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CONTENTS

STUDIES

ANCIENT HISTORY

Arturo SANCHEZ SANZ
ENLIGHTENED BODIES. THE SYMBOLOGY OF TATTOOING IN ANCIENT THRACE 3

Okan AÇIL
ON THE JUDEAN POLITICAL INDEPENDENCE IN THE PERIOD OF THE HASMONEANS 20

Samuel NIÓN-ÁLVAREZ
ROMAN EPIGRAPHY AND CULTURAL DYNAMICS: A VIEW FROM NORTHWESTERN IBERIA (FIRST–SECOND CENTURIES CE) 33

ARCHAEOLOGY

Ovidiu ȚENTEA, Vlad CĂLINA, Călin TIMOC, Alexandru BERZOVAN
A ROMAN ARCHAEOLOGICAL LANDSCAPE WEST OF THE IRON GATES OF TRANSYLVANIA REDISCOVERED USING LIDAR TECHNOLOGY AND NEW ARCHIVE DOCUMENTS 47

Adem YURTSEVER
ANCIENT RESTORATION PRACTICES IN THE CITY OF PERGE 64

Gayane POGHOSYAN
AN OVERVIEW OF THE OFFERING SCENES IN THE DECORATION OF URARTIAN BRONZE PLAQUES 87

ARCHAEOLOGICAL MATERIAL

Makbule ERKAN, Akın TEMÜR
A GROUP OF LOOM WEIGHTS FROM SYEDRA 91

Zerrin AYDIN TAVUKÇU, Ayşe AVLİ, Sinem COŞKUN
REFLECTIONS OF THE CULT OF APOLLON IN ALABANDA: BILYCHNIS WITH HERACLES DESCRIPTION 113

Dana KHOULI
THE SACRED RELATIONSHIP BETWEEN ANIMAL SYMBOLISM AND SAINTS ON SARCOPHAGI RELIQUARIES IN SYRIA 123

Ahmad DAWA
CLASSICAL COLUMN CAPITALS IN TARTOUS MUSEUM 129

Ofer GAT
A TYPOLOGICAL-MORPHOLOGICAL SPATIAL ANALYSIS OF POLYCANDLEON GLASS LIGHTING GOBLETS FROM THE ROMAN PERIOD IN ISRAEL: SPATIAL DISTRIBUTION AND CHRONOLOGICAL MOVEMENT AROUND THE MEDITERRANEAN BASIN 138

Daniel MALAXA, Simina STANC, Luminița BEJENARU
RECONSTRUCTING ANCIENT HUMAN DIET BY VALUING ANIMAL REMAINS: ARCHAEOZOOLOGICAL DATA CONCERNING THE MULTICULTURAL SITE OF VEȚEL-*LUNCĂ* (HUNEDOARA COUNTY, ROMANIA) 157

Irene SALINERO-SÁNCHEZ
IDENTITIES FROM AN ARCHAEOLOGICAL PERSPECTIVE. THE SOUTH OF THE IBERIAN PENINSULA AS AN OBJECT OF STUDY FROM THE POINT OF VIEW OF CULTURAL MATERIAL (5TH–7TH CENTURIES AD) 166

NUMISMATICS

Stefan KRMNICEK, Kevin KÖRNER
NUMISGAMES. COMPUTER GAME-BASED KNOWLEDGE TRANSFER OF ROMAN COINAGE 172

REVIEWS

Claudiu PURDEA
ANDREA POPA, *MANAGEMENTUL INTEGRAT AL PATRIMONIULUI CULTURAL MONDIAL ÎN ROMÂNIA. STUDIU DE CAZ: FRONTIERA ROMANĂ ÎN DACIA. SITURILE DE EPOCĂ ROMANĂ DE LA BREȚCU, COMOLĂU ȘI BOROȘNEU MARE* [*THE INTEGRATED MANAGEMENT OF WORLD CULTURAL HERITAGE IN ROMANIA: CASE STUDY: THE ROMAN FRONTIER IN DACIA, THE SITES AT BREȚCU, COMOLĂU, AND BOROȘNEU MARE*], SIBIU, ASTRA MUSEUM, 2023, 279P. ISBN 978–606–733–361–9 178

Sergiu Traian SOCACIU
LAVINIA GRUMEZA, VICTOR COJOCARU, ȘTEFAN HONCU, LUCIAN MUNTEANU, *CORPUS DER RÖMISCHEN FUNDE IM EUROPÄISCHEN BARBARICUM. RUMÄNIEN BAND 2. KREIS VASLUI*, MEGA VERLAG, CLUJ-NAPOCA, 2022, 255P. ISBN 978-606-020-499-2 182

