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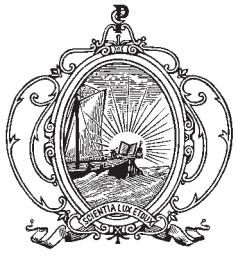

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TEOS IN THE GEOMETRIC AND ARCHAIC PERIOD: A MAJOR PRODUCTION CENTRE OF POTTERY IN NORTH IONIA*

Michael KERSCHNER and Hans MOMMSEN

Abstract

Recent archaeological and archaeometric research at Teos has shown that this *polis* was one of the most prolific production centres of painted pottery in Ionia from the late 8th to the mid-6th century BC. The neutron activation analysis (NAA) of kiln wasters established the chemical fingerprint of Teian pottery. Local production of painted pottery can be traced back until the Protogeometric period. In the Late Geometric period, Teian workshops produced the bird kotylae and, in the 7th century BC, their even more widespread successors, the bird bowls, the first standardised decorated fine ware in the eastern Aegean produced for large-scale export. In addition, the Teian potters had a major share in the production of the North Ionian Wild Goat style as well as in simply decorated dishes, bowls and other shapes. Another important result of this NAA was the localisation of a frequent and widespread type of Late Archaic trade amphorae, previously called 'Zeest's Samian and Protothasian', 'Ionian I' or 'İonia β' amphorae, at Teos.

Teos was one of the major *poleis* in Ionia as is testified by ancient literary and epigraphic sources.[1] Despite its importance in antiquity, the site was investigated only sporadically in three periods of excavation during the 20th century (Yves Béquignon and Alfred Laumonier in 1924–25; Baki Öğun and Yusuf Boysal in 1962–67; Duran Mustafa Uz in 1980–92).[2] Finally, since 2010, continuous and systematic excavations, surveying, geophysical surveys, conservation and restoration works, as well as a site presentation programme, have

* We thank Musa Kadıoğlu (Ankara) for his invitation to work at Teos and Sabine Ladstätter (Vienna) for her support of this co-operation. Furthermore, we want to thank Gocha Tsetskhladze for the smooth organisation of the conference and Marta Santos Retolaza for being such a cordial and attentive host at Empúries. This paper was submitted in the autumn of 2016. Publications of a later date could not be considered.

[1] On the history of Teos on the basis of the written sources: Rubinstein 2004, 1101–02; Strang 2007, 33–42, 52–58; Kadıoğlu 2013, 5–6; Kadıoğlu *et al*. 2015, 347–49. On the epigraphic sources: Loukopoulou and Parissaki 2004 (with bibliography).

[2] On the history of excavations and research of the site: Strang 2007, 9–14; Kadıoğlu 2012; 2013, 3–4; Kadıoğlu *et al*. 2015, 347; and the home-page of the excavation: *http://www.teo-sarkeoloji.com/arastirma-tarihi* (with full bibliography).

been carried out by Musa Kadıoğlu (Ankara University) and his team.[3] Contemporaneously, the Archaeological Museum of Izmir has carried out rescue excavations in the vicinity of the ancient city.

1. Teos in the Early Iron Age

The topographical situation of Teos (Fig. 1) is unique among the Ionian *poleis*.[4] The city was built on the isthmus rather than on the peninsula itself. In this way, Teos possessed two well-protected harbours, one to the south and another to the north; the latter was invisible from the open sea. The isthmus must have been much narrower in Geometric and Archaic times, and presumably the passage was further narrowed by marshes.[5] The acropolis hill is lower than the mountainous peninsula to the west, but has steep slopes on its north, east and south sides. As far as we know, the western peninsula was used as necropolis from the Late Geometric period onwards, but it was not inhabited or fortified.[6]

The literary tradition of the foundation and the early history of Teos is patchy and largely legendary.[7] There is, however, archaeological evidence attesting continuous settlement from the Protogeometric period onwards. In 1962–65, Yusuf Boysal and Baki Öğün discovered Early Iron Age pottery in deep layers in the central area of the Hellenistic-Roman city (Fig. 1).[8] The excavators reported a large number of bird kotylae and bird bowls of the second half of the 8th and of the 7th century BC.[9] The earliest finds reach back to the 10th century BC. A Protogeometric neck-amphora reused for the burial of a child was found in a deep trench ('E çukuru') *ca.* 150 m south of the Hellenistic-Roman theatre.[10] Further finds of Protogeometric pottery are reported from layers beneath the Hellenistic city wall west of the temple of Dionysos.[11]

[3] Kadıoğlu *et al*. 2013; 2015; 2016; Kadıoğlu 2013; and the home-page of the excavation: *http://www.teosarkeoloji.com/* (with full bibliography).

[4] Kerschner 2017a. For a site map: Kadıoğlu 2013, 2; Kadıoğlu *et al*. 2015, 346, plan 1.

[5] Systematic palaeogeographical research has not yet been carried out at Teos. The coastline given in fig. 1 is therefore conjectural, geared to the contour lines – *cf*. Hoepfner 2011, 133, fig. 76 (the schematic course of the Hellenistic fortification wall on fig. 76 is not correct, *cf*. Kadıoğlu *et al*. 2015, 346, map 1) – and including information from rescue excavations in the area of the modern town of Sığacık.

[6] İren and Ünlü 2012, 309–10, fig. 1; Kadıoğlu 2013, 1.

[7] Strang 2007, 44–49 (with bibliography). For recent overviews on the extensive discussion on the literary tradition of the Ionian Migration: Cobet 2007; Lemos 2007; Herda 2009; Mac Sweeney 2016 (all with bibliography).

[8] Öğün 1964, 116–17, figs. 3–4, 9 ('E çukuru').

[9] Boysal 1962, 7; 1965, 231.

[10] Öğün 1964, 117, fig. 9; *cf*. Coldstream 2008, 264, n. 4.

[11] Öğün 1964, 117; *cf*. Lemos 2007, 718.

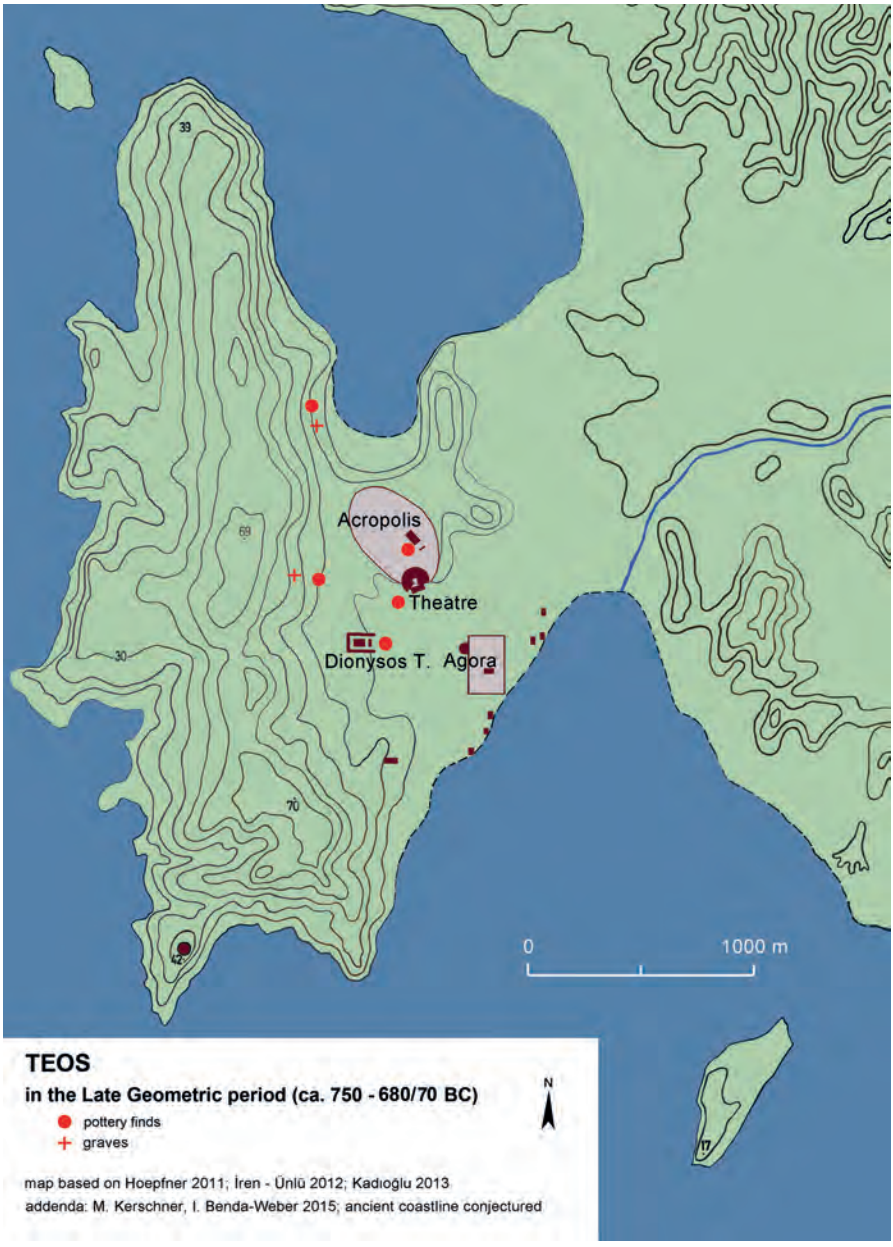

Fig. 1. Teos in the Late Geometric period (*ca.* 750–680/70 BC) (map by M. Kerschner and I. Benda-Weber, after Hoepfner 2011, İren and Ünlü 2012, Kadıoğlu 2013).

In the recent excavations by Musa Kadıoğlu since 2010, Late Geometric pottery has been found at several places (Fig. 1): on the acropolis, under the propylon of the *temenos* of Dionysos, in the area west of the Hellenistic city wall and in the western necropolis (Fig. 2).

A rich cremation burial of the Late Geometric period was unearthed by Turan Özkan in a rescue excavation north-west of the acropolis and close to the modern marina of Sığacık in 1996 (Fig. 1).[12] During the funeral ceremony one large krater (Fig. 3) and 23 kotylae (Fig. 4) were used for common feasting and afterwards smashed and thrown into the fire of the pyre, as was meticulously reconstructed by Kaan İren and Ayla Ünlü. All 24 vases are stylistically closely related and can be attributed to the 'Bird-kotyle Workshop'.[13]

A significant number of Late Geometric sherds was found in rescue excavations at a deep level underneath a habitation quarter of the 6th–5th century BC south-west of the marina of Sığacık in 2013–15.[14] This site is close to the place of the above-mentioned cremation burial (see Fig. 1). Since no contemporaneous structures have been found, it seems conceivable that the Late Geometric fragments originate from destroyed graves which had been levelled when the houses had been built in the 6th century BC. If this is true, the cremation burial excavated in 1996 was part of a necropolis north-west of the city centre.[15]

Stylistically the earliest piece discovered in this area is a rim fragment of a kotyle with hatched meander hooks (Fig. 5). This type is closely related with the bird kotylae and occurs in Middle Geometric II contexts at Clazomenae and at Eretria on Euboea, while the above-mention cremation burial at Teos and a grave of the third quarter of the 8th century BC at Ialysos on Rhodes show that this type continued into the Late Geometric period.[16]

[12] Özkan 2009; a more detailed discussion in: İren and Ünlü 2012.

