait between Samos and Asia Minor (Fig. 5). This narrower passage is today known as the Samos Strait.

Passage through the Fournoi Pass is, therefore, the most effective route north-south, and the archipelago also offers safe anchorage, unlike Ikaria and Samos. **Ikaria island has no safe harbour; Strabo refers to it as harbourless (Strabo 14.1.19),** although there are roadsteads for offshore anchoring under certain wind conditions (Roberts, 1699: 162). The local bishop described the wariness of mariners, stating:

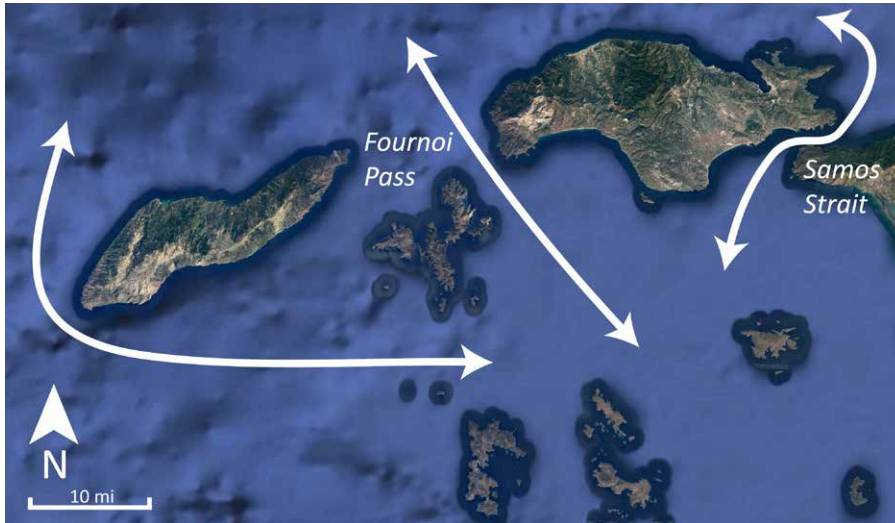


Figure 5. The three north-south sailing routes in the eastern Aegean (Image courtesy of GoogleEarth: GoogleEarth; Landsat/Copernicus 12/31/2016).

[Ikaria] has not one Port or Road for great Ships, but only two small Creeks for little Boats... And when 'tis fair, they lade and unlade their Vessels with all possible speed, at the Shore of *Icarus*, and so retire, for fear of a Storm (Georgirenes, 1678: 55-56).

Rather than anchor at Ikaria, mariners preferred Fournoi's many safe anchorages.

The Island [of Ikaria] wants Ports, as *Strabo* has observ'd...The good Ports of these Quarters are in the Isles of *Fourni* (Tournefort, 2014: 302).

Western Samos is similarly dangerous in adverse weather with nowhere to shelter: Tournefort states that in the event of bad weather, ships travel to Fournoi (1718: 313). The 16th-century-CE Piri Reis map series for Samos shows four anchorages with none in the west (Piri Reis, fol. 79b). The modern pilot directions state: 'Nisidhes Fournoi is a group of islands, islets, and rocks which provide shelter to small craft [*i.e.* 65 ft (20 m) or less] with local knowledge' (National Geospatial Intelligence Agency, 2011: 233). The Fournoi Pass directs maritime travel past Fournoi, but the archipelago is also the safest place in the region for vessels to anchor.

Besides the constriction and the safe anchorages, there is the wind, which also conspires to increase ship traffic around Fournoi. The northwestern Etesian wind, known as the Meltemi today, is the primary summer wind in the Aegean. It is strong but consistent, allowing mariners to sail effectively. Significantly, it is remarkably consistent at Samos; in fact, it is as consistent as the trade winds. Biel notes that the wind blows for 90% of the time during the summer months at Samos, consistency which is 'hardly exceeded in the most steady trade-wind regions of the Earth' (1944: 14). This makes

the route through Samos important for the summer trading season.

However, there are times when the Etesian wind is too strong. Semple (1931: 580) writes that the Aegean winds, 'In August ... attain such violence that sailing vessels for weeks at a time cannot beat against them but have to tie up behind islands'. In the area of Samos, where the northwest wind is so dominant, shelter in the lee of Ikaria and Samos is at times necessary. For example, a voyage in 1599 attempted the Fournoi Pass after a visit to Samos; however, no headway could be made against Etesian wind and they had to remain anchored behind Samos for several more days before continuing north (Bent, 1893: 42). Fournoi offers safe anchorage to wait out winds (Tournefort, 1718: 332) and it is a safer option than Ikaria (Georgirenes, 1678: 55-56).

Another potential danger in the Fournoi Pass is its current. The Mediterranean Pilot states, 'The current in this passage always sets N and causes a confused sea' (National Geospatial Intelligence Agency, 2011: 233). Modern environmental modelling demonstrates the complexity of the water-flows in the area, which causes a strong northward current (Korres and Lascaratos, 2003: 218). Clarke noted that large waves continually roll through the pass and make it difficult for ships to travel through the strait when the wind comes from the north (Clarke, 1813: 240). A pilotage account observed that sailing vessels were unable to make headway when the current and winds were in opposite directions, and instead had to take the Samos Strait (US Hydrographic Office, 1916: 304). While the archipelago often offered safe anchorage, the winds and currents could offer dangers as well.

To summarize, the Fournoi Pass is a constriction within the Aegean landscape affecting vessels under sail. It is formed by the islands of Samos and Ikaria,

and the Fournoi archipelago lies across the passage. There are few anchorages at Ikaria or western Samos, but Fournoi offers numerous possibilities. The winds during the sailing season are among the most consistent in the world, providing predictable passage. However, currents converge at the Fournoi Pass and can cause heavy seas and occasionally difficult passage if the wind is against them. As the following sections will explore, this area lay at a critical juncture for vessels sailing north-south from the Black Sea to Rhodes and the Levant, as well as east-west from Asia Minor to the Greek mainland.