Sergiu Traian SOCACIU
LAVINIA GRUMEZA, VICTOR COJOCARU, CRISTINA I. TICA (EDS.), *THE SARMATIANS AND THE OTHERS. NOMADIC AND SEDENTARY CULTURES IN CENTRAL AND EASTERN EUROPE IN THE FIRST HALF OF THE 1ST MILLENNIUM AD*, PONTICA ET MEDITERRANEA, XI, MEGA PUBLISHING HOUSE, CLUJ-NAPOCA, 2024, 502P. ISBN 978-606-020-783-2 184

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ANCIENT RESTORATION PRACTICES IN THE CITY OF PERGE

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Abstract: This study examines ancient restoration practices in the Pamphylia Region, focusing particularly on the city of Perge. It builds upon T. Ismaelli's extensive studies of Roman Imperial Period architecture and restoration methods, supplementing them with new examples specific to Pamphylia. Various restoration methods were identified and analyzed using archaeological evidence, including metal clamps, new marble inserts, and detailed repair processes aimed at extending the lifespan of architectural elements. The findings highlight the period's advanced engineering and architectural skills, demonstrating how these techniques were applied to preserve and restore significant public and private buildings. Additionally, the research categorizes these restoration practices and details techniques such as replacing damaged sections with new materials and reinforcing weakened structures using innovative methods. This detailed examination enriches the literature on ancient restoration practices in Pamphylia and interprets studies on the restoration of ancient architecture through tabular analysis. The study underscores the importance of these practices in preserving cultural heritage and offers a framework for future research.

Keywords: *Pamphylia, Perge, Ancient Restoration, Roman Architecture, Archaeology, Conservation*.

1. INTRODUCTION

Restoration practices are of great importance in the protection of cultural heritage and its transfer to future generations[1]. Although it is unclear whether ancient restoration practices had the purpose of transferring cultural heritage to future generations, these practices certainly extended the life of buildings and therefore are important areas to be examined. This study focused on ancient practices of restoration, which are constantly changing and evolving, and focused on Perge, one of the cities of the Pamphylia region (*Fig. 1*).

Before proceeding with the data on ancient restoration practices in Pamphylia, several important points should be mentioned. In ancient building research, it is crucial to document the traces on the building elements that make up the structure. In addition to decorative elements, many blocks that make up the building design contain important data on the construction process. For this reason, detailed documentation of the building elements should be carried out in addition to plan studies. The traces on each documented building element shed light on the restoration process and the materials, techniques, and application practices used in this process. This study examines the practice of ancient restorations on marble architectural elements and their historical relationship with buildings in the case of Perge

[1] The aim of this study is not to discuss modern restoration practices or to evaluate them.

and aims to create a classification system in light of current archaeological and epigraphic data.

The number of epigraphic documents on ancient restoration practices in Pamphylia is significant. Inscriptions are extremely important sources for understanding ancient restoration in Pamphylia[2]. However, although inscriptions provide crucial information, they do not provide detailed information on restoration techniques. Therefore, modern research and literature studies are necessary to understand the technical aspects of this work. In this study, the traces left on the architectural elements by ancient restoration practices in Perge were analyzed, and the application methods and results were presented for the first time. In this respect, the study is expected to make an important contribution to the literature on Pamphylian studies and help to understand the restoration practices in the ancient period (*Fig. 2*).

2. MATERIAL

Research carried out in the city of Perge has revealed important traces of ancient restoration techniques. In this study, different colored marble types were tested and shaped according to specific needs. The main characteristic of these applications is that they include techniques aimed at extending the service life of building elements. These applications were evaluated according to the locations where they were found.

3. ON THE METHODOLOGY OF THE STUDY

Literary sources on the techniques of ancient restoration practices are limited. However, studies examining the technical aspects of ancient restoration practices are extremely rare. In recent years, studies conducted in the city of Hierapolis have yielded important results in closing the gap in this field[3]. T. Ismaelli stated that although intensive studies have been carried out on ceramics and sculpture related to ancient restoration practices, the practices on buildings are not at the same intensity[4]. The researcher is correct in his opinion that not enough research has been done because there has not yet been a study based directly on restoration practices in the cities of the Pamphylia region, which is the basis of this study and includes the practice of these techniques. However, a small number of specialized studies are noteworthy. A. Öztürk shared data on the repair process[5] of the theater in his study on the Perge theater[6]. In A. Yurtsever's study on the gymnasium of Side, ancient repairs of the marble blocks of buildings were documented and analyzed[7]. Ismaelli, on the other hand, discussed the repair of an architrave from the South Bath propylon, agora and theater at Perge as analogical examples[8]. Apart from the examples mentioned above, there have also been studies on the construction process and construction techniques used in ancient buildings.