[13] On the 'Bird-kotyle Workshop': Coldstream 1968, 277–79, pl. 61a–d; Boardman 1998, 51, fig. 137; Coldstream 2008, 277–79, 479.

[14] Kadıoğlu *et al*. 2013, 213; 2015, 349–53. The earliest pottery fragments excavated so far on the acropolis date to the Late Geometric period (trench AK3, *cf*. Kadıoğlu *et al*. 2016, 459–60); among them are several fragments of bird kotylae.

[15] *Cf*. Özkan 2009, 65. İren and Ünlü (2012, 316), on the contrary, assume that the cremation burial was isolated, since no further grave had been found in the six other test trenches. They did not take into account, however, that later levelling measurements might have destroyed the fragile evidence of cremation burials and also graves so that only pottery fragments survived in the archaeological record. At least from the 6th century onwards, this area was used as necropolis shown by fragments of fragmentary sarcophagi of Clazomenian type. There is no reason to assume that these fragments 'seemed to have been transported from elsewhere', as İren and Ünlü did (2012, 310). Archaeometric analyses of the terracotta sarcophagi found at Teos are still a *desideratum*.

[16] Clazomenae: Ersoy 2004, 46–49, figs. 3f–g, 5c. Eretria: Andreiomenou 1981, 203–04, fig. 38 (middle). Teos: İren and Ünlü 2012, 312–15, figs. 18, 20 ('Group B'). Ialysos: Papapostolou

Fig. 2. Bird oinochoe from a Late Geometric cremation burial in the western necropolis (excavation 2012; inv. T12-NA-M1.3b) (photograph by A. von Miller; © Teos Arkeoloji Projesi).

Fig. 3. Krater of the Teian 'Bird-kotyle Workshop' from a Late Geometric cremation burial in the north-west necropolis (excavation 1996) (after İren and Ünlü 2012, 330, fig. 29).

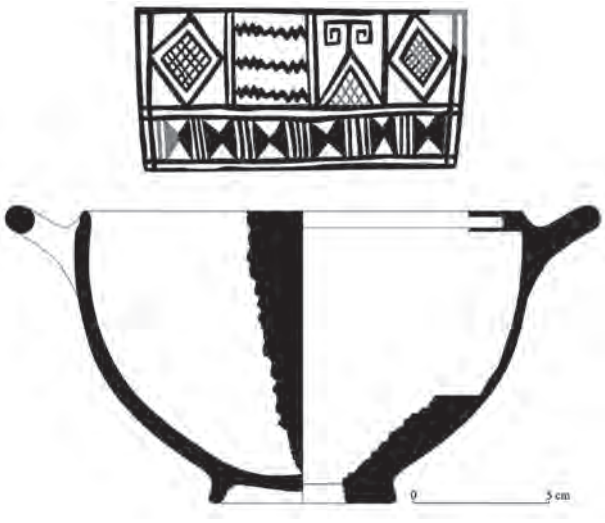

Fig. 4. Bird kotyle from a Late Geometric cremation burial in the north-west necropolis (excavation 1996) (after İren and Ünlü 2012, 324, fig. 11).

Fig. 5. Middle Geometric II/Late Geometric kotyle with meander hooks from the excavation 2013 west to the northern harbour (photograph by S. Gülgönül; © Teos Arkeoloji Projesi).

2. Teos in the Archaic Period

The literary sources for the Archaic period are more numerous and more reliable, so that the history of Teos becomes tangible for us from the 6th century BC onwards.[17] Around 575 BC, the famous poet Anakreon was born here, who, however, spent much of his later life abroad. The involvement of the city in long-distance trade is evident from its participation at Naukratis, an *emporion* in Egypt, run mainly by East Greeks.[18] Its economic interests reached also far to the north, where the Teians founded two colonies shortly after the middle of the 6th century BC, Abdera on the Thracian coast of the Aegean,[19] and Phanagoria on the Taman Peninsula.[20] At home, a spacious and largely fertile *chora* formed a solid basis for the economy of Teos.[21]

Archaic finds and deposits occur more frequently and at more places inside and around the area of the Hellenistic-Roman city than Geometric ones. Already the excavations of the 1960s discovered layers of the 7th and 6th centuries BC on the acropolis hill and in the plain south of it.[22] Since 2010, further Archaic deposits were unearthed on the acropolis, in deep layers south-west of the theatre and in the sacred precinct of Dionysos.[23] In the area west of the Hellenistic city wall remains of buildings of the 6th and 5th century were excavated in 2011–12 (Fig. 6).[24] Among the ceramic finds were a number of kiln wasters, mainly of transport amphorae (Fig. 7), suggesting that pottery workshops were located in this area at the western fringes of the city.[25]

1968, 80, pl. 37. *Cf*. Walter 1968, 40 (Samos); Özgünel 2003, 77, pl. 17.3 (Smyrna); Coldstream 2008, 278, and Kerschner *et al*. 2008, 27–28, pls. 10, 23 (Ephesus).

[17] Strang 2007, 48–58 (with ancient sources and bibliography); Kadıoğlu *et al*. 2015, 349–59.

[18] Herodotus 2. 178. 2. *Cf*. Möller 2000, 81–82. On current research at Naukratis, see Villing and Schlotzhauer 2006; Schlotzhauer *et al*. 2012; Villing *et al*. 2013–20; and the contribution of Johnston and Villing, below in this volume.

[19] Abdera was a re-foundation at the site of an earlier *apoikia* founded by the Clazomenians: Herodotus 1. 168–169; Strabo 14. 1. 30; Ps.-Scymnus 670–671; *cf*. Isaac 1986, 81–85; Loukopoulou 2004, 873; Strang 2007, 63–74. On Archaic Abdera and its pottery finds: Koukouli-Chrysanthaki 2004; Skarlatidou 2004a; 2004b; 2012 (with bibliography); Dupont and Skarlatidou 2012.

[20] Ps.-Scymnus 886; Arrian fr. 71 (= FGrHist 156); *cf*. Avram, Hind and Tsetskhladze 2004, 950–51. On recent archaeological research at Phanagoria: Kuznetsov 2008; 2010; Povalahev and Kuznetsov 2011; Kuznetsov 2013; 2016 (with bibliography). Overview of the Archaic pottery finds: Dupont 2011.

[21] Rubinstein 2004, 1001; Strang 2007, 18–42; Koparal 2013.

[22] Preliminary reports: Boysal 1962; 1965; Öğün 1964.

[23] Kadıoğlu *et al*. 2015, 361 (acropolis); 2016, 457–58, 474, fig. 4 (acropolis).

[24] Kadıoğlu *et al*. 2013, 213 (area west of the Hellenistic city wall).

[25] Kadıoğlu *et al*. 2015, 349–50, fig. 2.

Fig. 6. Buildings of the 6th (left) and 5th centuries BC (top right) in the area west of the Hellenistic city wall (excavation 2012). In the front left corner a smashed Archaic pithos (photograph by M. Kerschner; © Teos Arkeoloji Projesi).

Fig. 7. Kiln wasters of Teian amphorae from the area west of the Hellenistic city wall (excavation 2011), provenance group TeosB. On the left: sample Teos 21 (inv. T11-88/21-18.008.45a) (photograph by M. Kerschner; © Teos Arkeoloji Projesi).

Further west, on the peninsula, rescue excavations in the western necropolis of Teos uncovered several grave precincts in 2013–15.[26] The burials date from the Archaic to the Hellenistic period. Many of them were inhumations in terracotta sarcophagi of Clazomenian type.[27] In 2013–15 another rescue excavation unearthed parts of a habitation quarter south-west of the modern marina of Sığacık, where presumably already in antiquity a harbour was situated.[28]

The prosperity of the *polis* in the 6th century BC is mirrored in a monumental marble temple of Ionic order and a related altar. Both were recently reconstructed from scattered and reused architectural fragments by Musa Kadıoğlu and dated according to their style to *ca*. 550–525 BC.[29] This is shortly after the Persian conquest of the city *ca*. 550–539 BC,[30] when, according to Herodotus (1. 168), all inhabitants allegedly fled to the northern Aegean coast:

> The Teians did the same things as the Phocaeans: when Harpagus had taken their walled city by building an earthwork, they all embarked aboard ship and sailed away for Thrace. There they founded a city, Abdera, which before this had been founded by Timesius of Clazomenae.[31]

Obviously, this statement is an exaggeration,[32] given that the above mentioned remains dating to the second half of the 6th and to the 5th century BC were discovered at three different sites west and north-west of the Hellenistic

[26] Kadıoğlu *et al*. 2015, 363; 2016, 466, 476–78, figs. 8–9, 11.

[27] Kadıoğlu *et al*. 2015, 363; 2016, 466, 478, fig. 11. Previous discoveries of terracotta sarcopagi in the north-west necropolis are mentioned by İren and Ünlü 2012, 310.

[28] A northern harbour is mentioned by Strabo (14. 1. 30) and called *Gerrhaiidai*. Livy (37. 27. 9) calls the northern harbour of Teos '*Geraesticus*'. *Cf*. Strang 2007, 85–86; Hoepfner 2011, 132; İren and Ünlü 2012, 309; Kadıoğlu 2013, 19. Its identification is, however, uncertain, since Strabo specifies its distance from the Hellenistic-Roman city as 30 stades (= *ca*. 5.3 km), whereas the marina of Sığacık is closer to the Hellenistic fortification wall.

[29] Kadıoğlu *et al*. 2015, 353–62, figs. 9–19.

[30] The date of the Persian capture of the Lydian capital Sardis and the ensuing conquest of the Ionian *poleis* including Teos has been much debated, since the crucial passage in the Nabonid Chronicle (II.16), which is the only surviving written source for the date of Cyrus' campaign against Lydia, is damaged: Cahill and Kroll 2005, 605–08; Cahill 2010, 341–44 (with bibliography). Recently, van den Spek (2014, 256 with n. 184) argued – against the widely accepted view of Cargill 1977 – in favour of the previous reading and dated the conquest of Sardis to the ninth year of Nabonid, i.e. 547/6 BC.

[31] Translation A.D. Godley. *Cf*. Strabo (14. 1. 30): 'Anacreon the melic poet was from Teos; in whose time the Teians abandoned their city and migrated to Abdera, a Thracian city, being unable to bear the insolence of the Persians; and hence the verse in reference to Abdera. "Abdera, beautiful colony of the Teians."' (translation H.L. Jones, here and elsewhere).