Navigational routes

There are three options for vessels travelling north-south in the eastern Aegean (Fig. 5). First, a vessel could pass the western cape of Ikaria; however, here Cape Papas bears the full force of the Etesian wind and places the Ikarian shore dangerously on the ship's lee. Second, a vessel could take the eastern route through the narrow Samos Strait that separates the island from the mainland. But sailing this route requires a tack through a dog-leg, which can be time-consuming and which made the channel notorious for piracy. Bishop Georgirenes wrote that it is 'a great Nest of Pirats, whom no Ships that come into this Strait can escape' (Georgirenes, 1678: 3). Third, a vessel could pass through the large channel between Samos and Ikaria, the Fournoi Pass: this central channel provides the most direct and safest route, and it appears to have been most commonly used. '[T]he great Bogaz of Samos, which is nearly two leagues wide, is to the west, between this island [Samos] and the small *Fournis* islands... formerly called *Corseæ insulæ*. It is a passage very frequented by the ships sailing from Constantinople to Syria and Egypt, and there they find good anchorages' (Sonnini, 1801: 307, translation by authors). It is this channel that brought traffic to Fournoi. While most vessels sailing this route may not have stopped, the excellent anchorages provided respite for those who did.

The north-south route that passed Fournoi was part of an arterial network that connected the Black Sea and Aegean to Cyprus, the Levant, and North Africa. The key stops in the Aegean were Tenedos, Mytilene, Chios, Samos, Kos, and Rhodes (Avramea, 2002: 83-84). Evidence of this route is found from antiquity to the Early Modern period in the form of archaeology, historical sources, and maps.

While the Fournoi Pass is the preferred route, it nevertheless can be difficult and this difficulty may explain some of the wrecks at Fournoi. The winds that come down the heights of Ikaria and Samos and through the strait can have great force, while the currents around the islands are confused:

Having cleared the *Chian*, or *Erythraen* Straits, we sailed along the *Ionian* coast for the channel separating the stupendous heights of *Samos* from the lower land of *Icaria*. This marine pass is at present generally known in these seas by the appellation of the *Samian Boccaze*. It presents a bold and fearful strait, in the mouth of which is the small island of *Fourni*. A very heavy sea rolls continually through this channel, so that, with contrary wind, even a frigate can scarcely effect the passage. (Clarke, 1813: 240-241)

When these difficult conditions prevail, Fournoi is an attractive place to anchor and wait them out. Tournefort gives an account of seeking shelter in Pighadhi Bay at Ag. Menas island during a southerly gale (Tournefort, 1718: 333). As a 17th-century mariner recorded:

This Island of *Samos* makes two Boaks, or Channels, to wit, the great and the small: The great one is made by three uninhabited Isles, named the *Furnoes*. They are very high and bold to, and he that's well acquainted may ride under them, viz. between them, with his Anchor in 50 Fathom [91 m], and Sheat-Cable fast on the Rocks: I have lain there several Times my self, with hard Storms. (Roberts, 1699: 161)

The role of the Fournoi Pass as a chokepoint attracted pirates (Georgirenes, 1678: 54-55; Roberts, 1699: 132). The large volume of merchant traffic was easy prey for the corsairs' fast-rowed vessels (Ormerod, 1997: 19).

[Samos] lay directly on the coasters' route between (Egypt and) South Asia Minor and Constantinople, and at all unsettled periods in the Aegean, the Fourni, like the Spalmadori (Oenussae) and Moskonisi groups, which are similarly situated with regards to the straits of Chios and Mytilene respectively, became a recognized haunt of the pirates who preyed on this traffic. (Hasluck, 1911: 169)

Bishop Georgirenes wrote in 1678:

Three Miles distant from the Island [Ikaria], on the South-side towards *Patmos*, lye some small Islands uninhabited; but know by the name of *Furny*, and furnish'd with good Harbours, capacious enough for all sorts of vessels. Here the *Corsairs of Malta*, and other *Christians*, us'd to lay in wait for Ships that trade from *Scio* [Chios] to *Rhodes*. (Georgirenes, 1678: 54-55)

Pirates travelled annually to Fournoi from as far away as France, Italy, Malta, and Sardinia to hunt ships (Georgirenes, 1678: 4); the occasional Englishman would join as well (Roberts, 1699). We are fortunate to have accounts

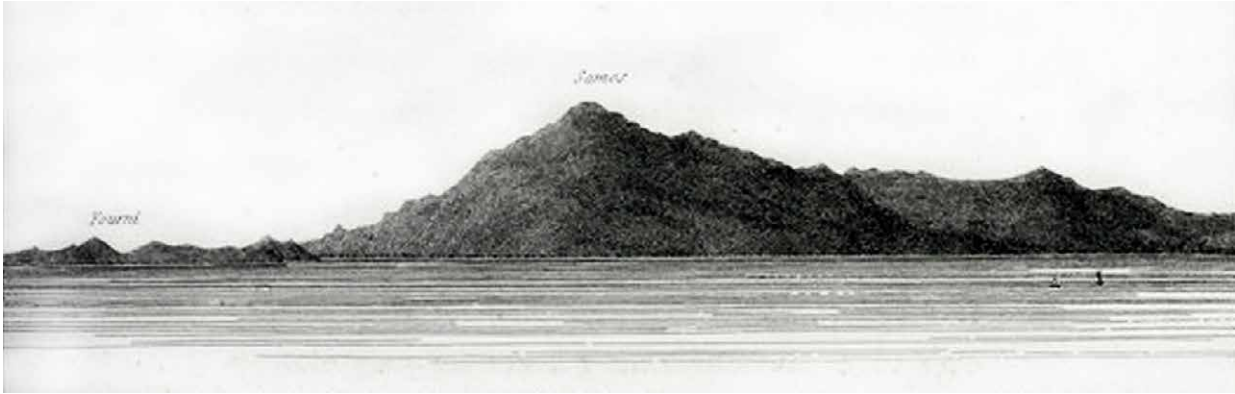


Figure 6. The 19th-century seascape of Fournoi and Samos drawn by Edward Clarke (1813: 367).

by both the pirates and mariners who sailed by Fournoi. An Englishman named Roberts published an account of his time with pirates in 1696. He wrote that the pirates would winter in the Cyclades and gather at the beginning of March,

And then they go for the Furnoes, and lie there under the high Land hid, having a watch on the Hill with a little Flag, whereby they make a Signal, if they see any Sail: they slip out and lie athwart the Boak of Samos [Fournoi Pass], and take their Prize. (Roberts, 1699: 132-133)

After starting the season at Fournoi, the pirates would then travel throughout the Levant and Egypt in a sort of pirating season designed to maximize prize taking based on shipping rhythms. After the summer in the Levant, they returned to Fournoi for the autumn, 'From hence [the Levant] toward the Autumn they come lurking in about the Islands, to and fro about the Boakes [straits] again, until they put in also to lie up in the Winter,' – mid December, he wrote previously (Roberts, 1699: 132).