In recent years, several studies on the effects of restoration practices on building elements have been published[9]. Considering that the ancient cities in Anatolia are taken into consideration, these studies are mostly written by Ismaelli, who classifies certain types of restoration methods. smaelli's classification consists of a main type and subtypes that include different variants of the same practices[10]. In this

[2] The data on ancient restorations in Pamphylia provide a rich source. Among these, especially an inscription from Side, a banquet hall (banetsaal) restored by Sophron and a restoration decision taken before 212 AD are known. There are also inscriptions from Side related to restorations in the theater. For example, one inscription states that (...)imos, son of Glykon, restored the statues of the gods in the stage building. There is also an inscription of Crispinus repairing the pulpitum of the theater in the late 3rd – early 4th century AD, and a later inscription of Phronton renovating the theater. It is also known that a repair was carried out on the aqueducts in the same city. For inscriptions and studies on the ancient repairs (banquetsaal, theater and stoas) of Side, see: NOLLÉ 2001, 458–459 no. 140; 468–473 no. 150–153, 484 no. 164-a; MANSEL 1963, 140–141; MANSEL 1964, 239–243; MANSEL 1962, 54–55; MANSEL 1978, 211–212; İZMIRLIGIL 2010, 87–112; BEAN 1965, 6–7 no. 86–87; ONUR 2006, 196–197; ADAK/ONUR 2010, 53–54; For the repair of aquaeductus see also: BOSCH 1951, 54–60 no. 6–8; MANSEL 1963, 51–52; MANSEL 1978, 94; NOLLÉ 2001, 399–407 no. 105–106.
Similarly, inscriptions found at Perge provide information about ancient restorations. An example, the inscription dating to the 3rd century AD was found on the west side of Nymphaeum F3, on the podium molding. For Nymphaeum F3 at the slope of the Acropolis, dated to the Late Hadrianic Period, see: MANSEL 1973, 144–145; MANSEL 1974, 112–113; MANSEL 1975, 83–92; DORL-KLINGENSCHMID 2001, 228–229 no. 85; LONGFELLOW 2011, 156–161; ÖZDIZBAY 2012, 62–66 fn. 477. For the inscription see: SAHIN 2004, 19–20 no. 294.

[3] Two important examples of studies on restoration practices in Antiquity are W. B. Dinsmoor's pioneering studies on the Parthenon and the Temple of Olympian Zeus and M. Korre's studies on the buildings on the Acropolis of Athens. Although these studies are important, the studies that examined this issue in depth emerged as a result of the research carried out in Hierapolis. For a discussion of the literature see: For a discussion of the literature, see ISMAELLI 2013, 268. For studies on the documentation of ancient repair practices with photogrometric methods, see: For a study on the causality of ancient repair practices, see PEKKANEN 2021, 115–125: QUATEMBER 2021, 45–56.

[4] ISMAELLI 2013, 267–324, 271.

[5] ÖZTÜRK 2009, 93–94. See also: ÖZTÜRK 2000.

[6] The theater of Perge has been extensively studied and is one of the well-researched structures of Pamphylia. The Late Antonine-Early Severan Period is accepted for its first phase. While A. Öztürk suggests 220–240 AD for the second construction phase, N. Atik suggests that the building was completed in the first quarter of the 3rd century AD. Atik also states that extensive renovations were made under Emperor Tacitus (275–276 AD) and in the 5th century. H. S. Alanyalı, on the other hand, states that a comprehensive renovation of the building took place between 250–260 AD on the third floor of the stage building, which is decorated with frieze-shaped panels depicting the struggles of centaurs and gigants, see: ÖZTÜRK 2000, 296–298; ÖZTÜRK 2009, 90–94; ATIK 2000, 298–321; ALANYALI 2000, 339–340; ALANYALI 2007, 89; ALANYALI 2012, 163–169. S. Şahin, on the other hand, stated that the first phase of the building should be the Early Imperial Period regarding the dating of the theater. For the dating of the theater and other discussions, see: ŞAHIN 2016, 5–12.

[7] YURTSEVER 2021a, 254–259; YURTSEVER 2024, 329–333; see also: YURTSEVER 2021b, 29.

[8] O. Bingöl states that applications such as anathyrose and scamillus are used to bring two building elements together, and that especially scamillus is a method used to protect fragile corners. Bingöl categorized the repair types of building elements under four main headings: gluing, fitting (compression), clamping, and mortising, see: BINGÖL 2012, 218–219, 267–272.

[9] For studies in this field, see: ISMAELLI 2013, 267–311; ISMAELLI/BOZZA 2016, 437–458; ISMAELLI 2021, 19–43; QUATEMBER 2021, 57–66; PAKKANEN 2021, 115–126; BOZZA 2021, 75–90; ANDREOTTI *et al*. 2023, 71–79; YURTSEVER 2024, 329–333.