[32] Herodotus (6. 22) evidently exaggerated in a similar way and with the same political intention, when he alleged that Miletus had been completely abandoned after its fatal defeat at the end of the Ionian Revolt in 494 BC. Contradictory to it, he stated (9. 99) that, only a few years later, a military unit of Milesian men fought in the battle at Mt Mycale in 479 BC; *cf*. Kerschner 1995, 218; Ehrhardt 2003, 5–11, 19. Archaeologically, habitation during the first half of the 5th century BC is attested on the eastern terrace of Kalabaktepe: Kerschner 1995, 214–18; *cf*. Ehrhardt 2003, 15–17.

city wall. They show a continuous settlement of Teos after the annexation by the Achaemenid empire in the mid-6th century BC.

Like Herodotus, Strabo (14. 1. 30) also relates 'the Teians abandoned their city and migrated to Abdera', but he adds 'some of them returned again in later times'. Repatriates could explain the houses and graves of the second half of the 6th century BC, if their absence did not last long. Another objection, however, argues against a complete abandonment of the city, even for a short time. The *polis* must have been well organised and wealthy in the third quarter of the 6th century BC, since it had both the means and the infrastructure to build a large, prestigious marble temple shortly after the Persian conquest. This was feasible only when the administration of the *polis* continued to work and when a large number of citizens kept the economy running.

Evidently, the Achaemenids as new sovereigns of Anatolia had no objections against imposing buildings representing the civic identity and the religion of their new Ionian subjects. In this respect, Teos was not an isolated case as is shown by the initiation and continuation of prestigious building projects of temples at Ephesus, Miletus and Didyma.[33] This tolerant attitude changed only after the suppression of the Ionian Revolt in 494 BC.[34] While recently conquered regions were generally treated in a liberal way by the Achaemenid administration, rebellions were punished with rigour and consistency. Miletus, the initiator of the Ionian Revolt, was extensively destroyed, its civic and religious monuments were radically demolished.[35]

The first phase of the Achaemenid rule over western Asia Minor in the second half of the 6th century BC, however, was a prosperous period:

> the Persian presence in the Levant and Europe redirected, rather than depressed, the Ionian economy. The Persians replaced, rather than destroyed, the Ionians' Lydian and Egyptian markets for luxuries and mercenaries, and offered new opportunities to the Ionians by integrating them into their empire as the naval arm of their advance into Europe and the Aegean archipelago.[36]

These conclusions by Pericles Georges, based mostly on numismatic evidence, are supported by the increase of imported Attic fine ware in western Anatolia during the second half of the 6th century BC observed by Yasemin Tuna-Nörling and Kutalmış Görkay.[37]

[33] Ephesus: Muss 1994, 77–78, 111; Ohnesorg 2007, 129, 132. Miletus and Didyma: Niemeier 1999, 290–91; Dirschedl 2012, 64 (both with bibliography). For further examples, see Görkay 1999, 22, n. 61. In general: Briant 1996, 564–66; Klinkott 2015, 151–67.

[34] Georges 2000.

[35] Kerschner 1999, 8–10, fig. 2; Ehrhardt 2003, 2; Graeve 2013, 9.

[36] Georges 2000, 10. *Cf.* Balcer 1991, 57–58. On Teos: Kadıoğlu *et al*. 2015, 363.

[37] Tuna-Nörling 1995, 107–12, 116–17, 143, figs. 26–27; Görkay 1999, 16–19.

3. Archaeometric Research on the Ceramic Production of Teos in the Geometric and Archaic Periods

For a long time, Teos was beyond the horizon of research on East Greek ceramics.[38] Despite being renowned from the ancient sources as an important and wealthy *polis* of Ionia, it was not taken into consideration as potential production centre of Geometric and Archaic pottery. It seems that this was due to the fact that so little was known of the pre-Hellenistic phases of the city from the excavations of the 20th century. Understandably, there is a tendency in research to focus on the well published excavations, whereas barely investigated sites are largely overlooked.

Kiln Wasters from Teos as a NewBasis for Neutron Activation Analysis (NAA)

At Teos, the situation has changed since 2012, when Musa Kadıoğlu included the Archaic period of the city as one of the focuses into his research programme in co-operation with the Austrian Archaeological Institute.[39] Stratigraphic excavations form a sound basis for the chronology of the pottery, while contextual studies take account of the whole range of ceramic classes extant at the site. Together with the Helmholtz-Institut für Strahlen-Kernphysik at Bonn University, we have started an archaeometric programme to investigate systematically the ceramic production of Geometric and Archaic Teos. The results of the first series of neutron activation analyses (NAA) are presented in the following.

Seven kiln wasters (Figs. 7–9) found in layers of the 6th and 5th centuries in the area west of the Hellenistic city wall (Fig. 6) formed an excellent basis for the identification of the chemical fingerprint of Teian pottery. Overheated in the kiln, these pots had been deformed and could never be used. They were discarded immediately after firing. Kiln wasters are of undisputed local origin and allow one to determine the chemical fingerprint of a certain production site.

All seven analysed kiln wasters show the same element pattern TeosB (Fig. 10). It was first detected in the NAA of bird bowls excavated at Miletus in 1993, yet its precise origin remained unknown for nearly 20 years for lack of unambiguous reference material.[40] Though it was evident from archaeological arguments that it must have been situated somewhere on the North Ionian mainland, it was only thanks to the discovery of the above-mentioned kiln

[38] On the research of East Greek and Western Anatolian pottery studies: R. Cook 1997, 295–300; Akurgal *et al*. 2002, 28–36; Kerschner 2017b.

[39] Kadıoğlu *et al*. 2015.

[40] Kerschner *et al*. 1993, 205–09, tab. 1–4, figs. 3–5 – labelled simply ‘B’ in previous publications as the origin was unknown at that time.

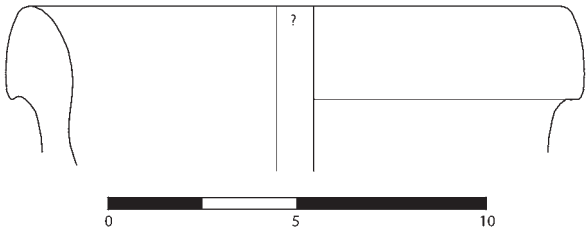

Fig. 8. Kiln waster of a Teian amphora from the area west of the Hellenistic city wall (excavation 2011), provenance group TeosB (sample Teos 21, inv. T11-88/21-18.008.45a) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

Fig. 9. Kiln wasters of Teian amphorae from the western necropolis (excavation 2012, inv. T12-NA-M1-0.1–0.2) (photograph by A. von Miller; © Teos Arkeoloji Projesi).

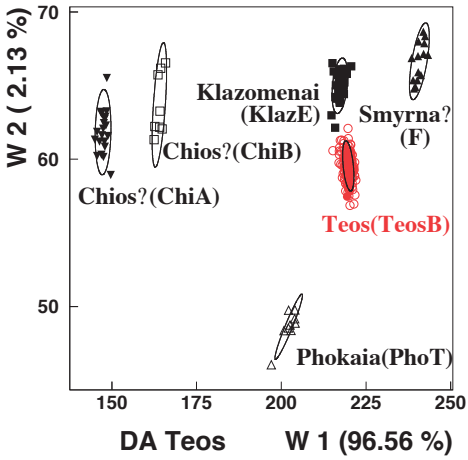

Fig. 10. The result of analysis of 280 samples of North Ionian pottery, corrected for dilution, assuming six provenance groups of homogenous chemical composition which can be assuredly or most likely located. The element patterns of these groups are well separated. The ellipses are the 2 *sigma* (root mean square deviations) boundaries of the groups. Seven kiln wasters excavated at Teos – rendered as full circles in red – fit in well with provenance group TeosB. Therefore its localisation at Teos is now assured. The provenance group PhoT can be assigned to workshops at Phocaea (Japp 2009, 204; Mommsen and Japp 2009, 276; 2014, 39, fig. 6). The indicated locations of the provenance groups ChiA and ChiB (on the island of Chios?), KlazE (at Clazomenae) and F (at Smyrna?) have not yet been proven by irrefutable reference pieces (kiln wasters or local clay samples), but it is likely by reasons of the distribution of the ceramic wares and stylistic classes comprised in these provenance groups (Kerschner and Mommsen 2009b, 134–39) (diagram by H. Mommsen).

wasters in 2012 and the subsequent NAA that it can be located with certainty at Teos now.[41]

This chemical fingerprint is well-defined and clearly separable from the other chemical fingerprints known from eastern Aegean potters' centres. It denotes one of the major provenance groups in the Bonn database comprising at the moment 218 members from numerous sites in the Aegean and western Anatolia, on the Black Sea, in Cilicia, in the Levant, in Egypt as well as on Sicily (Fig. 11).[42] Therefore it has been obvious for some time that the element pattern TeosB represents one of the most important production centres of painted pottery in the Eastern Aegean throughout the Late Geometric and

[41] Kadıoğlu *et al*. 2015, 349–51, figs. 2–3.
[42] See below for a bibliography of the individual find-spots.

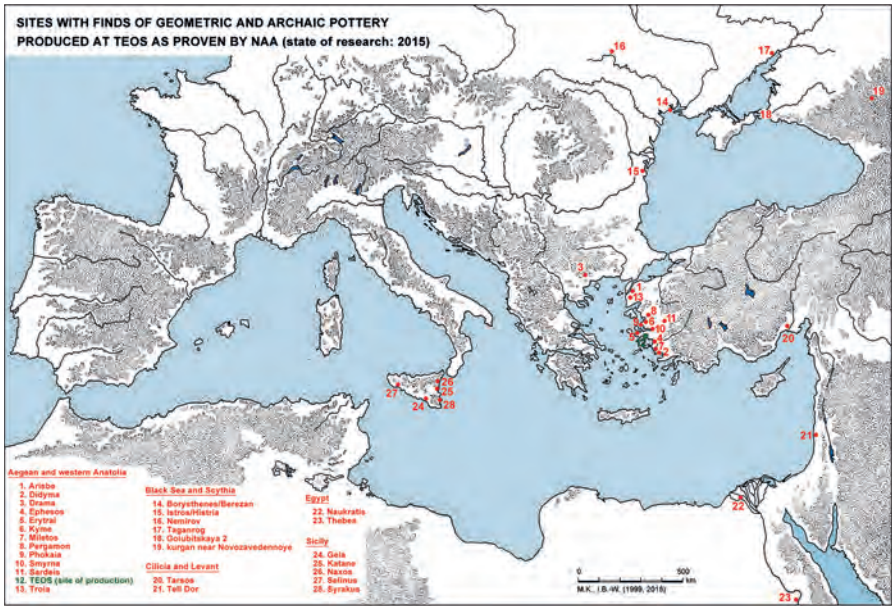

Fig. 11. Distribution map of sites with finds of Geometric and Archaic pottery produced at Teos as proven by NAA (state of research 2015) (map by M. Kerschner and I. Benda-Weber; © Austrian Archaeological Institute).