A passenger described the tense experience of sailing past Fournoi, writing:

How very different were the reflections caused, upon leaving the deck, by observing a sailor with a match in his hand, and our Captain busied in appointing an extraordinary watch for the night, as a precaution against the pirates, who swarm in these seas. Those wretches, dastardly as well as cruel, the instant they board a vessel, put every individual of the crew to death. They lurk about the Isle of *Fourni*, in great numbers; taking possession of bays and creeks the least frequented by other mariners. After they have plundered a ship, and murdered the crew, they bore a hole through her bottom, sink her, and take to their boats again. (Clarke, 1813: 245)

Clarke included a sketch (Fig. 6) of the seascape in his book from the perspective of looking north towards Samos and Fournoi (Clarke, 1813: 367).

Pirates were a present danger for those travelling in the Ikarian Sea until relatively recently. Concern for pirates apparently even extended to archaeologists working at Fournoi in the 1880s (Rehm, 1929: 22).

Pirates were not alone in monitoring ship traffic from Fournoi. The archipelago was key to controlling the channel through sea power, and the acropolis on Fournoi's Aghios Georgios Hill, and the watchtowers at Chrysomilia and eastern Ikaria at Drakano were used to control the straits (Viglaki-Sophianou, 2006: 155). Fournoi had limited natural resources, so the impetus for Fournoi to change hands from Miletus to Samos (to Athens?), then later from the Ptolemies to the Romans, had to do with control of this critical strait. The control exerted by Samos in the Archaic period likely had to do with Polycrates' exertion of sea power in the Aegean: he blurred the lines between piracy and sea power (Herodotus 3.39). It is interesting to note that when the Samians were forced to flee west they settled at Zancle, which also dominates a constricted passage: the Straits of Messina (Herodotus 6.22). The location must have seemed familiar and the coins they struck at Zancle indicate that sea power continued to be a consideration for them (Campana and Morello, 2012).

Fournoi is also significant for east-west navigation (Fig. 7). Accounts from the Classical period to the modern day describe the route from Delos/Mykonos to Fournoi/Ikaria (*Stadiasmus* 281; Thucydides 3.39; Strabo 14.1.13). The central Aegean trough that divides the Cyclades from the Eastern Sporades and Dodecanese is the most dangerous area of the Aegean, as there are no islands there to provide a barrier to the winds. As a result, storms move quickly through this area. The passage from Mykonos to Ikaria is the shortest crossing-route in the Aegean and it has drawn mariners in every period.



Figure 7. The primary east-west crossing-route in the Aegean, connecting Delos/Mykonos to Ikaria/Fournoi (Image courtesy of GoogleEarth; Landsat/Copernicus 12/31/2016).

The second crossing-route to the south (*Stadiasmus* 282; Nikolas Vlavianos, pers. comm.) – from Naxos to Kalymnos offers protection behind Amorgos, Levitha, and several other islands – is more than twice as long, 105 km versus 46 km.

The east-west route past Fournoi appears more often than the north-south route in ancient periploi and itineraries explored in the following section. Both Delos and Fournoi offer safe anchorage along major east-west and north-south navigational routes. Delos, of course, had additional religious significance (Constantakopoulou, 2010: 38). The anchorages in the northern bays of Thimena and of the main village of Korseai likely relate to east-west travel due to their orientation in regard to the sailing routes and the winds.

The more than 50 shipwrecks at Fournoi are not a function of trade with the villages on islands, but an indicator of the high volume of trade that passed through the Fournoi Pass. The whole Aegean navigational landscape conspired to send traffic by the archipelago, via this maritime chokepoint. The constriction drew admirals seeking to exert sea power and pirates seeking prizes. Mariners, understanding its significance, embedded meaning into the place through the archipelago's name, conveying to those who followed that the islands' natural bays offer anchorage for vessels passing through the strait.

Fournoi in maps, itineraries, periploi

The corpus of maps, itineraries, and *periploi* that survive from antiquity provide, perhaps unsurprisingly, a mixed record of Fournoi. The major island of Samos is nearly always recorded, while less-populated islands such as Ikaria are less-frequently mentioned. **Fournoi is missing**

from some key texts such as the *Periplus* of Pseudo-Scylax, Ptolemy's *Geography*, and the *Chorographia* of Pomponius Mela, but it appears in other major works. As a minor archipelago in terms of population, resources, and economy, the relatively frequent appearance of Fournoi is indicative of its navigational significance.

Stadiasmus Maris Magni

The periplus *Stadiasmus Maris Magni* is among the most complete ancient sailing guides. This compilation of sailing data dates to the 1st century CE, though recent scholarship argues that sections may date to as early as the 4th century BCE (Arnaud, 2005: 17).¹ The text describes sea routes by listing the distances between physical locations. Fournoi plays a prominent role in Aegean routes, though secondary to centres like Delos and Rhodes. The *Stadiasmus* provides the distance from Delos to Fournoi and two sailing routes along Fournoi (*Stadiasmus* 281, 283, 284).

The first section mentioning Fourni is the **west-east** route from Asia Minor to the Greek mainland.² This route from Asia Minor passes Fournoi on the way through the Cyclades towards Attica. The second section is a route from Kos to Euboea that includes a section of travel

1 The text used for this study is Müller's 1855 translation, which is problematic for a number of reasons identified by Arnaud (2005: 17). Arnaud has a new translation forthcoming (Neue Jacoby, vol. V, H.J. Gehrke, ed., Leiden: Brill) which should be consulted in the future.

2 'A Myndo (*ad Sunium?*) Atticæ navigator stadiis 1500. Navigabis autem per **Corsicas insulas**, tum trajicies inter Lerum et Calydnam; linquensque a dextra Orobidem (seu *Erebinthum*, *Lepinthum*) tene in Amorgias; deinde Donusam et Naxum et Cythnum a dextra habe' (*Stadiasmus* 281).

between Patmos to Fournoi and Fournoi to Delos (*Stadiasmus* 283). The route travels from Kos to Leros and then to Patmos. From there, the mariners go on to Fournoi and from there to Delos.³ A copyist appears to have made a mistake with the distance of 400 stades between Patmos and Fournoi, which Müller and Haussoullier argue is meant to be 100 stades (Haussoullier, 1902: 141; Müller, 1855: 499). The distance between Fournoi and Delos is given as 750 stades, and this is restated in the following section of the *Stadiasmus*, which lists distances between Delos and other islands (*Stadiasmus* 283, 284). Given that the *Stadiasmus* lists Fournoi rather than Ikaria, it may be advocating anchorage at Fournoi rather than at the Ikarian roadsteads.

