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**Eleventh Season of Excavations at  
Marea (2010)**

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Polish Archaeology in the Mediterranean 22, 55-78

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2013

Artykuł został opracowany do udostępnienia w internecie przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego. Artykuł jest umieszczony w kolekcji cyfrowej [bazhum.muzhp.pl](http://bazhum.muzhp.pl), gromadzącej zawartość polskich czasopism humanistycznych i społecznych.

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# ELEVENTH SEASON OF EXCAVATIONS AT MAREA (2010)

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with appendix by Krzysztof Babraj

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**Abstract:** The Christian basilica at Marea in northern Egypt continued to be excavated by a team from the Archaeological Museum in Kraków and the PCMA UW for the seventh season, the team's eleventh at the site. The south transept of the basilica was explored, including a plundered tomb with multiple burials. More units (29–35) and a small cistern under four of these were investigated outside the building of the basilica, near the northwest entrance. An ox protome of marble was among the notable finds. Studies of the ceramics and glass vessels, for the most part from the 5th–7th century AD, both local and imported, are presented in some detail. Of interest is a Red Slip Ware A plate stamped with a cross on the floor. The appendix gives a detailed architectural inventory of three of the jetties in the lake side harbor.

**Keywords:** Marea, basilica, Byzantine period, sculpture, jetty, glass, amphorae, stamped pottery, jugs

The site of Marea and its late antique agglomeration, situated in Egypt on the south shore of Lake Maryut (ancient Mareotis), approximately 45 km to the southwest of Alexandria, has been the object of extensive discussion revolving around its chronology and identification (Babraj, Szymańska 2010; Szymańska, Babraj 2008: 11–15; Wipszycka 2012). During the Graeco-Roman period, Marea was a transshipment port for goods sent down the Nile from the hinterland and subsequently dispatched to countries around the Mediterranean. It also exported

its own produce to overseas destinations. Ancient sources testify to the significant role that the town of Marea played as a harbor and production centre manufacturing an appreciated kind of wine, among other goods. Some modern research has questioned the 19th century identification of the Byzantine urban ruins as ancient Marea (Rodziewicz 2010). While the Byzantine dating of the preserved architecture has been confirmed by ceramic and numismatic evidence (5th–7th century), it is possible that the relics may belong to a different town, Philoxenite, erected in

the 6th century as a rest stop for pilgrims traveling to the nearby sanctuary of the martyr Saint Menas at Abu Mena. Resolving this controversy is the main objective of

the Polish archaeological expedition from the PCMA UW and the Archaeological Museum in Kraków working at the site since the autumn of 2000.

## ARCHAEOLOGICAL FIELDWORK

### BASILICA

Excavations this season were conducted in the south transept (36), aisle (5) and pastophory (37) [Fig. 9]. A stylobate with imprints of ten columns was identified in the transept and aisle. A wall with two passageways separated the aisle from the transept, creating a kind of ambulatory between the south wall of the transept and the inner colonnade. Several fragments of architectural décor carved in limestone and marble (cornices, jambs, column shafts,

bases, capitals) were found in the fill, among them a fine Corinthianizing capital [Fig. 4]. The most noteworthy find, however, is a small sculpted fragment of marble in the form of an ox protome [Fig. 1]. The object may have been part of the décor of tiered capitals, quite popular in the last quarter of the 5th century. In the upper zone they were usually decorated with carved images of rams, lions, eagles, etc. The ox protome (the ox being a symbol of St Luke the Evangelist) could have been broken off from

### Team

*Dates of work:* 12 July–12 August 2010

*Director:* Prof. Hanna Szymańska, archaeologist (Research Center for Mediterranean Archaeology, Polish Academy of Sciences)

*Deputy director:* Krzysztof Babraj, archaeologist (Archaeological Museum in Kraków)

*SCA representative:* Mohammed Gamel Eldin Aly Mohammed

*Archaeologists:* Dr. Nina Willburger (Württembergischen Landesmuseum, Stuttgart), Anna Drzymuchowska (Archaeological Museum in Kraków)

*Architect:* Daria Tarara (freelance)

*Restorers:* Joanna Babraj, Tomasz Skrzypiec (both Academy of Fine Arts in Kraków)

*Civil engineer:* Dr. Janusz Kogut (structural mechanics expert, surveying supervisor)

*Students of architecture:* Marta Kulikowska, Andrzej Kutiak, Marcin Ostrowski, Katarzyna Rozmus (Kraków University of Technology)

### Acknowledgments

Work at Marea is carried out on the grounds of a cooperation agreement between the Archaeological Museum in Kraków and the Polish Centre of Mediterranean Archaeology, University of Warsaw, with extra funding provided generously by Mrs. Hélène Zaleski. We are grateful to Dr. Zahi Hawass, Secretary General of Egypt's Supreme Council of Antiquities, and Dr. Mahmud Ismail Khaled, General Director of Foreign and Egyptian Mission Affairs and Permanent Committee, for their kind assistance at all stages of the project. Our work could not have been completed without the cooperation of Mr. Alaa Shehata, General Director of the Alexandrian Antiquities Department, and the generous help of Ms Emily Nessim, General Director of Foreign Excavations in Alexandria.

a capital of this kind (Kautzsch 1936: 156, e.g., Pl. 30, Figs 478, 494, 496); H. Schlunk 1937: 381–388; Frantz 1995: especially Fig. 13; Walters 1974: 176, Fig. 22, composite capital or basket capital from Bawit monastery; Badawy 1978: 202, Fig. 3.174; Sklábou-Mauroeidē 1999: 50, Fig. 52 in the same type but from ram protome; Lemerle 1937; Tkaczow 1993: 293, Cat. 284, Object 284, also in the same type but from ram protome; Pensabene 1993, 164–165, 465, Cat. 669, as above; Kalopisē-Bertē, Panagiōtidē-Kesisoglu [eds] 2010: 142, Fig. 288, also called a capital with representations of animals; Adam 2008: 95, Cat. 33; Effenberger, Severin 1992: 175, Fig. 88, capital constructed of two sections, dated to the 6th century and said to come from Bawit in Egypt, the lion protomes were located in the upper section over the kalathos; Wulff 1914: 277, unnumbered plate; Biernacki 2009: 281, Pl. 72; very similar protome with an ox on the capital from the episcopal basilica in Stobiec, Petrova 2003: 15). Otherwise

it is difficult to find an explanation for the presence of this sculpture in the transept of the church. Like most of the architectural décor, capitals of this type were made on the island of Proconnesus in the Propontis (modern-day Marmara in Turkey).