[10] Ismaelli identified five main types in his study. In Type A, fracture blocks are performed without modifying the surface of the block. In subvariants of this type (A–1 and A–2), metal rods or adhesives are used. The application manifests itself mostly in horizontal and vertical fractures, and metal connectors such as ∏-shaped iron are often used. In Type B, restoration techniques involve minor modifications to the contact surfaces to allow the fractured blocks to be joined. Without the addition of new treated material, the contact surfaces are only modified to provide better adhesion. In the Type B–1 subclass, the durability of the restoration depends only on the

study, based on ancient restoration practices in the city of Perge, Ismaelli's classification was used. In this study, archaeological data were used to determine the technical details of ancient restoration practices in the Pamphylia region[11]. This research focused on determining the techniques and purposes of ancient restoration practices. In this context, the restoration traces found on public buildings in the region were analyzed in detail. The data obtained, the historical context of the restoration techniques and their social, cultural and economic impacts were evaluated. Moreover, a detailed table was created as a result of the study (*Table 1*). This methodology builds on the methodology applied by Ismaelli, offers a systematic approach to the study of ancient restoration, and aims to provide a basis for future research. In this way, restoration practices in Pamphylia can be better understood, and important contributions can be made to the literature in this field.

4. RESTORATION TECHNIQUES: THROUGH PROMINENT EXAMPLES FROM PERGE

In the process of researching ancient restoration techniques, different application methods have been identified. Based on Ismaelli's classification[12], similar examples of ancient restoration practices in the Type A, Type C and Type E classes were documented in Perge.

Type A Restoration Application

An important group of restoration practices was documented in the city's theater. The Type A restoration practice, in which Π-shaped iron clamps are used to hold the broken blocks together, has been documented on the architraves of the stage building of the theatre[13]. On the architrave blocks of the Perge examples, the A–2 restoration practice, which is a subvariant of the Type A restoration practice according to Ismaelli's classification, is evident[14]. Looking at the architrave surface, it is understood that the metal clamps placed horizontally or diagonally extend over the fascia and bring the two blocks together. In some examples, the metal traces of the clamps on the block are still visible. However, it is understood that some decorated elements on the block were also destroyed during repair. The destruction of the decorated elements was not a problem here; the priority was to reuse the block (*Fig. 3a-e*).

Some of these applications at Perge were introduced by A. Öztürk and N. Atik[15], while Ismaelli discussed the techniques of these works[16]. The newly discovered blocks did not differ from the previous blocks. There are several important points that drew our attention from Öztürk's study. Öztürk found that renovations were carried out in the lower stage building of the theatre, and in some cases, different types of stones were used in the plaster capitals instead of Prokonnesos marble[17]. He also briefly mentioned the repairs on some architraves. He stated that these repairs may have been made as a result of a mild earthquake[18].

There are similar examples of this practice found in the theater of Perge and in other buildings in the city. A similar practice was documented on the façade of the architrave block of the propylon[19] of the city's bath gymnasium (193–211 AD)[20]. On the front façade of the architrave, currently on display at the Antalya Archaeological Museum, traces of a "Π" shaped clamping iron can be seen on the spool-bead decorated crown of the horizontally shaped second fascia (*Fig. 4a*). It appears that the architrave, which was broken into two pieces for some reason, was reassembled and used owing to this application[21]. Moreover, traces of the same technique were found on different architraves lying on the ground around the area where the propylon was found (*Fig. 4b-c*). The reason for the restoration of the architrave of the propylon at Perge is unknown[22]. However, such a practice indicates that the blocks were damaged after a severe earthquake and that the broken blocks were repaired and reused[23]. Apart from the example of propylon, a similar restoration

shape of the new contact surfaces and the use of adhesives. In Type B–2 subclass, metal elements are also used. In Type C, broken blocks or their damaged parts are replaced. In the subvariants of this type (C–1, C–2, and C–3), the repair consists of removing the damaged parts and replacing them with a new part. Some precautions are taken to prevent this new part from rotating or slipping. In Type D, restoration techniques involve the replacement of damaged fragments with new ones and the use of metal parts to make the broken blocks join together. In this technique, additional metal elements are used when the use of specially shaped recesses and connectors is deemed inadequate, taking into account the severity, function and location of the damage. The metal parts are usually made of iron and are often not lead-coated. These restoration techniques are subdivided according to the shape of the metal rods and clamps and whether the joints are vertical (against gravity) or horizontal (with gravity). In the subvariant of this type (D–1), in this subtype, the replacement part is held in place by one or more iron bars. The iron rods are usually used without lead coating. This technique is usually used in vertical joints. In the D–2 subvariant, L-shaped or Π-shaped iron clamps are used. These clamps are usually coated with lead to protect them from oxidation. In this subtype, the clamps are used in horizontal joints and prevent horizontal movement of the replacement part. Type E restoration, like the restoration seen in sculptures, involves the maintenance of the damaged block, partial or complete recarving to create a new surface or a new shape, without changing the original function of the architectural element. Type F restoration is described as the preparation of completely new blocks to replace damaged ones. On the subject see: ISMAELLI 2013, 273–302.