Archaic periods. Given the large quantity and wide distribution of their products, the workshop(s) of this centre focussed on the overseas export of painted pottery in addition to the supply of the local and regional markets.

The Earliest Teian Production

The earliest example assignable to the ceramic production of Teos is a fragment of a strainer jug, decorated in Mycenaean 'Pictorial Style' and dating presumably to Late Helladic IIIB.[43]It was found at Tarsus in Cilicia, but NAA showed that it was an import of provenance group TeosB (old B).[44] So far, no remains of the Late Bronze Age have been found at Teos, but it has to be taken into account that the systematic research on the pre-Hellenistic periods of the site started only recently. It is also possible that the Late Bronze Age

[43] Mountjoy 2005, 92–94, fig. 3.
[44] Mommsen *et al.* 2011, 905, 911 (sample 6, cat. 43).

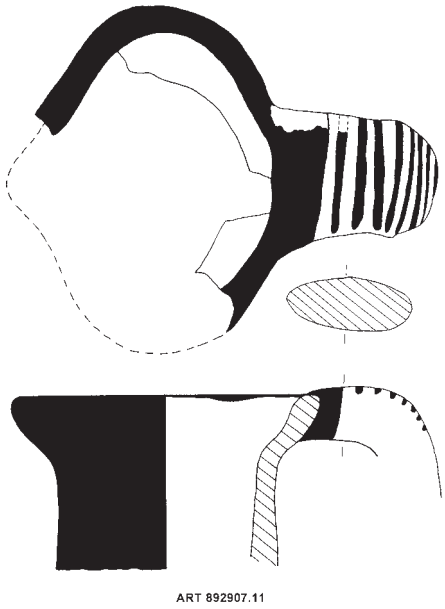

Fig. 12. Protogeometric oinochoe, found in the Artemision of Ephesus, provenance group TeosB (sample Ephe 136, inv. ART 892907.11) (drawing by S. Karl and I. Benda-Weber; © Austrian Archaeological Institute).

settlement was not situated beneath the later Hellenistic-Roman city, but somewhere in its vicinity and that the prehistoric potters used the same clay bed as their successors in the Geometric and Archaic periods.

The earliest among the sampled pieces belonging to provenance group B dates to the Protogeometric period (Fig. 12). It is a black-glazed mouth fragment of a trefoil oinochoe with a vertical strap handle decorated with horizontal bars.[45] It was found in a Protogeometric deposit in the Artemision of Ephesus.[46] This oinochoe may show that Teian potters exported their products at a regional level already in the 10th century BC, but it is also possible that it was brought to Ephesus by a worshipper coming from Teos and dedicated to Artemis there.

[45] *Cf.* Popham *et al.* 1980, 316–21, fig. 15, pls. 126.1–2, 140.22.6–7, 148.44.7; Lemos 2002, 67–72, pls. 7.6 (EPG), 21.3 (MPG); 34.4, 35.1–3, 37.2–3, 40.6, 50.1, 55.4 (LPG); 93.1.

[46] On the context: Kerschner 2003; 2006a, 369–71; 2011; Forstenpointner *et al.* 2008.

Teian Bird Kotylae, Bird Bowls and Related Vessels

Whereas pottery of the 10th to mid-8th century BC is still scarce among the finds at Teos, the recent excavations have provided a good overview on the range of local pottery of the Late Geometric period. Decorated fine wares of the late 8th and early 7th centuries BC are markedly dominated by the products of the 'Bird-kotyle Workshop' which was defined by Nicolas Coldstream:[47] the index fossil is the deep kotyle with high, inset rim and a frieze of three to five metopes (Figs. 4, 13–14). The central field frequently displays the eponymous stylised water bird. Closely related both in fabric and in decoration are round-mouthed oinochoai (so-called bird oinochoai; Fig. 2) and large kraters (Figs. 4, 15–16). Examples of all three shapes preferred by the 'Bird-kotyle Workshop' were analysed and showed the element pattern TeosB.

In 1968, Coldstream assumed the location of the prolific 'Bird-kotyle Workshop' was in the north-west of the island of Rhodes, either at Ialysos or at Camiros, based on the distribution of the bird kotylae as then known.[48] This assessment was adopted by most scholars, although some of them allowed for further production sites.[49] The introduction of archaeometric analyses in Greek pottery studies in the 1970s raised doubts on this attribution. In his pioneering article in 'Dacia' 1983, Pierre Dupont stated 'la fin du mythe Rhodien' on the basis of his XRF-analyses of various classes of eastern Aegean pottery and he demonstrated that the bird bowls, the successors of the bird kotylae, were rather of North Ionian than of Rhodian origin.[50] He declared that 'die meisten der "kanonischen" Vogel- und Rosettenschalen' originated in North Ionia,[51] namely at Clazomenae and in another production centre which he could not pinpoint for lack of reference material.[52] Since the range of stylistic classes comprised by the

[47] Coldstream 1968, 277–79, pl. 61a–d; repeated in Coldstream 2008, 277–79 with an addendum on the North Ionian provenance on p. 479. *Cf.* Walter 1968, 40–41, pls. 42–44; Boardman 1998, 51, fig. 137; R. Cook and Dupont 1998, 18–19, 26, fig. 5.4; İren and Ünlü 2012, 311–13, figs. 3–24, 29–31.

[48] Coldstream 1968, 279.

[49] For example Boardman 1967, 134; Walter 1968, 40–41: 'Der Vogelskyphos mag die Erfindung einer Landschaft sein, aber er ist doch zu einer gemeinionischen Gattung geworden und als solcher in der Ägäis weit verbreitet'; R. Cook and Dupont 1998, 26: 'The Bird bowl, like the Bird kotyle, is generally thought to have been a Rhodian invention, but there was evidently manufacture in other parts of the East Greek region, and until more is known about them it is well to be cautious.' İren and Ünlü (2012, 314) assumed Teos or Clazomenae as production places. For a detailed overview of the research history, see Akurgal *et al.* 2002, 63–66.

[50] Dupont 1983, 31, 33, 40–41; *cf.* Dupont 1986, 61, n. 3.

[51] Dupont 1986, 61, n. 3. The 'canonical bird and rosette bowls' presumably correspond with the 'standard fabric' defined in Akurgal *et al.* 2002, 66.

[52] Dupont 1983, 31, 33.

Fig. 13. Bird kotyle from a Late Geometric cremation burial in the western necropolis (excavation 2012, inv. T12-88/21-NA-M1.1) (photograph by A. von Miller; © Teos Arkeoloji Projesi).

Fig. 14. Bird kotyle from a Late Geometric cremation burial in the western necropolis (excavation 2012, inv. T12-88/21-NA-M1.1) (drawing by A. von Miller and I. Benda-Weber; © Teos Arkeoloji Projesi).

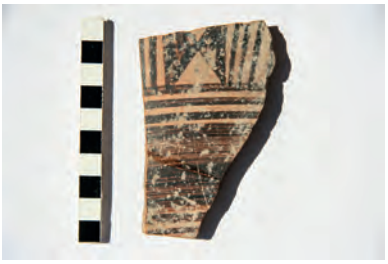

Fig. 15. Fragment of a Late Geometric krater of the 'Bird-kotyle Workshop' from the area west of the Hellenistic city wall (excavation 2011) provenance group TeosB (sample Teos 05; inv. T11-88/21-10.007.4) (photograph by A. von Miller; © Teos Arkeoloji Projesi).

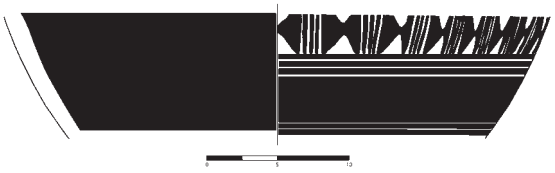

Fig. 16. Late Geometric krater of the 'Bird-kotyle Workshop' from the area west of the Hellenistic city wall (excavation 2011), provenance group TeosB (sample Teos 05; inv. T11-88/21-10.007.4) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

Fig. 17. Bird bowl of the Teian 'standard fabric', second to third quarter of the 7th century BC, found at the Artemision of Ephesus (inv. ART 88 K 833.1) (photograph by N. Gail; © Austrian Archaeological Institute).

latter was similar to that of Clazomenae, Dupont assumed that this unlocated chemical group was North Ionian and labelled it 'Ionie du Nord 2'.[53]

The North Ionian origin of the bird bowls was corroborated by our first series of NAA in 1993.[54] Back then, however, no finds from North Ionian sites were available for scientific analyses, and therefore the exact place of manufacture remained uncertain. Only in 2012, nearly 20 years after our first series of NAA, the discovery of kiln wasters in Teos (Figs. 7–10) provided unequivocal reference material for the localisation of provenance group TeosB in this North Ionian *polis*.

According to the NAA carried out at Bonn, the large majority of the bird kotylae and the bird bowls were produced at Teos.[55] The Teian production comprises two main fabrics – the 'standard fabric' (Fig. 17) and the 'orange series' – both revealing the same element pattern TeosB.[56] Macroscopically, they can be easily distinguished from each other by colour and hardness. The 'orange series' is more reddish and distinctly softer than the beige-coloured 'standard fabric', presumably due to a lower firing temperature.[57]

[53] Dupont 1983, 31, 33.

[54] Kerschner *et al*. 1993. Both Boardman (1998, 51, fig. 137) and Coldstream (2008, 479) subscribed to the results of our NAA and adopted the location in North Ionia. Coldstream, however, assumed Clazomenae as the likeliest place of production, possibly as no Late Geometric finds from Teos had been published at that time.

[55] Kerschner *et al*. 1993; Akurgal *et al*. 2002, 66–71; Posamentir and Solovyov 2007, 184–85, figs. 1.1–3; Kerschner and Mommsen 2009a, 86; Posamentir *et al*. 2009, 41, 45, fig. 4.1 (The photo has to be rotated 90 degrees to the left).

[56] Kerschner *et al*. 1993, 199–201, 208–09; Akurgal *et al*. 2002, 66–67, figs. 18–23, 63–72, pl. 2. Our 'standard fabric' is the one described by Coldstream 1968, 279 as 'Rhodian'.

[57] Akurgal *et al*. 2002, 67.