A barrel-vaulted crypt (38) with a small square dromos abutted the south wall of the pastophory in the southeastern part of the transept [Fig. 2]. Its plan was rhomboidal, 3.40 m by 2.10 m, reaching 2.50 m in height. It is the third structure of its kind uncovered in the basilica (Szymańska, Babraj 2005) and it is probably contemporary with the tombs found previously, but was built when liturgical services were no longer held in the church [see Fig. 9, room 4]. The entrance was found sealed with stones. Despite it, the tomb turned out to have been looted, leaving human skeletal remains scattered all over the interior. The bones were identified as belonging to adults of both sexes as well as children, but it was impossible this season to complete anthropological studies

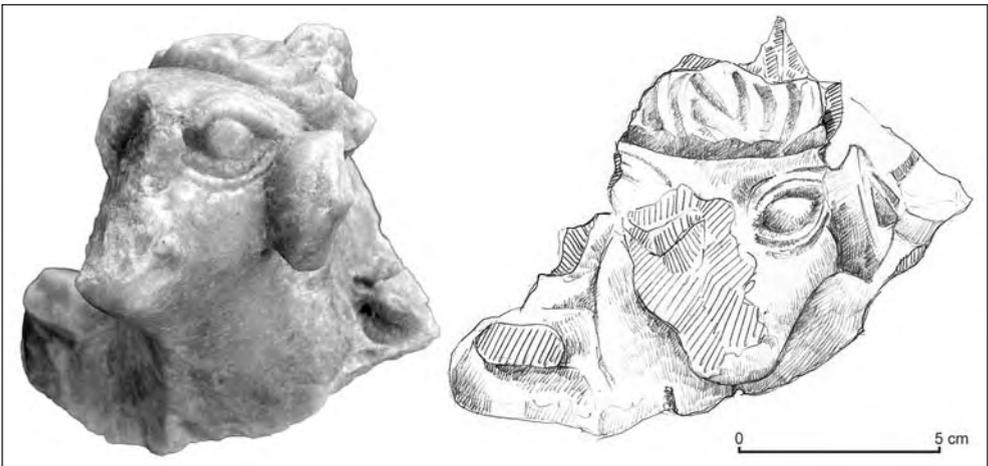


Fig. 1. Fragmentary ox protome of marble (H. 14 cm, W. 16 cm maximum)  
(Drawing T. Skrzypiec; photo J. Babraj)

on this material. The crypt was resealed and the dromos backfilled to the level of the outer surface of the vault.

#### UTILITARIAN COMPLEX

Excavations in the northern part of the public complex were geared to discovering the actual entrance to the cellar unit discovered last season (Szymańska, Babraj 2012: 68–70). This cellar, which ran under units 30, 33, 34 and 35, turned out to be accessed by a flight of three steps hewn in the rock, leading from the lake through a doorway in the immediate vicinity of the dividing wall between rooms 33 and 34 [Fig. 3].

*Fig. 2. Crypt in the south transept of the basilica, view from the south (Photo T. Skrzypiec)*



*Fig. 3. Entrance to the cellar under courtyard 34, view from the east (Photo J. Babraj)*

A partly preserved mosaic floor in the *opus sectile* technique was discovered in unit 35 [see Fig. 9] (Dunbabin 2006: 257; Guidobaldi, Guidobaldi 1983: *passim*). The similarity between this area and a courtyard (20) located to the south of the church entrance is striking. The next unit to the north (33) contained a well-made and largely preserved flagstone floor [see Fig. 9]. Tethering holes cut in the stone at a height of 0.45 m, three in this room and three in neighboring unit 30, suggested a stable function. The units opened onto the lake and the tethering holes were in the east wall.

A channel was partly explored in unit 7, in the southern part of the shops. The channel was closed from above with a handsomely shaped post, 1.40 m high. On its flat upper surface it bore a sign that is likely to be a cruciform masonry mark [Fig. 6]. Similar posts are attested in the sanctuary at Abu Mena (Grossmann 1989: 61, 107, 138).

[KB, HS]



Fig. 4. Corinthianizing capital from the fill of the basilica transept  
(Photo J. Babraj)



Fig. 5. Marble pedestal; top, cruciform stonemason's mark on the top of the pedestal  
(Photos J. Babraj, K. Rozmus)

## POTTERY FINDS

A completely interred amphora with broken off neck was found in room 31 adjacent to the basilica in the northern part of the complex. This North African amphorae (Keay type 62, see Bonifay 2004: 137–138), dates from the 4th–6th century [Fig. 7, bottom]. Inside the amphora there was a marble floor tile, which most likely found its way inside by accident, since its dimensions (12 cm by 12 cm) were too small to permit its use as a lid for the amphora. Pottery finds from the unit included fragments of bowls and of amphorae (LRA 7, LRA 4, LRA 5/6) from the heyday of the basilica, that is, the 5th–7th centuries (Majcherek 2008: 117). There is reason to believe that the complex, which has been referred to arbitrarily as an industrial area, or at least this unit and the neighboring unit 33, which has been identified as a kind of depot for animals (see above), was actually used by pilgrims as a resthouse. The waterfront location facing Lake Mareotis further supports this idea.