Examination of the **two** routes reveals the role that Fournoi plays within the navigational landscape. The passage across the Aegean, for which the periplus gives two possible routes ‘through the islands’, the first being a southern route from Levitha to Amorgos and the second being Fournoi to Delos (*Stadiasmus* 282, 283). Significantly, for the latter route the *Stadiasmus* does not list Ikaria to Mykonos, but specifically names Fournoi to Delos (*Stadiasmus* 283).

Strabo’s Geography

Strabo’s *Geography* dates to the 1st century CE. In it, he mentions ‘the *Corassiae*’ on three occasions and *Corsia* on another (10.5.13, 14.1.13). Strabo gives an account of the Ikaria Sea, though he misplaces Fournoi and Patmos to the west of Ikaria.

Near by are both Patmos and the *Corassiae*; these are situated to the west of Icaria ... after it is named the sea that lies in front of it, in which are itself and Samos and Cos and the islands just mentioned – the *Corassiae* and Patmos and Leros. (Strabo, 10.5.13).

He also gives an account of travelling from Mycale in Asia Minor to Sounion in Attica, giving the distance as 1600 stades. He states, ‘the voyage one has at first Samos and Icaria and Corsia on the right, and the Melantian rocks on the left; and the remainder of the voyage is through the midst of the Cyclades islands’ (Strabo 14.1.13). This brief description would not be much use to mariners but likely was reported to Strabo as the route based on visual

landmarks. The **Melantian rocks** are located across the central Aegean trough, to the south of Mykonos. Strabo’s description is nearly as simple as stating to travel due west from Mycale; however, this route connecting Asia Minor to the Greek mainland appears to have been important in every time period.

Agathemerus’s Sketch of Geography

The *Sketch of Geography* by Agathemerus dates to approximately the 1st or 2nd century CE (Diller, 1975: 59). Agathemerus gives an account of distances from Alexandria, Egypt, to the River Don in the Black Sea (1.4). He lists distances between major landscape features such as promontories, islands, rivers, and cities. In the Ikarian Sea, the route is from Cos to Arcitis (Arkioi?) and then Corsia (Agathemerus, 1.4.18). From there, the route goes to Samos and into the Aegean Sea with the next landmark being the Argennon promontory in the Chios Strait. In the next section, he lists the same route, but ‘from city to city’ (Agathemerus 1.4.19). In this case, he jumps directly from Cos to Samos, which confirms that the settlements on Fournoi were minor and the archipelago was likely more of a navigational point, similar to a promontory, than a destination, like the cities listed in the latter route.

The Peutinger Table

The Peutinger Table is the most complete extant Roman map. This 13th-century-CE parchment is a copy of a 4th-century-CE map; the 4th-century version is thought to build on a 1st-century-CE original (Dilke, 1987: 238). For example, Pompeii, destroyed in 79 CE, is included on the map, indicating a 1st-century connection, while Constantinople and Antioch are given prominence, which is the reason for the 4th-century date.

The Aegean section of the map includes a number of islands (Fig. 8), though not in geographical order. The choice of islands included is confusing, as it includes economically important islands (such as Crete, Lesbos and Chios) and those significant for navigation and travel (Milos, Ikaria and Delos, for instance). There are apparent mistakes, such as an island named Mycale, which takes the name of the promontory in Asia Minor (Miller, 1916: 604). It is therefore unclear how familiar the mapmaker was with the Aegean islands, or what we should infer geographically from the map.

Near the islands marked ‘*Delo*.’ (Delos) and ‘*Icaria*.’ (Ikaria) is an island abbreviated as either ‘*Corss*.’ or ‘*Corsa*.’ This name has been interpreted as an abbreviation of *insulae Corasiae* (Miller, 1916: 604), and the inclusion of ‘*Korseai*’ on the Peutinger Table corresponds with Fournoi’s likely role under Roman Aegean hegemony as a base of sea power. The acropolis above the village of Fourni continued to be used as a watchtow-

3 A Co ad Lerum stadia 320. A Lero ad Parthenium *Leri* stadia 60. A *Parthenio Leri* insulae ad Patmi Amazonium stadia 200. Ab Amazonio ad Corsiam stadia 100. A Corsia ad Delum stadia 750. A Delo ad Syrum stadia 150. A *Syro ad Andrum insulam* stadia 150. Ab Andro *extrema* ad Gaurium portum stadia 80. A Gaurio ad [*Paeonium*] *Andri* promontorium stadia 50. Ab eo promontorio ad [*Gerestum*] proxime promontorium stadia 150. A *Geresto* ad Carystum stadia 120. A Carysto ad Petalias insulas stadia 100’ (*Stadiasmus* 283).