[11] Since the epigraphic data were previously evaluated in a different study, they are not included in this study, see: YURTSEVER 2024, 329–333.

[12] For the classification made by Ismaelli, see: ISMAELLI 2013, 273–302, see also supra note 10.

[13] Two main reasons that make Type A restoration necessary should be considered. One of these is the occurrence of a severe shaking (such as an earthquake) that will affect the building, and the other is the damage to the building elements during the construction phase of the building while the building is still under construction. We can say that the process of joining parts of the same building element (Type A) is usually applied after an intense damage. Therefore, the detection of such a restoration practice should indicate a different phase of the building.

[14] For the A–2 class repair practice, see: ISMAELLI 2013, 275.

[15] ÖZTÜRK 2009, 93–94 pl. 14, 1; ATIK 2000, 312 abb. 35.

[16] ISMAELLI 2013, 276 fig. 6a.

[17] ÖZTÜRK 2009, 93.

[18] A. Öztürk states that the repair activities in the theater may have been carried out during the reign of Tacitus (275/276 AD), and later between 450/475–525 AD, see: ÖZTÜRK 2009, 93.

[19] The architrave is on display at the Antalya Archaeological Museum.

[20] Propylon (H) has been dated between 193–211 AD thanks to its inscription, see: MANSEL 1975, 73; ABBASOGLU 1994, 86; GLIWITZKY 2010, 27.

[21] For the building element, see: ABBASOGLU 1994, 86, 91 pl. 38, 1–5; TÜRKMEN 2007, 157 cat. no. 67.

[22] The architectural elements of the building and especially its decorations have been discussed in different publications, but a restitution study supported by block documentation has not yet been carried out.

[23] This building was originally constructed during the reigns of Trajan and Hadrian, and then it was probably destroyed by an earthquake and rebuilt at the beginning of the 3rd century AD (reign of Caracalla), see: GLIWITZKY 2010, 24–25.

was documented on the door lintel of the taberna of the city's agora[24].

Similar examples of the repair practices classified under type A in the Pamphylia region were documented on the Side. The examples in Side are blocks belonging to the Emperor Hall of the city's gymnasium[25]. In one of these examples, the architrave was broken in three places in the vertical direction, and the oval-shaped architrave, which was broken into three pieces, was restored and reused. The metal clamp slots in the form of "Π" on the upper back of the structural element and on the front frieze are quite prominent[26]. The soffit of an architrave from the second floor of the Emperor's Hall from the same building was also restored at two points. The decorations on the soffit were partially damaged by this application, but owing to the repair, the structural element could be reused (*Fig. 5*)[27]. This practice in Side is thought to have taken place in the late 2nd to early 3rd century AD[28].

Outside the Pamphylian region, similar applications can be seen in the cities of Laodicea and Hierapolis. One such example in Laodicea is an architrave found in the eastern corner of the southern stoa of the building called the North (Sacred) Agora[29]. On the fascia of the architrave, it is evident that a vertically broken piece was reassembled with dowels and "Π" shaped metal clamps. Repair traces are also visible in the soffit section of the architrave. A similar application was found on an architrave belonging to the west stoa of Temple A of the same city, dating to the Antonine Period[30]. In this example, the deep clamp slots on the crown and frieze sections of the architrave indicate comprehensive repair (*Fig. 6a-b*).

A similar application was found on an architrave belonging to the stage building of the Hierapolis Theater[31]. The architrave was broken in two vertical segments and subsequently restored. The block was reassembled with "Π"-shaped metal clamps from the upper fascia, frieze, and upper base surface[32]. The application here took place during the ancient restoration of the second floor of the stage building in the period between 350 and 352 AD[33]. However, similar practices have been documented in other buildings in the city[34]. Similar restoration practices were identified in many other ancient cities in Anatolia. One of these is an architrave from the portico of the Smyrna Agora[35]. The traces of restoration on the second fascia of the architrave and on the frieze, along with the use of dowels and metal clamps in the shape of "Π", are quite evident. While this restoration practice destroyed the decorated elements of the architrave, it allowed the block to be used a second time (*Fig. 7a-b*).