One of the highlights of the season was an Egyptian Red Slip Ware A plate base stamped with a cross motif [Fig. 7, top left], discovered behind the west wall of the latrine (14) next to the basilica. Its surface was very worn. It dated from the 5th–6th century (for the type, see Egloff 1977/I: 68, 74; 1977/II: Pl. 12, Fig. 27; Gempeler 1992: 23, Pl. 23:5; for the cross stamp decoration, Hayes 1972: 387–393).

Exploration of a channel in unit 7, located in the southern wing of shops, brought the discovery of seven complete jugs similar in form to those found in a cistern in 2009 (Szymańska, Babraj 2012). The jugs, used primarily for carrying water, are dated to the 6th–7th centuries

(Drzymuchowska 2012: 73). The fabric is Nile silt tempered with sand and mica, the break featuring a black core. One jug [Fig. 8, top] had a long and slender neck bearing wheel marks, slightly flaring rim and an inset at the junction of neck and body. The handle, which was rounded in section, was attached to the neck below the rim and to the upper part of the body. The bottom was concave with a center projection (Egloff 1977: Type 230; Rodziewicz 1984: Pl. 31, Fig. 89). The second jug [Fig. 8, middle], also made of Nile silt with a sandy matrix, had a black core observed in the break and a stouter, bulbous shape. The wide and flaring mouth smoothly passed into a short neck and globular body. An oval-sectioned handle was attached directly to the rim and to the upper part of the body. The bottom was indented with a center projection. The third jug had a short neck ending in a wide, uneven, flaring rim. The body was of irregularly bulbous shape and had a concave base [Fig. 8, bottom]. Similar jugs were found in 2009 in a cistern under rooms 30, 31, 32, 33 (Szymańska, Babraj 2012: 69).

The pottery assemblage from the basilica, as well as the northern part of the complex fronting the façade of the church produced the usual set of kitchenware: pots, bowls, storage containers, jugs, and lids, made primarily of Nile silt and marl clay, tempered with lime and sand. A large number of fragments belonged to amphorae: LRA 5/6 produced at Abu Mena, as well as Kellia amphorae types 187–190, 167 and 173–177 (LRA 7) dated to the 7th–8th century (Majcherek 2002: 61). Fine wares in the form of Egyptian Red Slip Ware and Aswan fabrics were generally less frequent.

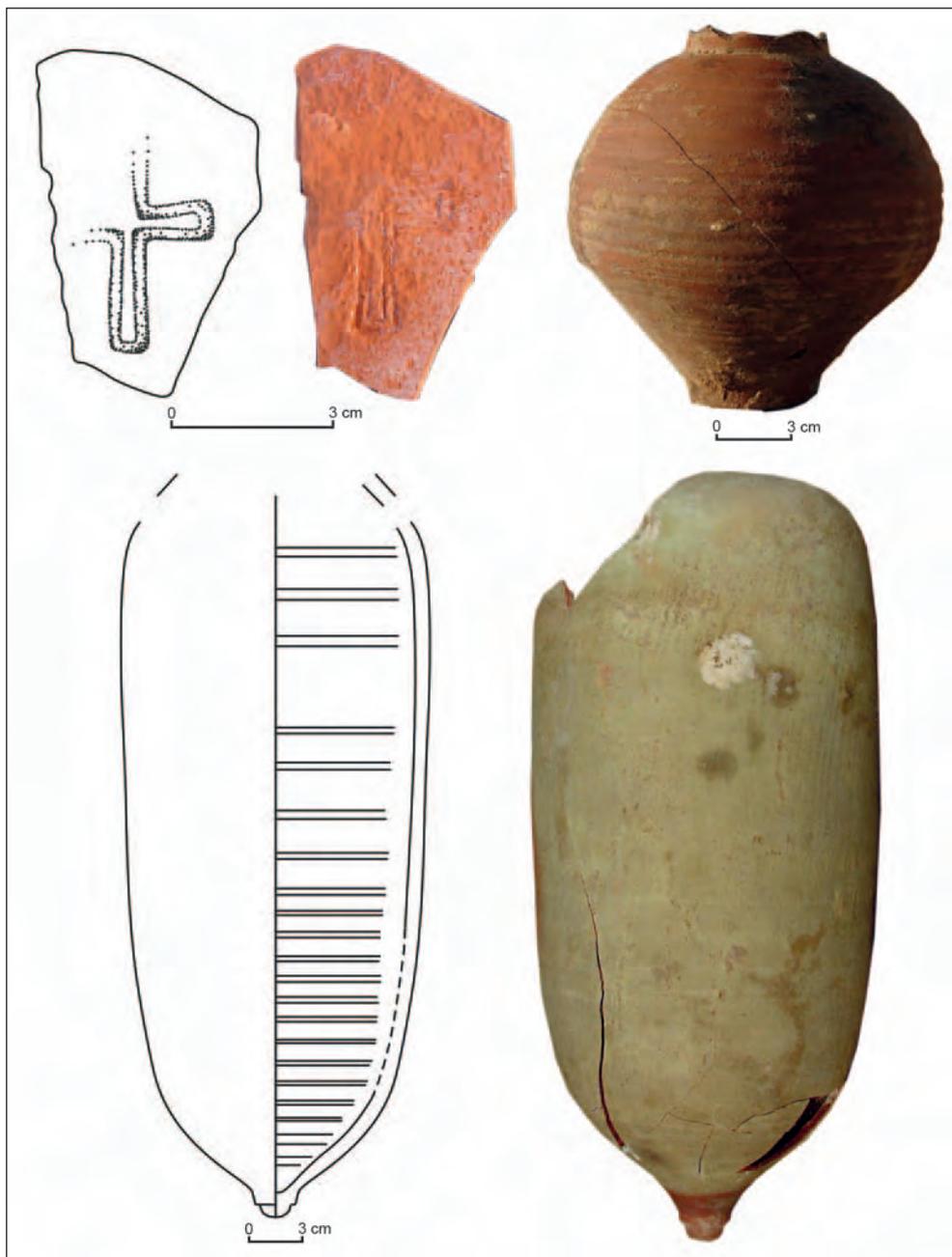


Fig. 6. Red Slip Ware A plate with stamped cross decoration (top) and amphora with broken off neck found set in the floor of unit 31 (Drawing A. Drzymuchowska; photo J. Babraj)

Identified imports included sherds of LRA 1 amphorae, produced on Cyprus and in Cilicia, as well as LRA 4 amphorae

from Gaza (Tomber, Thomas 2011: 57; Dixneuf 2011: 129–130).