Bird kotylae were occasionally emulated, for example on Samos, at Ephesus and in Caria.[58] None of these local varieties were standardised and produced on a large scale for export, as were the bird kotylae from Teos. The Samian, the Ephesian and the Carian offshoots show peculiarities not only in fabric, but also in style and motives which are unparalleled in the Teian 'standard fabric'. The outside of an Ephesian bird kotyle (provenance group H) is covered with a yellowish slip, a feature that never occurs on Teian examples.[59] Three of such uncanonical examples from the Heraion on Samos were analysed by us and proved to be made of a local Samian clay paste defined by the element pattern SamJ.[60] Stylistically, these Samian emulations are characterised by a very low frieze of three metopes, some of them with a meander tree in the central position unlike the Teian products of the 'standard fabric', where the central field is always dedicated to the water bird, if there are only three metopes. The lateral lozenges of the Samian pieces are vestigial, the baseband is omitted.[61]

In the second quarter of the 7th century BC Teian potters modernised their most successful product in a temperate way. They replaced the thick-walled, deep shape of the kotyle with the more elegant and lighter form of a shallow bowl. But they retained the traditional Geometric decoration with a stylised bird between two lozenges for seven more decades. Although this pattern was outdated by the second half of the 7th century BC, when the Orientalising style was predominant in eastern Aegean vase-painting, the bird bowls (Fig. 17) kept to it, presumably because it had already achieved the quality of a trademark by that time.[62] Only in the last quarter of the 7th century, the old-fashioned Geometric metopal frieze was replaced by rosettes (Fig. 18), meander hooks, pendant lotus flowers, pairs of eyes, or simple bands (Fig. 19).[63] At that time,

[58] Walter 1968, 40–41, pl. 44 (Samos); Akurgal *et al*. 2002, 48, 99, cat. 25, fig. 17; Kerschner 2007, 223–24, pl. 31.1 (Ephesus); Özgünel 1979, 86–87, 95, 113, 116, pls. 25, 29; R. Cook and Dupont 1998, 19–20, fig. 5.6 (Caria).

[59] Kerschner 2007, 223–24, pl. 31.1. On provenance group H, see Akurgal *et al*. 2002, 47–50; Kerschner and Mommsen 2009a, 86, fig. 1.

[60] NAA samples Samo 23–26 (two of them belonging to the same vessel) = Walter 1968, 106 nos. 262, 263, 267, pl. 44. On the Samian provenance group SamJ: Kerschner and Mommsen 2009a, 84–85, figs. 1, 3. On NAA of Samian finds from Naukratis: Schlotzhauer 2006, 308–10, 314, figs. 12–14; Schlotzhauer and Villing 2006, 59–60, figs. 14–17; Mommsen *et al*. 2012, 439, fig. 13. See also the contribution by L.R. Geißler, H. Mommsen, R. Posamentir and K. Riehle, below in this volume.

[61] Walter 1968, 40–41, 106, nos. 262, 263, 265, 267, pl. 44.

[62] In the Bonn database, all analysed bird bowls of the 'standard fabric' and the 'orange series' belong to the Teian provenance group TeosB (altogether 12 out of 15 NAA of bird bowls).

[63] Akurgal *et al*. 2002, 71–72, 81; Posamentir and Solovyov 2007, 185, fig. 1.4; Kerschner 2006c, 145–46, fig. 16; Kerschner and Mommsen 2009a, 86. In the Bonn database, the provenance group TeosB comprises four rosette bowls – samples Teos 16 (Fig. 18), Teos 29, Smyr 33 (Akurgal *et al*. 2002, 104, cat. 50, pl. 3) and Bere 219: Posamentir and Solovyov 2007, 185, fig. 1.4 – and four banded bowls: samples Teos 10, Teos 19 (Fig. 19), Ephe 17 and Ephe 251.

Fig. 18. Rosette bowl from the area west of the Hellenistic city wall (excavation 2011), last quarter of the 7th/first quarter of the 6th century BC, provenance group TeosB (sample Teos 16; inv. T11-88/21-10.8.1) (photograph by A. von Miller; © Teos Arkeoloji Projesi).

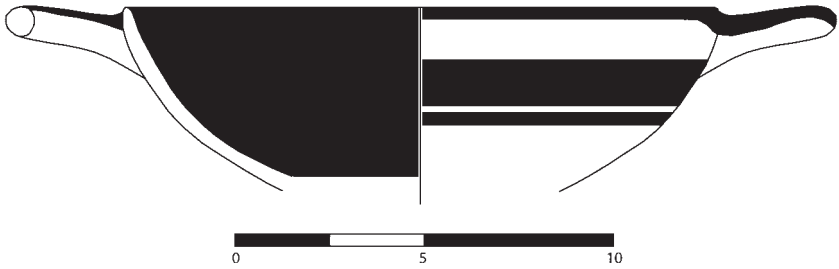

Fig. 19. Late Archaic banded bowl with grooved inside from the area west of the Hellenistic city wall (excavation 2011), second half of the 6th century BC, provenance group TeosB (sample Teos 19; inv. T11-88/21-117–133) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

however, the competition increased and workshops at Clazomenae (provenance group KlazE, previously labelled E)[64] as well as in other North Ionian (F =

[64] The former provenance group E – *cf.* Akurgal *et al.* 2002, 75–80, 141; Kerschner 2006c, 140–41, 144–47, figs. 10–13, 15, 18; Posamentir and Solvoyov 2006, 117–19, figs. 19, 23–24; Schlotzhauer and Villing 2006, 57–58, figs. 6–10; Posamentir and Solovyov 2007, 189–90, fig. 2; Kerschner and Mommsen 2009a, 87–88, fig. 1 – can now securely located at Clazomenae. In the

Smyrna?)[65] and Aeolian production centres (AiolG = Cyme/Larisa?) manufactured their own rosette-, meander- and eye bowls.[66]

Headed by the 'Bird-kotyle Workshop(s)' which later turned into the 'Bird-bowl Workshop(s)',[67] the pottery production of Teos increased considerably during the second half of the 8th century BC. It evolved from a mere supplier of the local needs into an export-oriented production on a large-scale. This rise was achieved by focussing on a few standardised shapes and decoration types.[68] The decoration was carefully executed, but not sophisticated. It could be carried out by experienced craftsmen within a relatively short time. Reducing the required working time lowered the costs and obviously made the bird kotylae and bird oinochoai competitive on regional as well as on overseas markets. What was the cause of their success? It might have been a combination of the high quality of potting, especially the smooth finish of the surface and the hard-fired, durable fabric, with a reasonable price. The 'Bird-bowl Workshop(s)' at Teos were the first in the eastern Aegean introducing a standardised ceramic production on a large scale, and they were one of the first within the Greek culture area. In the late 8th and 7th century BC, Teian potters were surpassed in success only by their Corinthian competitors.

Teian Wild Goat-Style and Related Pottery

Along with the Subgeometric bird bowls, Teian potters produced also Wild Goat-style pottery in the 7th century BC. This demonstrates that conservative and progressive tendencies might have been pursued contemporaneously at the same production centre, especially if it was a large one.[69] Such a diversity of styles is well known from extensively investigated cities like Athens or

Bonn database, there are three rosette bowls in the provenance group KlazE (former E): Akurgal *et al*. 2002, 104, cat. 52, pl. 3; Kerschner 2006c, 145–46, fig. 15.

[65] On provenance group F, see Akurgal *et al*. 2002, 80–84, 141; Kerschner and Mommsen 2009a, 88, fig. 1; and also the contribution by L.R. Geißler, H. Mommsen, R. Posamentir and K. Riehle, below in this volume. In the Bonn database, there are two bird bowls of the late types V–VI (Akurgal *et al*. 2002, 101–02, cat. 36–37, pl. 2).

[66] On provenance group AiolG, see Akurgal *et al*. 2002, 84–92, 142; Kerschner 2006b; 2006c, 141–44; fig. 11; Posamentir and Solovyov 2006, 107–10, figs. 2–6; Schlotzhauer and Villing 2006, 58; Posamentir and Solovyov 2007, 181–82, 190–91, fig. 3; Kerschner and Mommsen 2009a, 90; 2009b, 139–42; Mommsen *et al*. 2012, 440; and also the contribution by L.R. Geißler, H. Mommsen, R. Posamentir and K. Riehle, below in this volume. In the Bonn database, there is one rosette bowl and one eye bowl of provenance group AiolG: Posamentir and Solovyov 2007, 191, fig. 3.1–2.

[67] We do not know how the production was organised. Given the abundant output, it seems likely that it was rather a group of related workshops than a single big one.

[68] On the phenomenon of standardisation in the field of Greek pottery, *cf*. Kotsonas 2014a; Stissi 2014.

[69] Kerschner 2006b, 113–15.

Corinth. The polychrome Chigi Group was made at the same time as Subgeometric aryballoi and kotylae in mid-7th century Corinth.[70] Early red-figured masterpieces and mediocre lekythoi in the lingering black-figure style were both made in Late Archaic Athens.[71] Now archaeometric analyses attest that this was also the case in some of the big production centres in the eastern Aegean like at Miletus, Teos and the Cyme/Larisa(?).[72]

Our knowledge of the Orientalising phase of Teian vase-painting is still scanty, since the excavations at Teos have yielded only few deposits of the 7th century BC so far. There are, however, three fragments of Orientalising oinochoai found at Ephesus and at Clazomenae (Figs. 20–22) which belong to provenance group TeosB and can therefore be identified as Teian imports. Two of them were excavated in a stratified sacrificial deposit of the last third of the 7th century BC in the Ephesian Artemision.[73] The emphasis of the decoration is on the shoulder. There is a field with ornaments (Fig. 20) or an animal frieze (Fig. 21), underlaid with a group of bands.

The older fragment (Fig. 20) is dated by its stratigraphic context prior to *ca*. 625/20 BC.[74] Some petals of a pendant lotus flower are preserved on it. This blossom was presumably part of a chain of lotus buds and flowers, as it

Fig. 20. Shoulder fragment of an oinochoe with pendant lotus flower, North Ionian Archaic I, third quarter of the 7th century BC, provenance group TeosB, found at the Artemision of Ephesus (sample Ephe 95; inv. ART 94 K 184.1) (drawing by M. Kerschner; © Austrian Archaeological Institute).

[70] On the Chigi Group: Amyx 1988, 31–40, pls. 11–12. On Subgeometric and related pottery of the same period: Neeft 1987, 127–272; Pemberton 1989, 79–81, pl. 4 (Group 1, deposit of the mid-7th century BC); Stillwell and Benson 1984, 54–69, pls. 12–15.

[71] On early Athenian red-figure: Boardman 1975, 29–36, 91–95, figs. 33–53, 129–161. On late Athenian black-figure: Boardman 1974, 125–27, 146–50, figs. 233–261; Haspels 1936, 41–191, pls. 14–50. *Cf*. also the observations of Smith (2014, 143–45) on small pelikai by the Pan Painter.

[72] Kerschner 2006b, 113–15; 2017b.

[73] Kerschner 1997; on the date: 175–82.