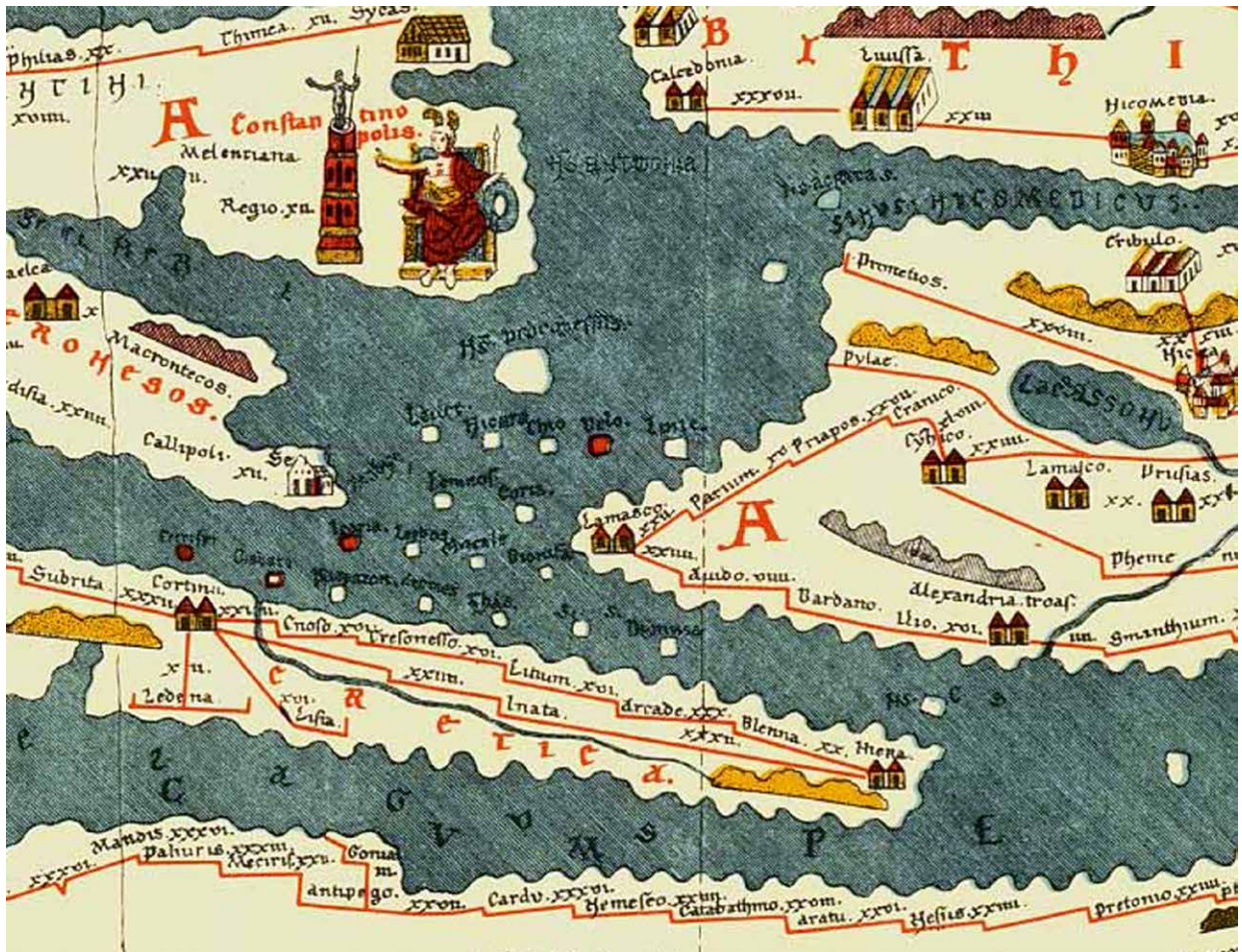


Figure 8. The Aegean section of the Peutinger Table with Crete to the bottom and Constantinople at the top; an island nearly directly in the middle is named Corsos or Corsa next to Delo or Delos (Image courtesy of Austrian National Library).

er to control the strait. The 1st-century-CE origin of the map is contemporary with the base for a statue of Augustus found on the acropolis (IG XII, 6 2: 1205).

Antonine Itinerary

The *Antonine Itinerary* was prepared for the travels of an emperor during the 3rd century CE (Dilke, 1987: 235). The itinerary is divided into two sections, land and sea. In the sea section, there is a list of islands for ‘*In mari quod Thraciam et Cretam interluit*’, which includes the island ‘*Carsa*’ (*Itinerarium Antonini Augusti* 1.3). Likely related to *Corsa* in the Peutinger Table, this may be a phonetic corruption of Korseai. The itinerary lists the route from Delos to Mykonos and passage to Ikaria as the main east-west crossing-route. The emperor for whom the itinerary was prepared – likely Caracalla in 214-215 CE (Dilke, 1987: 235) – would have encountered Fournoi while travelling along this route.

Ravennatis Anonymi Cosmographia

The *Ravennatis Anonymi Cosmographia*, among the most comprehensive sources, provides a compendium of place-names dating to c.700 CE and includes a list of Aegean islands (5.21). One island is named *Cyrise* or *Curse* depending on the source text (*Ravennatis Anonymi Cosmographia* 5.21.15). It is listed between ‘*Cirros*’ (Syros?) and Delos, though the list is not necessarily in any geographical order. Pinder and Parthey posit it may be Cythera (1860: 395 n. 15), but Müller argues that *Curse* is a corruption of Korseai (1855: 499).

The name Korseai often appears corrupted, typically phonetically (e.g. *Corsia*, *Carsa*, *Corsa*, *Curse*). Phonetic corruption is common for place-names (Joyce, 1866). For example, *boğaz* in Turkish became *boghas* in French and *Paphos* in Greek became *Bāfus* in Arabic (Tournefort, 1718: 306; Rapoport and Savage-Smith, 2014: 476). In fact, a phonetic derivative of the name Korseai appears on 15th- and 16th-century-CE maps as *Cursia* (Ortelius, 1570: 146.1; Laurenbergio, 1650; Piacenza, 1688: 206).

The Stadiodromikon of the De Ceremoniis

The *Stadiodromikon* found in *De Ceremoniis aulae Byzantinae* (2.45) lists distances and locations from Constantinople to Crete. It follows a catalogue of military and ships from three expeditions (*De Cerimoniis* 2.678), suggesting that the *Stadiodromikon* is an itinerary for Constantine VII Porphyrogenitus's failed expedition to Crete in 949 CE (Huxley, 1976: 295).

[From Constantinople] to Herakleia, 60 miles; from Herakleia to Tapeukia, 12 miles; from Tapeukia to Tenedos, 18 miles; from Tenedos to Mytilene, 100 miles; from Mytilene to Chios, 100 miles; from Chios to Samos, 100 miles; from Samos to Phournoi [Φουρνοι], 30 miles; from Phournoi to Naxia, 70 miles; from Naxia to Ios, 30 miles; from Ios to Thera and Therasia, 20 miles; from Thera and Therasia to Ta Christiana, 20 miles; from Ta Christiana to Dia, 80 miles; from Dia to Crete, 12 miles; in all 792 miles. (*De Cerimoniis*, 2.678)

While it is less than 4 miles between Fournoi and Samos at the narrowest point, it is approximately 30 miles from Pythagoreio on Samos to the village of Fourni-Korseai. It is unknown which locations were the start and end points of the day's sail, but the *Stadiodromikon* may be accurate when describing sailing distances rather than geographic distances. This would have been a half-day sail, which probably meant Fournoi was the staging point for a day's journey to Naxos. Significantly, sources dating to after the *Stadiodromikon* often use derivations of the name Φουρνοι, such as Fournoi, Furni, Fornelli, etc.

Piri Reis's Book on Navigation, portolans, and later maps

The *Book on Navigation* by Admiral Piri Reis was originally prepared for Ottoman Sultan Süleyman I in 1525 CE. The book became a compilation over several centuries as items were added. The 17th-century copy used in this study is currently in the collection of the Walters Art Museum (manuscript W.658) and it draws on geographical information from the 11th-16th centuries CE. Fournoi appears in maps of Europe, the Mediterranean, the Ikarian Sea (Fig. 9a), Samos, Ikaria

(Fig. 9b), and Fournoi itself (Fig. 10) (Piri Reis, fol. 63b, fol. 64a, fol. 79b, fol. 81b, fol. 82b, fol. 83b).