[AD]



*Fig. 7. Jugs from the channel in unit 7  
(Drawing A. Drzymuchowska; photo J. Babraj)*

## GLASS FINDS

Glass finds from the excavation in 2008 and 2009 (but not the current fieldwork due to time constraints) were studied in the course of the season. There were more than 1000 fragments in total and over 500 of them were diagnostic pieces (bases, rims, handles, stems), permitting a more specific identification.

As in previous years the majority of the glass ranged in date from the late 5th to the 7th century AD (Kucharczyk 2004; 2005a; 2007). Most of the glass finds were uniform in quality and shape and seem to be, as already mentioned by Kucharczyk, local/regional products.

Most of the glass is of bluish-green or green color, but the surface of a large proportion of the fragments is coated either with intense iridescence or a thick black/brown or white weathering layer or coating; in some cases the original color is beyond identification.

Most of the vessels were free-blown and without decoration; nevertheless some were decorated with applied trails and a few were pattern- or mould-blown.

A huge quantity of the glass represents domestic glassware, such as bottles, mostly with funnel-necks [Fig. 9:a], jars or storage jars with wide bodies, as well as smaller flasks. Most of this glass was left undecorated. Thin threads or thick coils were applied to some vessels around the necks [Fig. 9:b] or a rim coil was added. Owing to the poor surface condition of most of the recovered vessels, it is not possible to ascertain whether trails were once of the same color as the vessel or a contrasting color.

Only a few fragments of bowls, beakers, plates or dishes have been recovered;

examples included a fragment of a conical beaker on a foot and two fragments of shallow bowls with cracked rims [Fig. 9:c]. Some vessel bases represented plates of an uncertain type.

Forms hitherto unattested at Marea included jugs and small bottles with mould-blown ribs or pattern-blown bodies. The differing quality of the glass suggests that they were not local products, but imports, however, more research into late Roman and early Byzantine glass found in Egypt is necessary to clarify this assessment. Evidence of further imports may be represented by an appliqué with actor's mask (Szymańska, Babraj 2012: 67–68. Fig. 9), which was attached once to the side of a thin-walled vessel, possibly a lamp. There is no trace of a handle above the boss, which means that it was not attached just below a handle as previously assumed. Stamped appliqués of this type range in date mostly from the 2nd to the 4th century AD, although some can be also dated to the 5th century AD (Whitehouse 2001: 227–233, Nos 799, 811, 812; Antonaras 2009: 332–335, Pl. 45, XXIV 753). Regardless of where it fits in this date range, this fragment is one of the earliest glass finds from the site.

As might be anticipated from the excavation of a basilica and its surroundings, a large number of lamps was also found. The total number was in excess of 150. More than 100 fragments of lamps with solid stems used in so-called *polycandela* were registered. Lamp stems were common in the assemblage but in some cases body fragments were also recovered.

Most of the lamps with solid stems (around 80) demonstrated a rounded

or elongated depression on one side of the stem, while the other side was flattened [Fig. 9:d]. Lamps of this kind are known especially from Alexandria, with few examples coming from elsewhere. In the light of this distribution, Renata Kucharczyk has suggested that this lamp type was specific to the Alexandrian region, with a local/regional provenance highly likely (Kucharczyk 2005a: 56–57).

The lamp type was long-lived and has been found in late Roman/Byzantine contexts, as well as Islamic layers at Kom el-Dikka in Alexandria (Kucharczyk 2005b: 39–41, Fig. 6:8).

The remaining lamps had solid rounded stems or very thin and fragile stems. Also noted were fragments of *polycandela* lamps with hollow stems, although these were very rare.



Fig. 8. Glass finds: a – bottle neck; b – bottle with decorated neck; c – bowl with cracked rim; d – solid stem of a lamp; e – stemmed goblet with folded collar; g – stemmed goblet; h – hollow stem with tubular edge (Photos and drawings N. Willburger; inking M. Kulikowska, A. Kutiak, M. Ostrowski, K. Rozmus)