[74] Kerschner 1997, 120, 198–200, cat. 26, fig. 49, pl. 4; Akurgal *et al*. 2002, 74, fig. 71 (sample 99/26 = Ephe 95). On the date of the context: Kerschner 1997, 181 (layer F, *ca*. 625/20 BC).

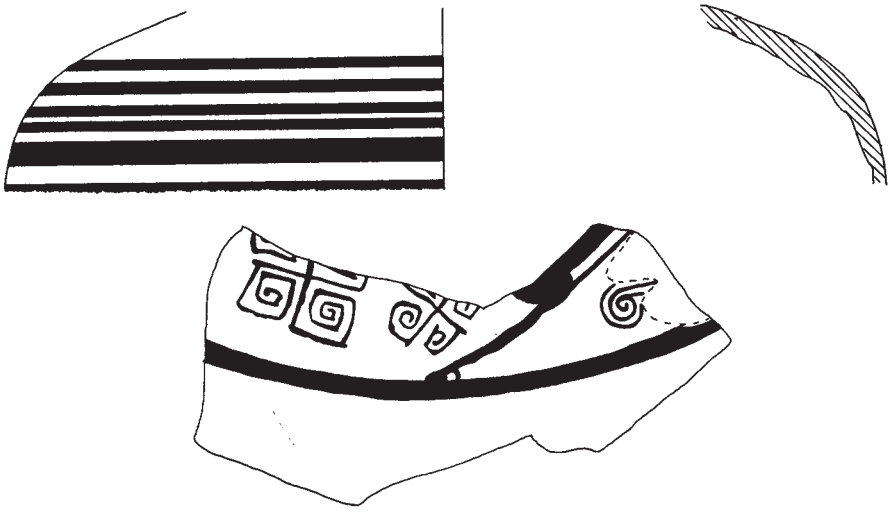

Fig. 21. Shoulder fragment of an oinochoe with the forepart of a running wild goat, North Ionian Archaic I, last quarter of the 7th century BC, provenance group TeosB, found at the Artemision of Ephesus (sample Ephe 96; inv. ART 94 K 242.1) (drawing by M. Kerschner; © Austrian Archaeological Institute).

Fig. 22. Shoulder fragment of an oinochoe with a chain of pendant lotus flowers and buds, North Ionian Archaic I, second half of the 7th BC, provenance group TeosB, found at Clazomenae (sample Klaz 39; inv. AKM 2332) (photograph by J. Schubert; © Akademisches Kunstmuseum, Bonn).

is shown on a fragmentary oinochoe at Bonn (Fig. 22).[75] That piece was found at Clazomenae and proven by NAA to be a member of provenance group TeosB and therefore an import from neighbouring Teos. A completely preserved example of the same class of oinochoe was excavated in cremation no. 32 at the Akpınar necropolis of Clazomenae.[76] This burial can by dated to *ca*. 650–640 BC on the basis of three Protocorinthian aryballoi among the funerary goods.[77] The oinochoe shows the decoration system as a whole: above the shoulder field is a broad neck decorated with an open cable and a trefoil mouth; the lower part of the body is covered by large void rays between groups of bands.[78]

Future archaeometric research will show if this piece is also a Teian import or rather a product of Clazomenian potters. Both cites were close neighbours and obviously exchanged artistic concepts and presumably also artisans. This is the most likely way to explain why we find similar types of vessels and decorations both at Teos and at Clazomenae. In this case intensified archaeometric pottery analysis will offer an excellent possibility to explore cultural and economic interrelations of two neighbouring *poleis*.

The younger fragment from the Artemision deposit (Fig. 21) attests animal friezes on Teian oinochoai in the last quarter of the 7th century.[79] Its find context provides a *terminus ante quem* of *ca*. 600 BC.[80] The forepart of a wild goat running to the right is preserved, surrounded by very large filling ornaments: meander crosses in front of the animal and beneath its body a double spiral which will become canonical in the next stage, the so-called 'Late Wild Goat style' of the early 6th century BC. These oinochoai of the last quarter of the 7th century kept the shape and the overall arrangement of the decoration of their forerunners in the third quarter. This is shown by a stylistically closely related vessel excavated in nearly undamaged state in the Scythian barrow of Filatovka in the eastern part of the Crimea.[81] In the animal frieze on the shoulder, the running wild goat is chased by a big dog. The decoration of the neck and that of the lower body is the same as on the earlier oinochoe from cremation no. 32 at the Akpınar necropolis.

Unlike the vase-painters at Teos, contemporaneous artisans in South Ionia usually extended the animal friezes to the belly of the oinochoai, and they

[75] Sample Klaz 39; inv. AKM 2332. *Cf*. Greifenhagen 1936, 378, no. 26, fig. 28; Kerschner 1997, 215–16, fig. 56.

[76] Hürmüzlü 2004, 84–85, fig. 15.

[77] Hürmüzlü 2004, 84, fig. 14.

[78] The lower part of a similar oinochoe decorated with large void rays was excavated in grave 109 of the same cemetery: Hürmüzlü 2010, 118–22, fig. 44a–b.

[79] Kerschner 1997, 172, 199–200, cat. 131, fig. 51, pl. 17; Akurgal *et al*. 2002, 74, fig. 72 (sample 99/27 = Ephe 96).

[80] Kerschner 1997, 182 ('Aufschüttung A', filled in shortly before 600 BC).

[81] Korpusova 1980, 98–104.

preferred a chain of lotus flowers and buds in the lowest frieze around the foot.[82] Differences can also be seen in the range of filling ornaments and in the style of the cable pattern on the neck.

The oinochoe from Filatovka presumably originates from Teos (or possibly Clazomenae). It indicates that North Ionian Wild Goat-style vases were already exported in the late 7th century BC. A big boost in the overseas sale of this elaborate class of painted pottery was attained in the first third of the 6th century BC, when Teian artisans adopted the black-figure technique of Corinthian type for their animal friezes.[83] They modified the Early Corinthian prototypes slightly and combined them with traditional friezes in reserve technique. This is the latest phase of North Ionian Archaic I, baptised by Robert Cook 'Late Wild Goat-style', and datable to the first third of the 6th century BC.[84] A classic example of this standardised production is a fragmentary krater found at the Artemision of Ephesus (Fig. 23). The NAA of this piece demonstrated its Teian origin (provenance group TeosB).[85]

Another numerous and widespread class are the so-called Borysthenes amphorae (Fig. 24).[86] These neck-handled amphorae all show the same standardised decoration: a large running wild goat with its head turned back on the shoulder, a thick cable pattern on the cylindrical neck, broad bands enhanced with white – red – white lines on the belly, and rays around the foot.

Even more standardised, more numerous and more widespread on the overseas markets were small dishes decorated with simple Orientalising ornaments like meander hooks on the everted rim and leave rosettes in the centre (Fig. 25).[87] Some varieties were only banded.

Teian workshops had a large share in these classes of the latest phase of North Ionian Archaic I in the first third of the 6th century BC, but there were other producers in the region, too, among which Clazomenae (provenance group KlazE) and a great Aeolian potters' centre (presumably Cyme/Larisa) were the most important.[88]

[82] Kerschner and Schlotzhauer 2005, 25–45.

[83] Walter-Karydi 1973, 77–87, pls. 107–112, 114–116, 124–125; R. Cook and Dupont 1998, 51–6, figs. 8.17, 8.19, 8.20; Schlotzhauer *et al*. 2012, 40–41.

[84] R. Cook and Dupont 1998, 51–52.

[85] Sample 99/31 = Ephe 100; inv. ART 73 K 10.8. Akurgal *et al*. 2002, 74–75, fig. 76; Kadıoğlu *et al*. 2015, 352–53, fig. 6.

[86] Kerschner 2006c, 136–39, figs. 5–7.

[87] For example, Akurgal *et al*. 2002, fig. 77; Posamentir and Solovyov 2006, figs. 22–23, 28–29; Kerschner and Mommsen 2009b, pls. 7, 9; Mommsen *et al*. 2012, Taf. 6e–j. *Cf*. Walter-Karydi 1973, pls. 122–123.

[88] Teos (provenance group TeosB): for example, Akurgal *et al*. 2002, 74–75, figs. 71–76; Kerschner 2006c, 136–38, figs. 5–6; Posamentir and Solovyov 2006, 119–23, figs. 19–21, 25–27, 30; 2007, 184–89, figs. 1.5–31; Kerschner and Mommsen 2009b, pl. 6. Clazomenae (provenance group KlazE): Kerschner 2006c, 140–41, fig. 10; Posamentir and Solovyov 2007, 189–90, fig. 2.

Fig. 23. Shoulder fragment of a krater of the late phase of North Ionian Archaic I (so-called Late Wild Goat-style), first third of the 6th century BC, provenance group TeosB, found at the Artemision of Ephesus (sample Ephe 100; inv. ART 73 K 10.8) (photograph by N. Gail; © Austrian Archaeological Institute).

In the middle and second half of the 6th century BC, Teian potters produced also black-figure pottery like the column krater with an elaborate depiction of a siren on its handle plate (Fig. 26). Analysed examples from Berezan[89] show that Teian workshops had a share in the large and diverse class of East Greek black-figure pottery studied systematically and labelled 'Clazomenian black-figure' by Robert Cook.[90] He classified the bulk of it in five groups, but admitted that 'a number of miscellaneous pieces, although related, do not fit tidily into any of the groups … described'.[91] Doubts that all Ionian black-figure could be connected with only one place of origin were also uttered by John Cook who stated that there were 'miscellaneous pieces' from Smyrna which 'should perhaps be regarded as Clazomenian'.[92] Robert Cook was well

Provenance group AiolG/Aiolg (Cyme/Larisa?): Kerschner 2006c, 141, figs. 11–12; Posamentir and Solovyov 2006, 107–09, figs. 4–5; 2007, 190–94, figs. 3.3, 3.9.

[89] Posamentir and Solovyov 2006, 117–19, figs. 17, 20; 2007, 187–89, figs. 1.33–34.

[90] R. Cook 1952; R. Cook and Dupont 1998, 95–107, fig. 12.1–8.

[91] R. Cook and Dupont 1998, 105.

[92] J. Cook 1965, 132.