The most significant is a map of the Fournoi Pass oriented with north to the right side (Piri Reis, fol. 82b; Fig. 10), which depicts the western half of Samos and the eastern half of Ikaria, together with the entirety of the Fournoi archipelago. It shows a large fleet of ships under way through the pass with the Etesian wind. It includes the islands of Fourni, Thimena, and Agios Menas, in addition to the small islands and islets of Thimenaki, Alatonisi, Makronisi, Plakaki, Petrokaravo, and Anthropofas. It even indicates the reef between Plakaki and Makronisi islands. The map shows two vessels without their sails set, denoting anchorages, at Kambi Fournon and Kamari. These two anchorages correspond with archaeological survey-finds and locations given by modern Mediterranean pilots (US Hydrographic Office, 1916: 304). Also notable is the watchtower at Drakano on Ikaria, which is a significant navigational feature in the pass.

Paul Kahle translated the Turkish text into German. The islands of Thimena and Fournoi are listed on the map as *gezire-i-hurşyd* and *gezire-i-furna* (Kahle, 1926: 62). The section on Fournoi reads:

[The isles of Hurşyd and Furnaz] were in earlier times the residence of the monks, but are now empty spaces. The islands were inhabited in the historic period, however, and the remains of ruined buildings are known on the islands. The Islands, which we call Hurşyd, the infidels call Qursije [Korseai], and Furnaz was called Lipis.⁴ When it was necessary for one to sail to these islands with a large ship, the middle between the two islands is 40 fathoms deep. In any case one should wait until after the Island of Fourni to weigh anchor in the middle of the Bogaz [strait]. It is a good and nice harbour. If one lies the middle between the south-facing island and Hurşyd, it is a good place to anchor. At the area between Hurşyd and Furnaz across from Hurşyd to the north, at a distance of an arrows flight there is a spring with drinkable water. This spring is not known by all. One follows the way to the north as the arrow flies to find this water. (Kahle, 1926: 62, English translation by Scott Tucker)

This account illustrates how Fournoi continued to be recognized as a safe anchorage into the Ottoman Period.

The Piri Reis map of Ikaria, oriented with north to the left side, also includes Fournoi (Fig. 9b). A ship is shown anchored at the Drakano roadstead, easily recognizable

⁴ It appears that the Ottoman text flipped the two Greek names, since in European maps of the period 'Lipsi' appears on the western island (Thimena) and 'Cursia' appears on the eastern island (Fourni) (Ortelius, 1570; Mercator, 1596: 269).

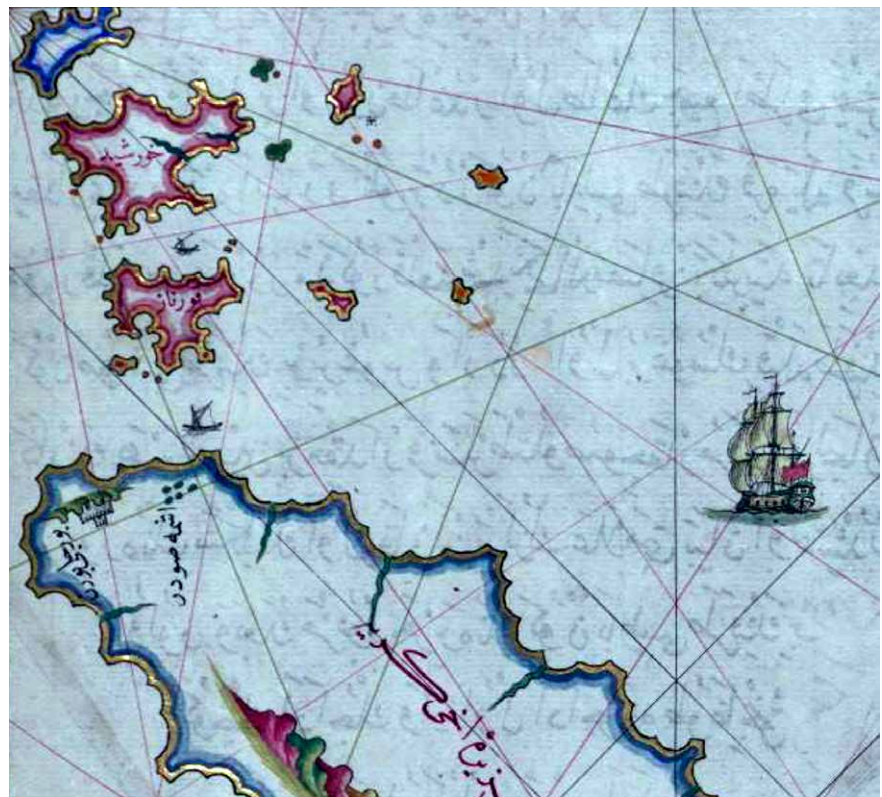
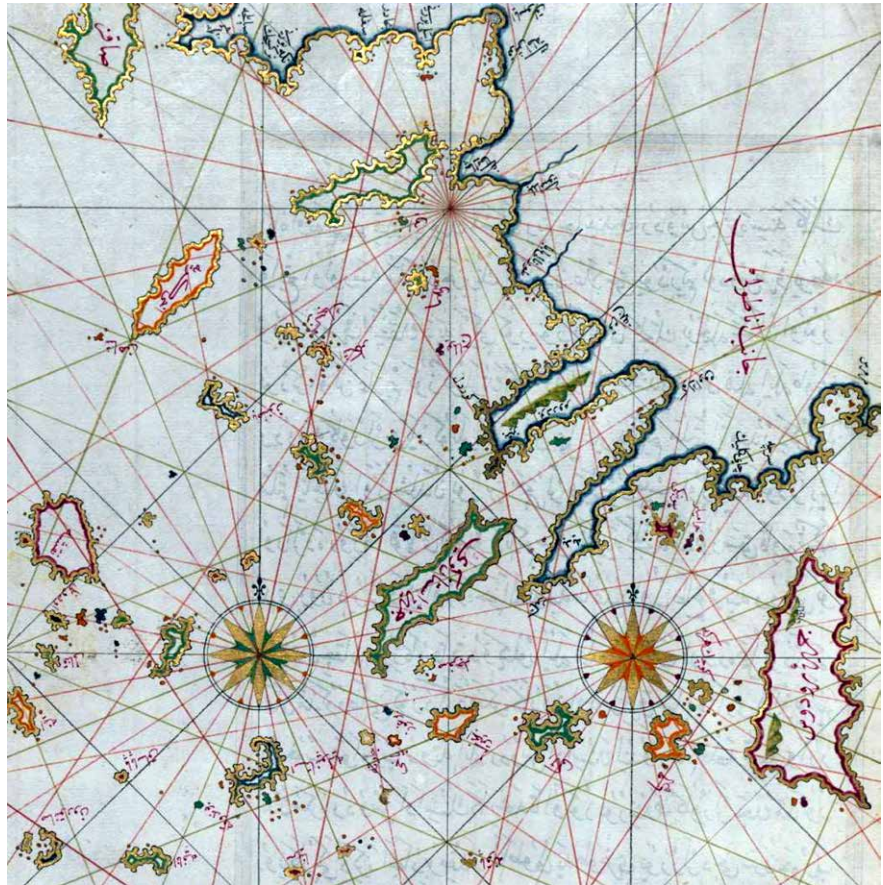