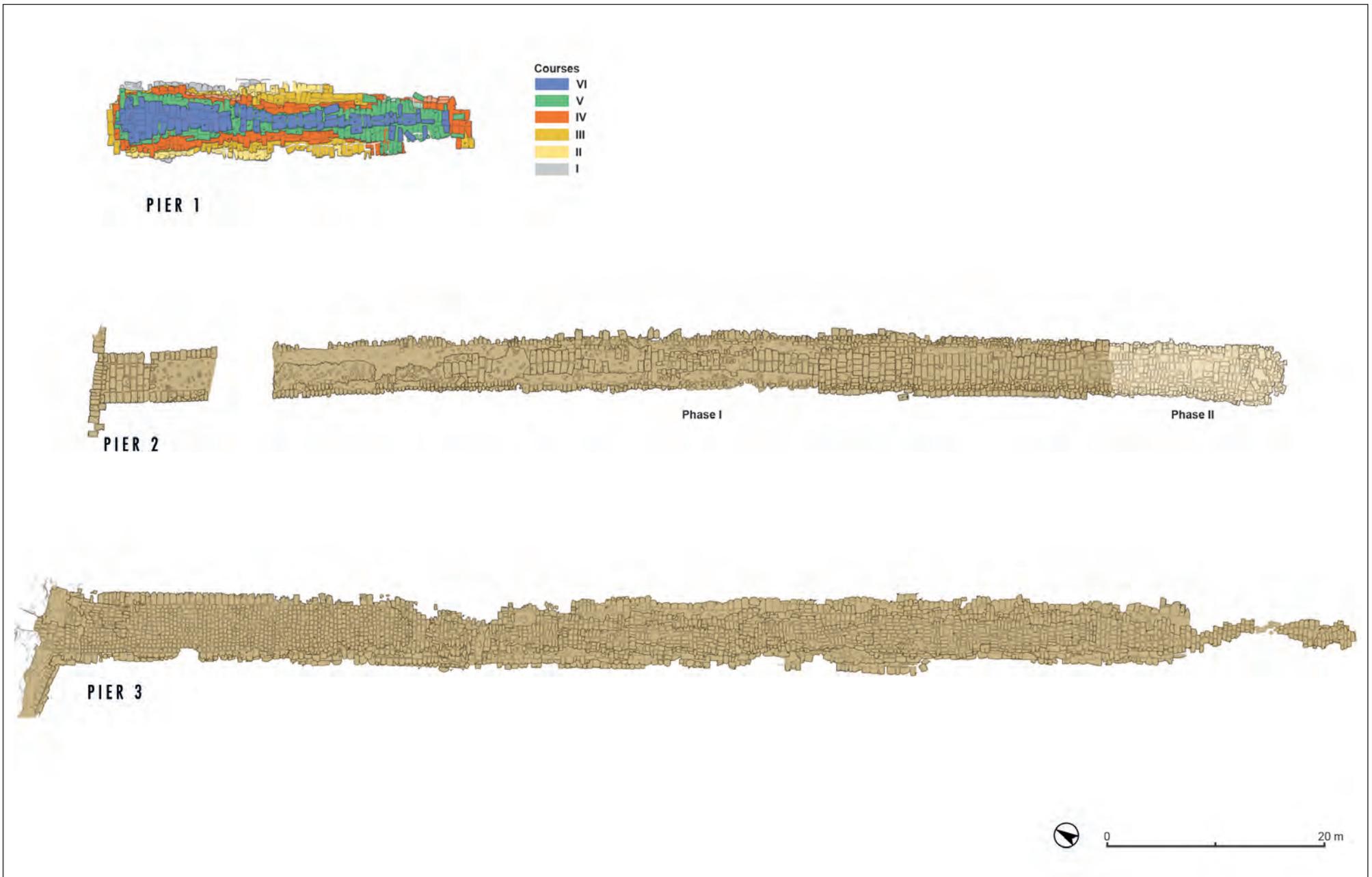


Fig. 10. Piers I, II and III, collated plans showing layers and construction phases  
(Plans D. Tarara; collation based on drawings by M. Kulikowska, M. Ostrowski, K. Rozmus, A. Kutiak)

Fragments of yet another type of lamp were recovered. These were tumbler-shaped forms and had characteristic folded-out rims with one of the usual three small handles. Conical lamps were represented by rounded-bottom fragments, with a coil knob base and pronounced knob base.

Stemmed goblets or 'wine-glasses' were well represented, as in previous years. As one of the main products of the late Roman/Byzantine glass industry, this form is common throughout the whole Mediterranean area and beyond, and is known, for example, from the north Pontic regions and even central Europe. Stemmed goblets/wineglasses were used as drinking vessels and as oil lamps, depending on the owner's needs (Stern 2001: 270–271). They are a frequent find in churches and synagogues, where lighting was required,

but also in private households. Around 30 fragments of stemmed goblets — mainly the foot with part of the stem, the fragile bowl hardly ever survives — were discovered at Marea over the past three years [*Fig. 9:f*]. Most of them showed a solid stem and fire-rounded edges, but two had a hollow stem and tubular edges [*Fig. 9:g*].

Of interest are three stemmed goblets of a special type: the cup itself begins with a folded collar [*Fig. 9:e*]. One vessel of this type came to light during the 2004 Marea excavations, another was found at Alexandria (Kucharczyk 2005a: 58, Figs 2, 3; Rodziewicz 1984: 240, Fig. 262, Pl. 73, No. 372.), but this type has not been recorded in the literature anywhere in or outside of Egypt.

[NW]

## APPENDIX THE HARBOR JETTIES OF MAREA

Krzysztof Babraj

Archaeological Museum in Kraków

The four jetties of the harbor in Marea must have served the dual purpose of cargo and passenger loading and unloading, as well as servicing cargo ships and river boats with shallow keels. The biggest one is Jetty III, located nearest to the basilica; it is also relatively the best preserved. It stretches more or less north, being skewed a little bit to the west. The next jetty to the west (II) is the second largest of the piers and lies between the basilica and the magazine (Fakharani Museum) [*Fig. 11*]. Nearest to the modern highway crossing Lake Maryut

on a causeway running north in the direction of the airport at Borg el-Arab is the first pier, the shortest of the lot, whereas the fourth structure, which is also the most degraded, is located to the northeast of the basilica, on a peninsula already within the concession of the French archaeological mission of Valérie Pichot from the Centre d'Études Alexandrine.

In view of progressive degradation and erosion of the pier construction, the surviving architecture was inventoried and documented this season by a team of

students from the Kraków University of Technology Faculty of Architecture: Marta Kulikowska, Marcin Ostrowski, Katarzyna Rozmus and Andrzej Kutiak. The exhaustiveness of the following descriptions of the three piers within the Polish concession was determined by the condition of the piers and accessibility of the remains.

### JETTY I

Pier I is located to the east of the road crossing Mariut Lake and is oriented more or less northwest. When first documented, it measured 39 m from the entrance from the quay to the last preserved part above water level (30 m of this is in good condition and visible above water) and 7 m across at the widest point.