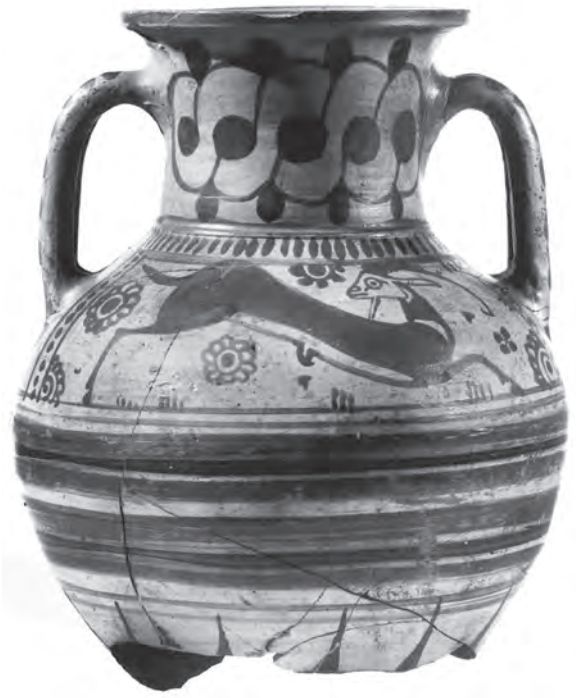

Fig. 24. Neck-handled amphora of the so-called Borysthenes class from Siana (Rhodes) in the Kunsthistorisches Museum in Vienna (Antikensammlung Inv. IV 1623) (photograph © Kunsthistorisches Museum Vienna, Antikensammlung).

Fig. 25. Rim fragment of dish with meander rim, North Ionian Archaic I, first half of the 6th century BC, provenance group TeosB, found at the Artemision of Ephesus (sample Ephe 182; inv. ART 79 K 62.1) (photograph by N. Gail; © Austrian Archaeological Institute).

Fig. 26. Handle plate of a black-figure column krater with a siren, surface find from the theatre area (inv. T13-Tiyatro-yüzey.1) (photograph by C. Özbil; © Teos Arkeoloji Projesi).

aware that, in 1952, there were still other sites in northern Ionia 'of which nothing is yet known' and assessed that 'what we call Clazomenian was made, if not at Clazomenae, then at some neighbouring site'.[93] An important neighbouring site, virtually unexplored at that period, is Teos.

Teian Black-Figure Pottery

The differentiation between Teos and other production centres on the North Ionian mainland still needs further research. This applies especially to the immediate neighbour to the north, Clazomenae. Both Teos and Clazomenae were important producers of painted pottery throughout the Geometric and Archaic periods. They were situated in close vicinity, and they obviously shared several classes of decorated pottery,[94] including terracotta sarcophagi of Clazomenian type, many of which were found in recent rescue excavations in the western necropolis of Teos.[95] Now, as the element patterns of the major

[93] R. Cook 1952, 147.
[94] *Cf.* İren and Ünlü 2012, 314.
[95] Kadıoğlu *et al.* 2016, 466, 478, fig. 11.

provenance groups of Teos (TeosB) and Clazomenae (KlazA, KlazE) have been established, the starting situation for subsequent archaeometric research is extremely promising. The chemical profile of all three element patterns is clearly distinct from each other, as is illustrated in Figs. 27–28.

Teian Transport Amphorae

Within the frame of this short overview, only a brief glance can be cast at transport amphorae. Most of the kiln wasters from Teos forming our reference samples for the provenance group B were amphorae (Figs. 7–9). There are some rim fragments among them (sample Teos 21; Figs. 7–9), and these show the profile of a well-known and widespread class of amphora which was described first by Ireeda Zeest in 1960, who proposed a Samian origin.[96] This attribution was contested by Dupont in 1982 on the basis of his XRF analyses.[97] For lack of reference material, the question of the production place was much discussed, but could not be solved. This class of amphora has been differently labelled according to the presumed production area: 'Samos-Zeest', 'Zeest's Protothasian', 'pseudo-Samian' and recently 'Ionia I' by Iulian Bîrzescu and 'İonia.β' by Yusuf Sezgin.[98] Russian archaeologists like Aleksandr Abramov and Sergey Monakhov preferred the descriptive name 'amphorae with complexly articulated foot' (Fig. 31).[99]

Samos, Miletus, Thasos, Abdera, Torone and even Corinth have been proposed as place of production.[100] Yaşar Ersoy was the first – in 1993 – who suggested a North Ionian origin on the basis of the frequency of this amphora class in the settlement of the 6th century BC at Clazomenae.[101] His view, however, was not accepted until recently. In 2006, Dupont partly revised his previous attribution, based on XRF-analysis, of 'Zeest's Samian and Protothasian' amphorae to the northern Aegean coast, and cautiously suggested for some of them a North Ionian (Chian and Teian) origin, though

[96] Zeest 1960, 16, 79–80, pls. I.3, 5–6, 15. For a close comparison of the rim profile, see Bîrzescu 2012, 117, 316, cat. 1021, pl. 51 ('Ionian I, Type 2, Variant B').

[97] Dupont 1983, 42, fig. 18.

[98] R. Cook and Dupont 1998, 178–86; Carlson 2003, 584; Ersoy 2004, 56, 73; Bîrzescu 2012, 113–25; Sezgin 2012, 259–81, 325.

[99] Abramov 1993, 11; Monakhov 2003a, 38–42; 2003b.

[100] For example, Ruban 1991, 185–90; Naso 2005, 77, n. 24 (Milesian); Lawall 1995, 137, n. 90 (Ionian); R. Cook and Dupont 1998, 182–83; Dupont 2000, 59; Monakhov 2003b, 256 (northern Aegean); Seifert 2004, 28, 74, nos. 209–214, pls. 83–84 (Corinthian). A comprehensive overview on the history of research is given by Bîrzescu 2012, 113, 122–23.

[101] Ersoy 1993; 2004, 56, 65, figs. 15f, 23g–i.

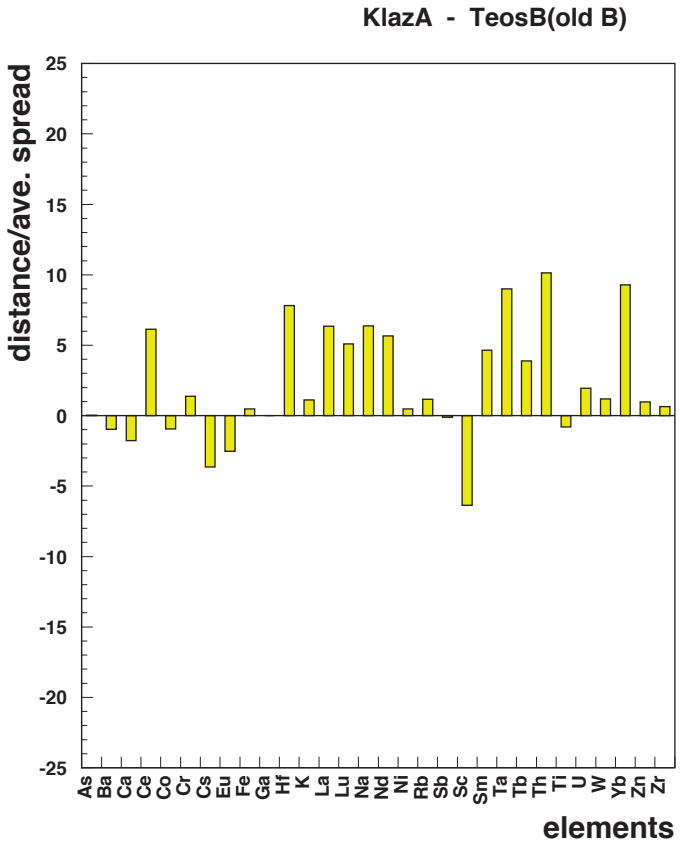

Fig. 27. Graphical comparison of chemical compositions of groups KlazA (located at Clazomenae) and TeosB (Teos). Plotted are the differences of the concentration values normalised by the average standard deviations (spreads). The concentration patterns are for many elements statistically not similar (distance/average spread > ~2) (diagram by H. Mommsen).

he was not able to prove it for lack of reference material.[102] Bîrzescu and Sezgin corroborated this proposal by arguments of distribution.[103] The hypothesis of a North Ionian origin can now by confirmed and specified thanks to the NAA of the kiln wasters from Teos (Figs. 7–9). This type of amphora is

[102] Dupont 2006 = 2007, 43; 2009; Dupont and Skarlatidou 2012, 253, 256–57, fig. 14. For the previous localisation on the northern Aegean coast, see R. Cook and Dupont 1998, 182–83.

[103] Bîrzescu 2012, 122–23; Sezgin 2012, 325.

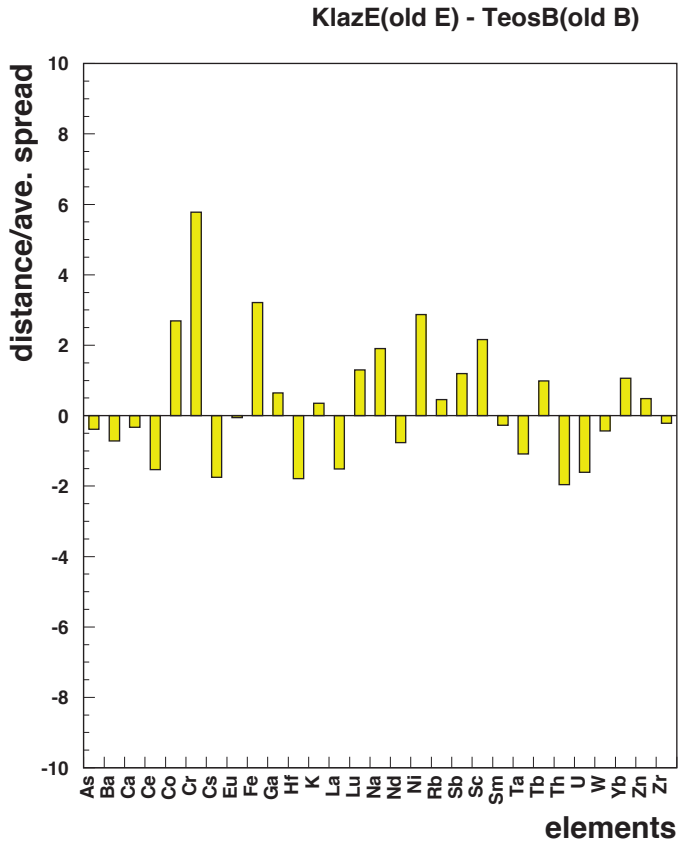

Fig. 28. Graphical comparison of chemical compositions of groups KlazE (Clazomenae-B = old E) and TeosB (Teos). Plotted are the differences of the concentration values normalised by the average standard deviations (spreads). The concentration patterns are for many elements statistically not similar (distance/average spread > ~2). Especially Co, Cr, Fe, and Ni are higher in KlazB (diagram by H. Mommsen).

abundant at Teos and prevails distinctly among the amphora finds in deposits of the 6th and 5th centuries BC. The analysed examples – Teos 12–14 – show the element pattern TeosB (Figs. 29–30). A long-standing academic discussion can now be ended: the so-called 'Zeest's Samian' amphorae are in fact Teian.