An architrave from the Nysa Theater was cracked vertically, and dowels and metal clamps were used at two different points on the top to repair the damage[36]. This was done to prevent the crack from deepening and damaging the block further. The architrave was probably damaged during the construction phase and reinforced in this way. This practice does not indicate a specific construction phase. A different architrave from the Nysa Theater allows for repair via the use of a dowel slot and metal clamps on the third fascia. Apart from the examples from Hierapolis and Nysa, similar practices were documented in the ancient city of Ephesos[37] and around the Temple of Zeus Lepsynos at Euromos[38]. In Ephesos, the repair marks on the second fascia and frieze of the architrave clearly show the use of dowels and "Π"-shaped metal clamps. Although this restoration practice destroyed the decorated elements of the architrave, it allowed the block to be used for a second time.

The building elements evaluated in the Type A class and their comparison examples are mostly large-scale building elements such as architraves. However, some attic-ionic type pedestals from the gymnasium of the ancient city of Side show that the application was also carried out on relatively smaller blocks. Traces of dowel and metal clamp slots on the attic-ionic type pedestals here, which indicate ancient restoration, have been documented[39]. Slots were formed on the bodies of the column bases, which were broken in two, and clamps were placed on the upper base surface. Thus, the pedestal, which was split in two, was brought together and reused in the restoration. It is quite clear that this practice indicates a building phase. The interventions made at different points to split the pedestals in the middle and reuse them indicate a comprehensive restoration. Research on the building also indicates that the building underwent restoration in the late 2nd to early 3rd century AD[40]. It is understood that the column bases were also repaired during this restoration (*Fig. 8*).

[24] ISMAELLI 2013, 276 fig. 6e.

[25] For Gymnasium see: YURTSEVER 2021a.

[26] The architrave belongs to the second floor of the emperor's hall of the gymnasium, see: YURTSEVER 2021a, 255 fig. 311a-b.

[27] YURTSEVER 2021a, 256 fig. 312.

[28] YURTSEVER 2021a, 254–256.

[29] The architrave in question has been dated to the second half of the 3rd century AD based on its stylistic characteristics, see: YENER 2019, 166, 326–327 pl. 57.

[30] YENER 2019, 197, 336 pl. 77. See also for the temple: SIMSEK 2007, 227–234.

[31] ISMAELLI 2013, 275 fig. 5g; ISMAELLI 2021, 23–24 fig. 3; ISMAELLI/BOZZA 2016, 447 fig. 10.

[32] For the mentioned architrave see: Ismaelli and Bozza 2016, 447 fig. 10.

[33] For the phases of the theater of Hierapolis see: BERNARDI-FERRERO 1988, 179; D'ANDRIA 2010, 180.

[34] For similar practices documented in the city of Hierapolis, see: Ismaelli 2013, 275–276 fig. 5; ISMAELLI/BOZZA 2016, 444 figs. 8–10.

[35] The arrangement in the Smyrna Agora was reportedly realized after the earthquake of 178 AD, see NAUMANN/KANTAR 1950, 107, 111: NAUMANN/KANTAR 1950, 107, 111: VANDEPUT 2007, pl. 119, 1; ISMAELLI 2013, 276 fig. 6f. See also: CAVALIER 2005, fig. 253.

[36] KADIOĞLU 2006, 139 taf. 32, 7.

[37] In the ancient city of Ephesus, there are also examples of reassembly of broken building elements. An architrave from the Nymphaion of Trajan was broken in a diagonal vertical direction, and the broken pieces were reassembled with dowel slots and metal clamps on the frieze and fascia, thus reusing the damaged structural element. For the example of Trajan's Nymphaion (AD 102–114) see: QUATEMBER 2009, 457, 466 fig. 13. A similar repair to the Trajan Nymphaion is documented on the architrave on the west side of the Temple of Hadrian (117/118 AD) on Kuretler Street. Certain parts of the temple collapsed in the 4th century AD, after which the collapsed parts were restored. For the restoration practices seen on the structural elements of the building, see: QUATEMBER 2010, 386–387, 393 fig. 5, 10; QUATEMBER 2017, 160 taf. 245, 247 (frieze), 272 (architrave), 300 (cassette).

[38] The Euromos example shows a deep slot on the fascia of the architrave and traces of a metal clamp extending vertically. It was not possible to determine to which part of the building the block, which appears to have been extensively repaired, belongs. However, the temple is dated between 130–140 AD., see: DOĞAN 2020, 345, 374 fig. 238.

[39] For an example see: YURTSEVER 2021a, 92 fig. 85, pl. 11,3.

[40] YURTSEVER 2021a, 254, 259.

Type C Restoration Application

Ancient restoration practices, classified as Type C, are common in many cities. This method involves the replacement of damaged parts with new parts and the use of adhesives to join the broken blocks together. In this technique, no metal parts are used; the broken surface is recarved, and the newly added part is inserted into an appropriately shaped cavity[41]. In this respect, the use of adhesives, as well as compression of the fragments, is necessary. Although chemical analysis has not yet been carried out in the cities of Pamphylia, it is clear that some kind of adhesive was used. Such applications are mostly for consolidation. Consolidation can be performed in the process of restoring an ancient building, as well as for blocks that have been damaged during the construction phase of a building[42].