It has six courses of stone blocks (I to VI counted from the bottom up) [Fig. 10]. The upper courses near the entrance to

the quay have been destroyed and only the lower layers of stones have survived close to the water level. The typical size of blocks of stone in layer VI on top was 60 cm by 110 cm; in layer V the stones were more elongated in shape, measuring approximately 40 cm by 100 cm. In layers IV and III the stones showed greater diversity both in size and shape. The stones in all layers were arranged in a regular pattern.

### JETTY II

The length of this jetty from where it meets the quay to the farthest tip visible above the water table is 108.5 m [Fig. 12]. Below the lake surface the width of the pier is a constant more or less 5.80 m, while above the water it is 4.55 m at the base and up to 5.50 m in other parts. The structure of the pier reveals two phases of construction. The first 90 m, built in the first phase,

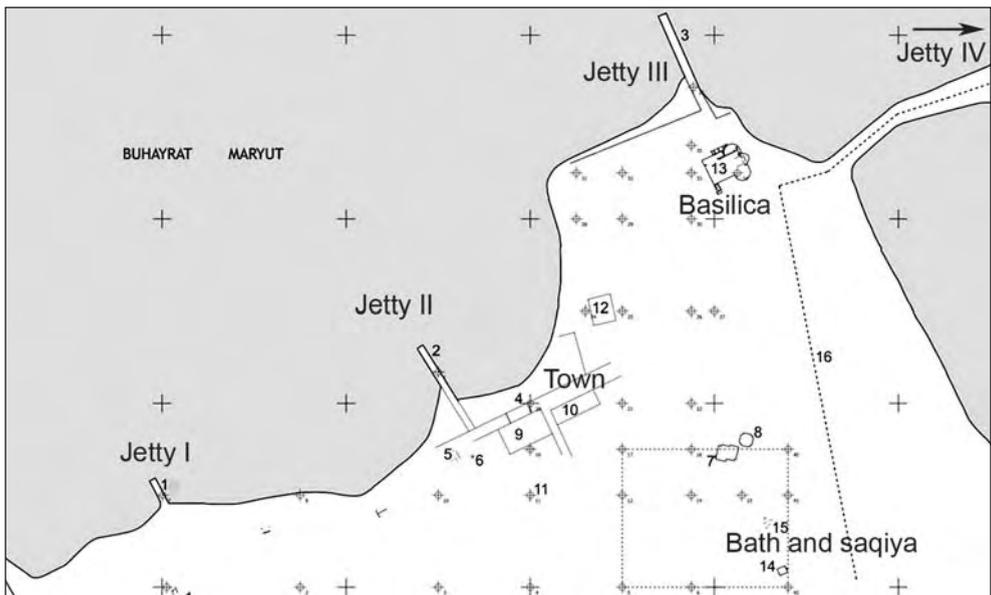


Fig. 11. Site of Marea with the four jetties marked  
(Drawing M. Niepokólczycki, D. Tarara)

are homogeneous. Beyond this point, the arrangement of blocks is disrupted, most likely as a result of enlargement of the jetty in the second phase. A marked change in the layout of the masonry occurs 93 m from the base of the jetty and the new arrangement continues to the end of the feature [Fig. 10].

The jetty consists of five courses (I to V numbered from the top down) differing in structure and building material. The lowermost course is below the water table today and it is the best preserved: 95.3%. The courses rising to the top are preserved: IV – 75.2%, III – 70.3%, II – 38.5%, and I – 3.2%. Most of the ashlar masonry blocks used to build the jetty present

similar dimensions and shape. They fall into three basic groups:

Group A: from 90 cm x 50 cm x 35 cm to 120 cm x 60 cm x 40 cm, sporadically reaching 150 cm x 90 cm x 40 cm; used for courses I and II and the casing of the lower courses, chiefly III and V.

Group B: demonstrating the greatest variation, ranging from 30 cm to 40 cm; the length and height uniform and equal to 60 cm and 35 cm respectively; used to build the casing of the lower courses (III and IV) and to fill the space within the casing of course II in the front part. In several places, it is evident that only one of the width variations of group B blocks was used; for instance, in the frontal part of the jetty



Fig. 12. Jetty II, view from the north  
(Photo T. Kalarus)

the casing of course III was built of blocks 35 cm to 40 cm wide, while the width of blocks in the casing of course IV did not exceed 35 cm. However, in other parts of the jetty this rule did not apply, as both width variants were used interchangeably. Group C: not exceeding 30 cm in width and length, never more than 15 cm in height; used to fill the space within the casing of the lower courses (III and IV).

The arrangement and choice of masonry varies significantly depending on the course and the phase.

### Phase I

Course I is extant in only two places and even there it is not preserved well enough to attempt its complete reconstruction. It is built of blocks from group A, laid in transverse alternating rows of stretchers and headers. No extant blocks or their impressions permit a reconstruction of the layout of stones that lined the edges of course I.

Course II is preserved completely only in a small area 3 m long at the base of the jetty. The casing on both sides was constructed of group A blocks in stretcher bond, the fill of group A stretchers and group B headers, in each row two A blocks and one B block. The layout can be illustrated as follows: A:BAA:A, A:AAB:A in

recurrent mode, although farther on the course is less clear due to severe erosion and the above pattern is no longer discernible. Group B blocks are either more random or completely absent, replaced here with A blocks as headers. No significant fragments of the casing are extant, but the layout was most likely the same as at the base, as suggested by single stones and by the dimensions of gaps where the casing is missing. Three stones situated at a distance of 5 m, 46 m and 49 m from the base of the jetty each have a semicircular groove 8 cm in diameter located approximately 30–40 cm from the edge of the block.

Course III is exposed in many places due to erosion. The casing is of A blocks, while the fill is made up of loosely arranged C stones mixed with sand. In the middle of the jetty, this arrangement changes to single A blocks separating groups of several B blocks. This arrangement appears on both sides of the jetty, but on the western side the A blocks are preserved fragmentarily. The A blocks on the western side of the jetty are also larger than on the eastern side.