Figure 9. The Piri Reis map of the Ikarian Sea showing a) Fournoi between Ikaria and Samos and b) Ikaria with the tower at Drakano, a ship at anchor at the Drakano roadstead, and a ship at anchor at Fournoi at either Keramidou or Thimena (Image courtesy of Walters Art Museum).

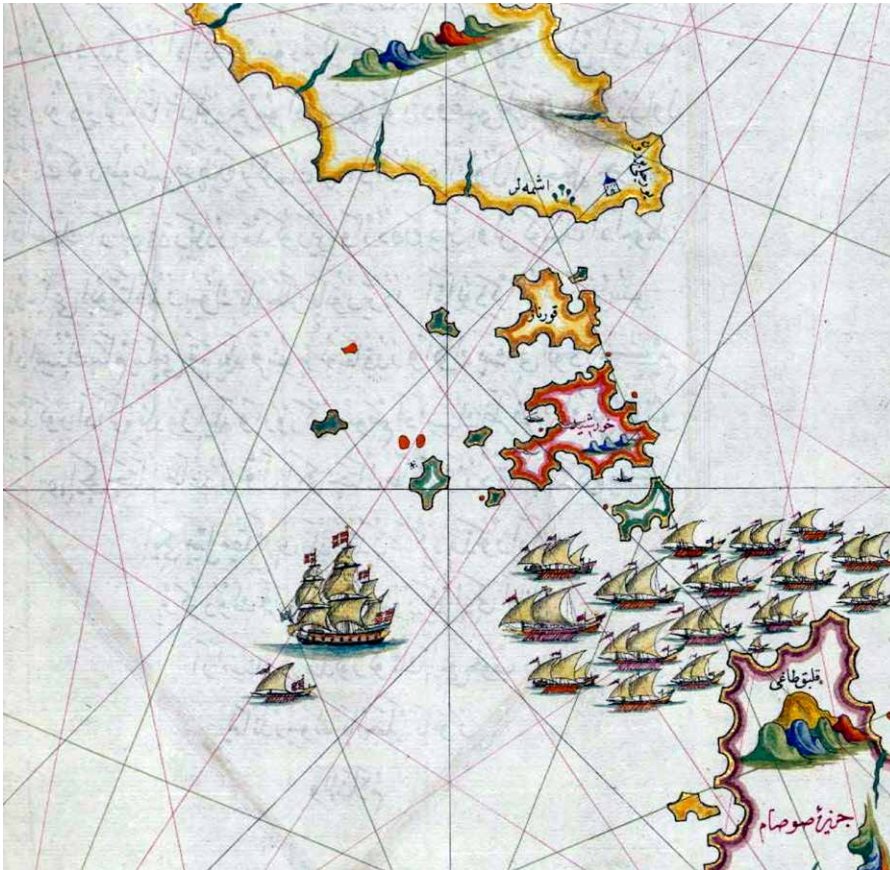


Figure 10. The 1525 Piri Reis map showing the Fournoi Pass (Image courtesy of Walters Art Museum).

from the depiction of the Drakano tower. Another ship is shown anchored at Fournoi, between the islands of Fourni and Thimena. This may be the anchorage that the previous text refers to. While the map is not precise, the anchorage appears to be the western bays of either Keramidou or Thimena harbours. The most likely bay is Keramidou, because it is protected from both the north-west and southerly winds. It remains a safe harbour today, though one in which it is necessary to anchor vessel bow and stern, perpendicular to shore. During the survey, the remains of an Ottoman-period ship were found here, which perhaps lends support to the interpretation that the bay featured is Keramidou.

Maps by European cartographers at this time likewise depict Fournoi. Of particular note are portolan charts, which were created for navigation (Campbell, 1987). In the collection of portolans known as the *Vallard Atlas*, Fournoi appears on the maps of Europe and of the Aegean (Vallard, 1547: 8, 15). On the Aegean map, the archipelago is labelled as 'Fornoli' and 'Crusia' (Fig. 11). The Vallard map is less precise than the Piri Reis map, but it nevertheless would have been useful for planning navigational routes. Then, around the 16th century CE, there was an increase in printed maps which are meant not for navigation, but rather as reference material. A

Venetian map by Benedetto Bordone from 1528 has a simplistic depiction of the archipelago that would not have been useful for navigation (Bordone, 1528). It lists the name *Fornelli* and describes the archipelago in the Ikaria section. A map with a similar name and description is found in Antonio Millo's *Isolario* dating to 1582 (Millo, 2006). A map dating to 1570 by Abraham Ortelius (Fig. 12) uses the names *Fornoli* and *Cursia* (Ortelius, 1570), as does Gerardus Mercator's map of the Aegean from 1596 (Mercator, 1596: 269).

It is not until the modern period that accurate depictions of the archipelago appear in pilots and maps. In the 19th century, Clarke included a sketch of the Fournoi Pass among a list of key straits (Clarke, 1813: 367). The sketch shows the profiles of Fournoi and Samos as one approaches the channel from Patmos (Fig. 9), and it corresponds with his account of the tense passage through the strait and the concern of the ship's crew about pirates (Clarke, 1813: 245). Pilot accounts such as this were used by mariners until the close of the age of sail.