During the surveys conducted at Perge, clear examples of this ancient restoration practice, classified as Type C, were found. One of these examples was documented on the molding of a vertically oriented wall architrave belonging to the palaestra of the South Bath-Gymnasium (*Fig. 9a*) and on the attic-ionic type column bases on the north-south oriented colonnaded street (*Fig. 9b-d*). Especially in the case of Figure 9d, it appears that the body of the column base was largely replaced with a new piece. To increase the friction, the area around the base where the appropriate piece was to be placed was first treated with a thick-tipped comb, and then, small slots were created with a plowshare to expand toward the center.

In the Pamphylia Region, there are similar examples of this repair practice at Perge. In the Great Nymphaion at Side, a section of the tooth cut of a triangular pediment was damaged. The damaged part was cut out on a certain plane, and a new small marble block cut was placed where it was removed (*Fig. 10a*). This appears to be a simple repair and was probably carried out during the construction of the building in the Late Antonine to Early Severan Period[43]. A similar treatment has been documented on another example from Side, a tooth-cut cornice and the first fascia of a wall architrave. It seems unlikely that these treatments were carried out during extensive restoration. These structures must have had minor consolidations on site when the gymnasium to which they belonged was first built (130–150 AD)[44] (*Fig. 10b-c*). An example of a similar ancient restoration on the main wall body of the building was presented in Side[45]. In an application that took place in the late 4th to early 5th century AD, the decaying part of the conglomerate block, which had weakened and decayed over time, was cut away, and then the empty part was filled with different stones, eliminating the static deficiency and extending the life of the wall[46] (*Fig. 10d*). Considering that the building was first constructed between 130 and 150 AD, this restoration, which took place at the beginning of the 5th century AD at the latest, seems to be an understandable need.

In addition to the Pamphylian examples, these have been previously described by Ismaelli[47]. It is possible to see some examples not discussed by Ismaelli in Laodicea. One such example was documented on the first fascia of the architrave and the architrave crown found in the pronaos of Temple A, dating to the Antonine Period[48]. Here, a large portion of the crown of the architrave was cut away, and another piece of the same dimensions was inserted. There are no traces of any metal fittings on the cut section. Therefore, as in the Pamphylian examples, compression and some kind of adhesive must have been used in this application. Temple A was damaged in some way and underwent extensive repairs during the reign of Emperor Diocletian (284–305 AD) [49]. Therefore, the application may have taken place during this period. Similar repair practices are used on the cyma of a cornice in the North Agora of the city,[50] dating to the Antonine Period, and on the first fascia and frieze of the architrave of Temple A, dating to the Severan Period.[51]

Type E Restoration Application

In the repair practice analyzed under Type E, the original missing or damaged sections are replaced by completely new blocks[52]. These blocks are shaped in accordance with the dimensions, shape and decorative elements of the original building element. In Ismaelli's study, this practice was frequently described in ancient sculptures, and examples of this practice found in architecture were also given[53]. An example found at Perge has a very special characteristic, apart from the examples of restoration practices in antiquity that have been identified thus far[54]. These findings were documented on a column, which was found in the square at the end of the city's east–west colonnaded avenue leading to the Western Necropolis. The column was subjected to three different restoration treatments, with traces of red paint preserved in place. In the first application, a long marble piece with rounded ends extending vertically was placed on the body (*Fig. 11a*). Here, the damaged part of the column body was removed via a regular cutting process and replaced with a marble piece of the same type. This application, which is located in the center of the cracks running diagonally across the column body, must have been applied to prevent the cracks from growing. There are also traces of mortar from the bonding process around the application. Another application on the same column followed a similar method, but here, the damaged part was cut slightly more irregularly (*Fig. 11b*). It was also observed that a smaller piece was glued right next to the patched marble slab. This application also involves bonding with mortar. One last application on the column body is quite interesting. Here, the marble slabs were not used as a whole but as pieces, and the cut part was covered. There is

[41] For Type C restoration practices and examples see: ISMAELLI 2013, 280–287 figs. 9–15.
[42] ISMAELLI 2013, 280–287.
[43] GLIWITZKY 2010, 121–122.
[44] YURTSEVER 2021a, 219–260.
[45] YURTSEVER 2021a, 31 pl. 5,3; YURTSEVER 2021b, 29 fig. 11.
[46] YURTSEVER 2021a, 31 pl. 5, 3; YURTSEVER 2021b, 29 fig. 11.
[47] ISMAELLI 2013, 280–287.
[48] YENER 2019, 192, 334 pl. 65, 79.
[49] SIMSEK 2007, 227–234.
[50] YENER 2019, 172–173, 330, pl. 65.
[51] The structural element was found in the western stoa of the temple and belongs to the second phase of the building, see: YENER 2019, 292, 336, pl. 78.
[52] ISMAELLI 2013, 293.
[53] ISMAELLI 2013, 293–294 fig. 24.
[54] I would like to thank Prof. Dr. Sedef ÇOKAY-KEPÇE for noticing and sharing with me this finding, which is an important in situ example of ancient restoration practices.

intense use of mortar. Unlike in the other two applications, the cutting is more irregular, probably due to the irregular cracks on the column body (*Fig. 11c*).