Course IV, like course III, was filled with a mix of C stones and sand, but the casing differed in structure, being made of B blocks laid individually or in pairs, as

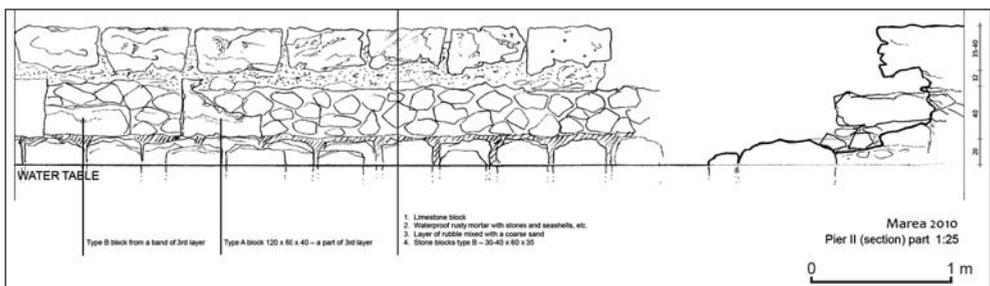


Fig. 13. Jetty II, section  
(Drawing D. Tarava)

follows: BCCCCCB; BCCCCCB; BBCCCCBB; BBCCCCBB. The course has a distinctive undulating face between the 51st and the 57th meter. Long B blocks are supplemented with smaller stones to obtain the desired shape.

Course V is currently below the water table. Only the bond of the casing is visible; the filling is not exposed anywhere on the jetty and will need to be further investigated in the future. It is the broadest of the courses, its width reaching 5.70 m. The blocks that constitute the casing measured up to 150 cm in length and 90 cm in width, which made them the largest elements of the jetty structure.

#### Phase II

In the past six years practically 70% of the topmost course of the part of the jetty constructed in the second phase was vandalized, leaving only five stone blocks in place. Photographic documentation from 2004 as well as extant elements suggest, however, that the layout was similar to that in the part of the jetty of the first phase. Alternating rows of headers and stretchers made use of A blocks.

At the end of the jetty there are two curvilinear features on the level of course I and bonded with mortar to blocks of course II. Each feature consists of five stones, the imprint of a sixth one on the southern side, and one stone with imprints of two other ones on the northwest. The outline of these features clearly indicates the location of the centre of the circle they had once formed and sets its diameter at about 140 cm. Only one course of masonry is extant and it bears no traces of mortar that would have indicated the original presence of more superimposed courses.

The layout of course II differs significantly from that recorded for phase I.

The casing structure and block dimensions are different. B blocks were used as filling, placed parallel and perpendicular to the jetty axis, while the casing consisted of A blocks in an unusual arrangement with a header between every two stretchers, creating tooth-like serrations on both sides of this course. It was also possible hypothetically that there were originally two headers instead of one and formed a smooth face on both sides; if that was the case, then the absence of the second header may be due to progressing erosion of the jetty.

Course III of the second-phase sector of the jetty is only partly visible at the tip, whereas in other places only the casing is exposed. The course consisted of B blocks laid transversely more often than parallel to the jetty axis. It is likely that, compared to the part built in phase I, a much smaller section of the course was filled with a mix of C stones and sand. This may be deduced from the dimensions of a "shaft" at the tip of the jetty, where the material had been washed away by the lake. If it was indeed so, then 40% of the described course would have consisted of "aggregated" sand and C blocks and as much as 60% would have been B blocks. In the first phase, this relationship had been reversed. The exposed fragment shows another interesting pattern. Moving from the water's edge, one can see a row (blocks laid parallel to the jetty axis) of alternating pairs of headers and stretchers, then a row consisting only of stretchers. Behind it is the "shaft" eroded by water, most likely containing the above described "aggregate".

Course IV is practically invisible; only the casing of B blocks is exposed. As for course V, only the casing of A blocks, measuring approximately 120 cm by 60 cm, is visible.

## JETTY III

The jetty closest to the basilica was the third one from the west and, as said above, it was the longest one, approximately 120 m measured from the quay to the end above the water table today [Figs 10, 14]. The width above water never exceeds 6.50 m; towards the end, the structure loses its continuity, but the submerged courses continue northward, maintaining a relatively constant width of 7.50 m. Its joining with the quay is currently at a slight angle, the shore on the eastern side receding slightly. It is possible that the orientation of the shore may have



Fig. 13. Jetty III, view from the north  
(Photo T. Kalarus)

changed since antiquity and there is some reason to think that the structure of the pier widened toward the quay, but the actual orientation of the shore at this point remains nebulous.

The quay to the east of the jetty consists of two courses of ashlar masonry, stretchers first and headers on top. The quay to the west has not been preserved. The joining between the jetty and the mainland was tightly fitted with some leveling of bedrock on the shore and a wedge-shaped block to ensure good bonding.

The pier is clearly divided structurally into two parts. The first part starts at the base of the jetty and continues for approximately 31 m; beyond that point the second part begins. The first part of the pier has a regular structure, the second section is very irregular. The jetty was built of five masonry courses, the lowest two (courses I and II counted from the bottom up) being submerged (in July 2010). Limestone ashlars were used for the construction, bonded with red waterproof mortar tempered with pebbles, shell and potsherds among others. The blocks in the lower two courses seem to be of a darker shade and less jagged than those in the courses above water, suggesting possibly a different quarry source.