The inclusion of the pass in this account is an indication of the importance of Fournoi in Aegean navigation in the period just prior to the widespread introduction of powered vessels. Across time, periploi, itineraries, maps, ethnographic accounts, watchtowers, and archaeology all

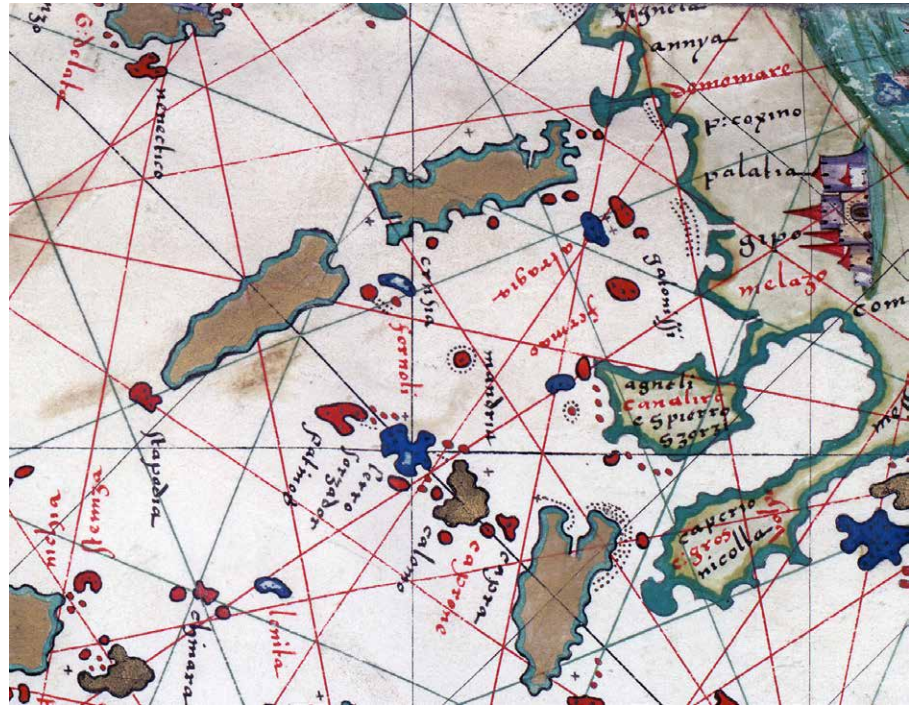


Figure 11. A portolan of the Aegean in the 1547 Vallard Atlas showing Fourni listed as 'Fornoli' and 'Cursia' (Vallard, 1547: 15).



Figure 12. The Fourni archipelago labelled as 'Fornoli' and 'Cursia', as well as the name 'Lipso', which is found on several maps, on a 1570 map by Abraham Ortelius.

indicate the navigational importance of Fourni. The archipelago was situated along the primary north-south route through the Aegean, as well as a major east-west route.

The importance of the Fourni Pass declined with powered vessels, construction of artificial harbours, and safe passage through the Samos Strait. But even today, the Mykonos-Ikaria passage is commonly used, though fewer vessels cast anchor at Fourni.

Discussion

The sinking of more than 50 ships in the Fourni archipelago is a function of the large quantity of ship traffic directed there by the Fourni Pass chokepoint. North-

south traffic in the eastern Aegean passed this way and Fourni was located on one of two major east-west routes in the Aegean, a well-travelled route attested in every time period. As a result, the large number of shipwrecks at Fourni cannot be attributed to the usual processes discussed in maritime archaeology. The archipelago was never home to major settlements, meaning these vessels were not part of a major trade-network feeding cities. Nor were they an abandonment complex for discarded vessels, or older vessels re-used as harbour structures as we find in major ports like Portus, Pisa, Yenikapı, or Thonis-Heracleion (Testaguzza, 1970; Sedge, 2002; Kocabaş, 2014; Robinson, 2018). With the exception of four sites, the vessels did not strike hidden

obstructions like the island of Yassiada or the reefs of the Chios Strait. Instead, this is a site-type defined by the navigation landscape.

This is significant because it suggests this type of site can now be sought in other areas. Straits have already been studied in the context of chokepoints bounded by land, but rarely have chokepoints been discussed as created by the navigational environment through the convergence of land, winds, and currents. This means that large assemblages of ships lost while under way may remain to be discovered. Large abandonment assemblages have contributed greatly to our understanding of ship construction; however, these often comprise aged vessels discarded once past their prime. In contrast, the Fournoi assemblage comprises vessels lost during their use-lives. An assemblage of 50 wrecks provides more information than a lone wreck's information about trade and exchange based on its cargo: the spatial patterning of the sites at Fournoi reveals clues to navigation and sailing habits, because these vessels were neither loading nor unloading, but were operating underway.

Conclusion

While the Fournoi archipelago was not in the foreground of most major historical events in the eastern Mediterranean, the corpora of historical sources and maps, military structures, toponyms, and shipwrecks all suggest it was an archipelago of significance in the Aegean's navigational landscape prior to steam power. The identification of the Fournoi Pass as a maritime chokepoint is a significant discovery.

Chokepoints for powered vessels have been considered since Mahan's seminal work *The Influence of Sea Power upon History* (1890); now, however, following the findings from Fournoi, one must consider how significantly different the sailing navigational landscape is for powered vessels and for sailing vessels. The advent of steam power allowed vessels to use the central Aegean trough, a difficult place for sailing vessels, and the Fournoi Pass became less relevant. But there is little doubt that in the age of wind-powered vessels the Fournoi channel would have served as a constriction complying with Mahan's theory.

Ancient sailing vessels, with their shallower draught and reliance on the winds, would have had more chokepoints to contend with. It may be possible to identify areas similar to Fournoi. Gibraltar, the Dardanelles and Bosphorus, Messina, and Kerch straits are obvious constrictions that have been studied in this regard, but Fournoi demonstrates that more-open regions can also become constricted – by islands, winds, and currents. Other sites of this type might be Croatia's Lošinj-Cres strait, Strait of Bonifacio, and the Flegrean Islands in

Italy. Indications of frequent use may be found in the presence of fortifications to control traffic and significant piracy.

To conclude, historical sources, maps, ethnographic accounts, and environmental data indicate that there was a large volume of ship traffic in the area of Fournoi. The spatial patterning and temporal distribution of the shipwrecks at Fournoi show more than 50 ships wrecked due to a wide variety of individual causes, rather than a single cause. The archipelago is not a naturally dangerous place for ships; in fact, mariners appear to have preferred to use the bays of Fournoi for anchorage than those of nearby Ikaria or western Samos. The broad temporal span of the wrecks suggests that these vessels were not lost in a single event, but rather were a function of single-loss events, attributable to a variety of causes, over 25 centuries. The Fournoi shipwrecks are best understood in this navigational context.

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