This does not mean that Teos was the only producer of 'Zeest's Samian and Protothasian' amphorae. Given the variety of fabrics observed, it is quite probable that other *poleis* – like Clazomenae or Erythrae, as proposed by Bîrzescu,

Ersoy and Sezgin – had a certain share in this group and produced specific sub-types of it.[104] Yet, thanks to our NAA, we can be sure now that Teos was a major producer of 'Zeest's Samian and Protothasian' amphorae. Further archaeometric research will be necessary to determine the production of the presumed other production sites of this numerous group of amphorae.

The distribution of the amphora class which can now be located to a large extent at Teos shows a pattern of far-distance trade connecting the eastern Aegean with the Black Sea and its Scythian hinterland, with Cyprus, Egypt, Sicily and, to a lesser degree, with Campania, Etruria and southern France, as Bîrzescu has demonstrated (Fig. 32).[105]

In terms of chronology it is interesting that this series of amphorae starts in the middle of the 6th century BC.[106] They are abundant both at Teos and abroad during the second half of the 6th century BC. That is exactly the period, when, according to Herodotus (1. 168) and Strabo (14. 1. 30), Teos had been depopulated, as all citizens had allegedly fled from the Persian army (see above). The abundance of Late Archaic Teian amphorae, however, manifestly shows that the contrary was true: Teos flourished in the first phase of Achaemenid rule in the second half of the 6th century BC.[107]

The Distribution of Teian Pottery in the Mediterranean and the Black Sea

The distribution of decorated fine ware from Teos (Fig. 11) is very similar to that of Teian transport amphorae, although the latter were not exported as pots, but rather as containers for bulk commodities like oil or wine. This map shows the distribution of the 218 members of the Teian provenance group TeosB recorded in the Bonn database. Apart from Teos, these analysed pots were found at numerous sites in the eastern and northern Aegean and in western Anatolia (Arisbe, Bademgediği Tepesi, Didyma, Drama, Ephesus, Erythrae, Clazomenae, Cyme, Miletus, Pergamon, Phocaea, Smyrna, Sardis, Teos, Troy), along the Black Sea coast (Borysthenes/Berezan, Istros/Histria, Taganrog, Golubitskaya 2), and in indigenous settlements and burials of Scythia (Nemirov,

[104] Ersoy 2004, 56; Bîrzescu 2012, 123; Sezgin 2012, 325. Dupont (2007, 43) proposed a production on the island of Chios beside one in the northern Aegean and another 'plutôt à situer en direction de Téos'. Both Monakhov (2003b, 256) and Naso (2005, 77) discerned different fabrics and therefore assume several production centres.

[105] Bîrzescu 2012, 124, 216, fig. 85.

[106] R. Cook and Dupont 1998, 178, fig. 23.10–12; Dupont 2000, 59; Monakhov 2003b, 256; Ersoy 2004, 56; Bîrzescu 2012, 115, 118, 121; Sezgin 2012, 269–70, 278, 325.

[107] *Cf.* Kadıoğlu *et al.* 2015, 363.

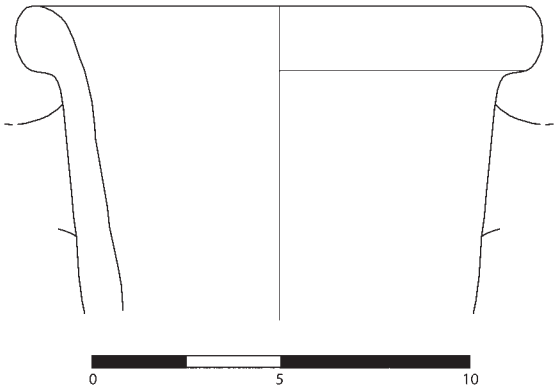

Fig. 29. Rim fragment of a Teian transport amphora, from the area west of the Hellenistic city wall (excavation 2011), provenance group TeosB (sample Teos 14; inv. T11-88/21-10.012.9) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

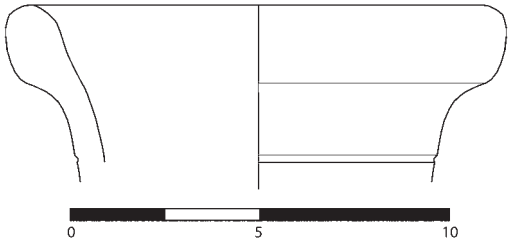

Fig. 30. Rim fragment of a Teian transport amphora, from the area west of the Hellenistic city wall (excavation 2012), provenance group TeosB (sample Teos 12; inv. T12-88/21-18.002.1) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

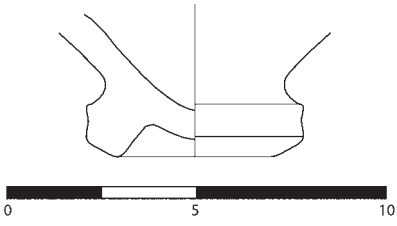

Fig. 31. Foot fragment of a Teian transport amphora, from the area west of the Hellenistic city wall (excavation 2011), chemical single (sample Teos 11; inv. T11-88/21-10.11.26) (drawing by A. von Miller; © Teos Arkeoloji Projesi).

Fig. 32. Distribution of Teian transport amphorae in the Mediterranean and the Black Sea (after Bîrzescu 2012, fig. 85).

Novozavedennoye), in Cilicia (Tarsus), in the Levant (Tell Dor), in Egypt (Naukratis, Thebes) and on Sicily (Gela, Katane, Naxos, Selinus, Syracuse).[108]

This is, of course, only a segment of the entirety of sites which imported painted pottery from Teos. There are definitely more sites where Teian pottery was found, but its existence has not yet been demonstrated by scientific analysis. The selection of mapped sites depends on our access to samples and on the funding of the NAA. Though incomplete, this distribution pattern already demonstrates the main areas of Teian exports: the Aegean, especially its eastern shores, the western and northern coast of the Black Sea and its Scythian hinterland, the Levant, Naukratis as hub for the trade with Pharaonic Egypt, and Sicily. If we include also the distribution of bird bowls of the 'standard fabric', we can add many of the Greek settlements on the northern Aegean coast, in southern Italy and in Cyrenaica. Within the Aegean, the

[108] Mommsen *et al*. 1996, 134; Akurgal *et al*. 2002, 63–92; Kerschner 2006c, 136–42, 147; Posamentir and Solovyov 2006, 119–24, figs. 17–20; Schlotzhauer and Villing 2006, 56–57, figs. 1–5; Mommsen *et al*. 2006, 25–26; Posamentir and Solovyov 2007, 185–89, fig. 1; Japp 2009, 202, 238 cat. Perga 91, fig. 12; Kerschner and Mommsen 2009a, 86–87; 2009b, 136–37, pls. 6–7, 9; Mommsen and Japp 2009, 276, tab. 2; Posamentir *et al*. 2009, 41, 46–47; Mommsen *et al*. 2011, 903, 905; Mommsen *et al*. 2012, 440, 442; Mommsen and Japp 2014, 39; Schlotzhauer 2014, 81, fig. 7; Kadıoğlu *et al*. 2015, 351. See also the contribution by L.R. Geißler, H. Mommsen, R. Posamentir and K. Riehle, below in this volume.

Cyclades and Euboea received Teian bird bowls, whereas they are noticeably infrequent on the Greek mainland. In the western Mediterranean, there was sporadic export of Teian fine wares to Etruria, the coast of southern France and to the coast of Andalusia. The most distant find-spots recorded are Huelva in the west, Nineveh in the east, Trakhtemirov in the north and Thebes in the south.[109]

With regard to the geographic frame, the Teian exports were still limited during the late 8th and early 7th century BC. Although the bird kotylae were a veritable economic success throughout the eastern Aegean, exports overseas were restricted mainly to the Cyclades and Euboea within the Aegean, to several Greek colonies and some indigenous sites in southern Italy and Sicily (Pithekoussai, Metauros, Gravina di Puglia; Naxos, Zancle, Megara Hyblaea, Syracuse, Gela), to Amathus on Cyprus and to Al Mina and Ashdod in the northern Levant. From the mid-7th century onwards, the export of Teian fine ware expanded considerably with the bird bowls and standardised vessels of the local variety of the Wild Goat style. It reached its peak in the late 7th and in the first decades of the 6th century BC, before it decreased rapidly.

[109] Kerschner 2006d, 237–44, figs. 14–19. For a new reconstruction, classification and dating of the bird bowl from Trakhtemirov, see Bujskich 2016, 9–11, fig. 2. *Contra*: Tsetskhladze 2016.

APPENDIX: RESULTS OF THE NEUTRON ACTIVATION ANALYSES OF GEOMETRIC TO CLASSICAL POTTERY FROM TEOS

sample	inv. no.	vessel	chemical provenance group
Teos 05	T11-88/21-10.007.4	Late Geometric krater	TeosB
Teos 06	T11-88/21-10.007.10	transport amphora	TeosB
Teos 07	T11-88/21-10.013.28	table amphora	TeosB
Teos 08	T11-88/21-10.013.29	transport amphora	TeosB
Teos 09	T11-88/21-10.011.13	mortar	CypI assoc. (Enkomi)[110]
Teos 10	T11-88/21-10.011.16	banded bowl	TeosB
Teos 11	T11-88/21-10.11.26	transport amphora	Single
Teos 12	T12-88/21-18.002.1	transport amphora	TeosB
Teos 13	T12-88/21-18.009a	transport amphora	TeosB
Teos 14	T11-88/21-10.012.9	transport amphora	TeosB
Teos 15	T11-88/21-10.012.1	Late Geometric cup	TeosB
Teos 16	T11-88/21-10.008.1	rosette bowl	TeosB
Teos 17	T12-88/21-YB.2	Protogeometric circle skyphos	TeosB
Teos 18	T11-88/21-12.76-117	column krater, late in North Ionian Archaic I	TeosB assoc.
Teos 19	T11-88/21-12. 117-133	banded bowl	TeosB
Teos 20	T12-88/21-18.008.45b	kiln waster of a transport amphora	TeosB
Teos 21	T11-88/21-18.008.45a	kiln waster of a transport amphora	TeosB
Teos 22	T11-88/21-10.012.30	kiln waster of a table amphora	TeosB
Teos 23	T11-88/21-10.012.31	kiln waster of a transport amphora	TeosB
Teos 24	T12-88/21-5.002	kiln waster of a transport amphora	TeosB
Teos 25	T11-88/21-10.013.13	kiln waster of a bowl	TeosB
Teos 26	T12-88/21-18.009	kiln waster of a transport amphora or hydria	TeosB
Teos 27	T12-88/21-18.018.2	banded bowl	single
Teos 28	T12-88/21-10.005.1	bird kotyle, standard fabric	TeosB assoc.
Teos 29	T12-88/21-18.010.2	rosette bowl	TeosB assoc.

[110] On the provenance group CypI, located on the eastern coast of Cyprus, see Mountjoy and Mommsen 2015, 425.

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