So-called swallowtail cramps were used occasionally to bond the ashlars together; one such cramp can be seen on the eastern side of the structure, in course IV, about 15 m from the shore [Fig. 15].<sup>1</sup> Oddly, in

<sup>1</sup> Gr. Πελικίνος, Lat. *securicula* (Ginouvé, Martin 1985: 109 and Pl. 28.3–4), originally used in joinery and carpentry. In stone architecture wooden cramps (usually hard oak, olive, or cedar wood) were used with softer stone (for example, see Daux, Hansen, Hellmann 1987: Pl. 1) and were invariably sealed with lead (Orlandos 1994: 179–182; Martin 1965: 241–247; Hellmann 1992: 84–87; 2002: 94, Fig. 108). According to Wolfgang Müller-Wiener (1988), this type of cramp remained in use in some areas until the Hellenistic period, but by that time it was made of iron (e.g., on Delos). In the Roman period, beside being used seldom, these archaic techniques were improved by the introduction of iron screws into the cramp (Adam 2008: 57, Fig. 126, 127). J.P. Adam generally believes that the swallowtail cramp disappeared from the architecture of the Apennine Peninsula in the 1st century AD.

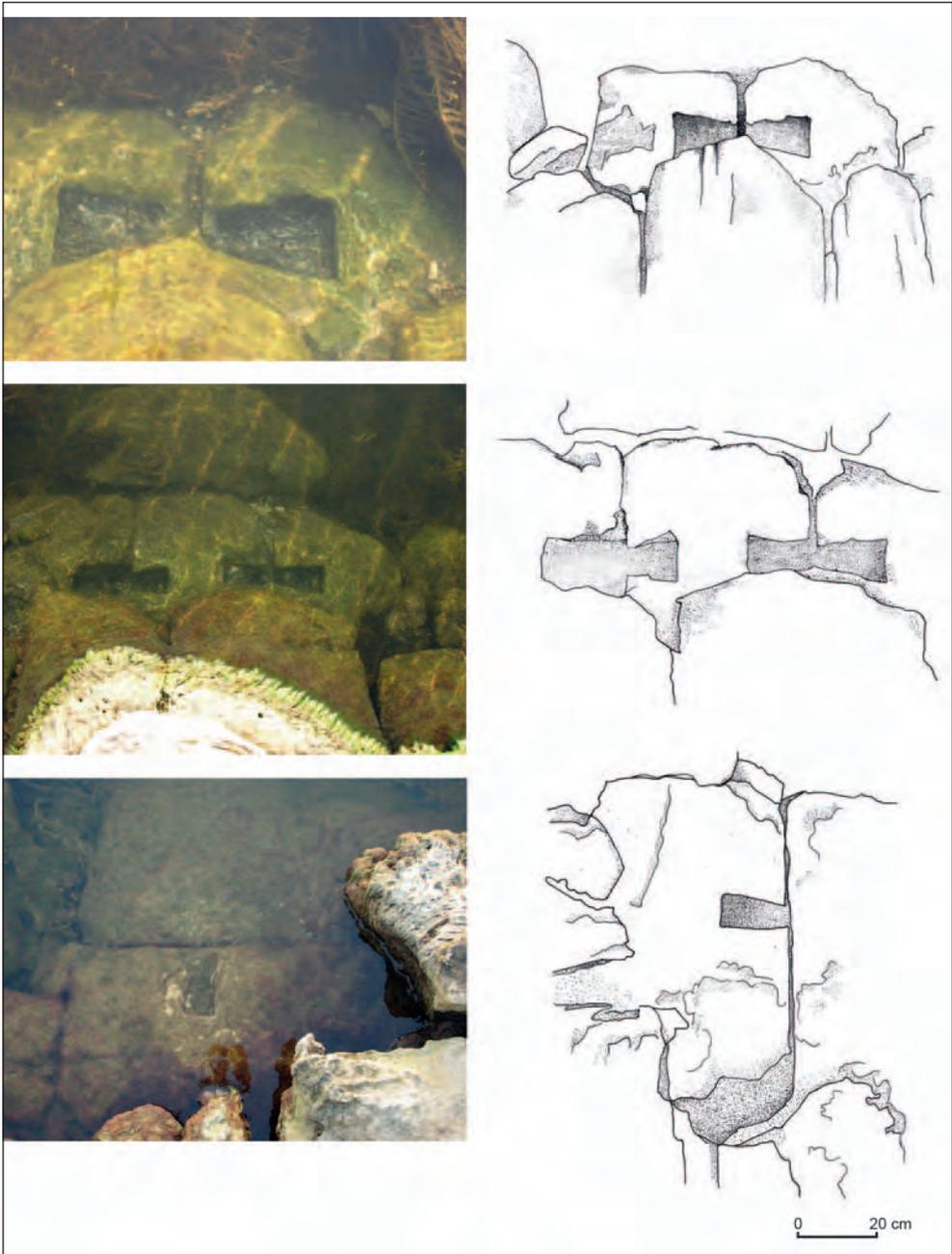


Fig. 15. Swallowtail cramps observed on blocks of jetty III  
(Photos T. Skrzypiec)

the case of a “dovetail cramp” [see *Fig. 15*] on the eastern side of jetty III, the fastening did not serve its purpose. It is possible that the builders had a change of plan during construction. One part of the outline of a swallowtail cramp [see *Fig. 15*] was damaged when the cramp was wrenched from the metal that had been poured over it.

The cracks on the two ashlar bonded with the cramp are puzzling. Such cracks are usually considered as proof of earth tremors, but so far no other architectural evidence of earthquakes has been forthcoming from Marea.

Occupational debris was excavated at the base of the jetty, on its western side, below the uppermost preserved course of stone. The pit measured 2.39 m by 3.50 m.

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Of the three layers that were distinguished, the lowest one, approximately 8 cm thick and brick-red in color, contained potsherds and oyster shells. It was sealed with a 2 cm thick layer of compact clay partly mixed with lime mortar. Overlying it was a 5 cm thick deposit with an occasional ceramic sherd and a few pieces of glass. The stones of the pier were laid on this layer with an extra layer of lime mortar underneath.

#### SUMMARY

In sum, the lake harbor at Marea is distinctive thanks to the relatively well-preserved ancient infrastructure. There is no comparative material from the Mediterranean that could be used in describing and analyzing these jetties.

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