The closest example of this repair practice (Type E) identified in Perge was documented and published in Tripolis[55]. Although we cannot explain the historical process of the practice in Perge, a very wide time period is given for the Tripolis examples. What stands out in the Tripolis examples and what makes this study valuable is that archaeometric analyses were conducted on repair practices. In these analyses, organic materials such as eggs, beeswax, and resin as well as inorganic materials such as calcite, quartz, and mica were used for bonding. In addition, adhesive mortars were used on the edge and under the carvings[56]. In the Perge examples, the mortars were also used under and beside the carvings and in the wide part of the body, as shown in Figure 11c. Although the Perge samples were not analyzed, we can say that the organic and inorganic materials used in the Tripolis samples may have been used here as well[57].

CONCLUSION

Important findings have been obtained in architectural history studies carried out in the Pamphylia region. In particular, the epigraphic data from Perge and Side provide information on which buildings and by whom ancient restoration projects were carried out. The epigraphic data showed that the restoration projects were mostly related to public buildings, and the people who carried out this process were the wealthy or city administrators of the period. It is expected that practices in public buildings are reflected in epigraphic documents because issues concerning the city as a whole are included in these documents and because issues concerning the city as a whole are included in these documents. The practices that are not reflected in epigraphic documents were identified through archaeological documentation methods. The results of this study can be presented under certain headings; the types and nature of restoration practices, workshops and labor force; and a comparison of the practices in Perge and Side.

Considering the typology and nature of the restoration practices in Perge, these practices were generally carried out to ensure the reuse of the buildings and to preserve their structural integrity. The qualities of these practices are also categorized with different typological examples. Type A restoration practices stand out in terms of quality due to the scope of the work. These practices are characterized by physical interventions usually carried out after a destructive event. The reassembly of broken structural elements with dowels and metal clamps indicates extensive repairs. This method enabled the reuse of buildings and allowed for the identification of elements affecting the urbanism of the city. It is understood that Type A restoration practices were carried out in emergency situations, and critical structures for the city were quickly repaired with this method. Type C restoration practices were carried out by replacing damaged parts with new parts and using adhesives. In this technique, metal parts are not used, the broken surface is recarved, and the newly added part is inserted into an appropriately shaped cavity. These applications are usually for consolidation purposes and are intended to increase the durability of structures. Type E restorations involve the replacement of missing or damaged sections with completely new blocks, with the addition of new parts in accordance with the original dimensions, shape and decorative elements of the building. Although this method is frequently used for sculptures, it has also been applied to architectural structures.

The restoration practices documented and evaluated in Perge can also be analyzed in terms of workshops and the labor force. Restoration practices also point to a workshop. A workshop and trained labor force are needed in the city for restoration practices that need to be carried out quickly. When these conditions are met, damaged buildings can be quickly repaired and put back into use. The city's own workshops reduce costs and speed up work. For this reason, it is important to identify restoration practices in ancient buildings, as they may provide clues to solving workshop problems. Although we cannot make a detailed style comparison about the workshops of Pamphylian cities for the time being, answers to important questions will be found with the increase in similar studies in the future.

The table created in this study is important. The information in the table shows how advanced engineering and construction knowledge and techniques were in antiquity (*Table 1*). In particular, the widespread use of technical materials such as metal clamps and dowels is an indication of the efforts made to increase the durability of structures and to make them reusable. In addition, this table systematically presents the restoration practices carried out in the cities of Pamphylia and the surrounding ancient cities. An analysis of the table shows that most restorations were carried out on public buildings. This can be interpreted as the fact that these buildings played a central role in the social life of the cities and were therefore frequently restored. Moreover, the main goal of restoration techniques is to make buildings or building elements usable again and to preserve their structural integrity. While the table created in this context helps us understand the diversity and historical development of restoration practices, it is important to include new data from other cities in this table. Thus, each academic study to be written will enrich this table, expand the literature in this field, and diversify the knowledge in the field of restoration practices in Antiquity.

Comprehensive studies conducted with the right methodology in building research identify the usage process, construction phases and application methods of ancient buildings. Anatolia is rich in Roman imperial period cities and architectural building elements. However, studies on the effects of restoration practices on building elements are limited. Ismaelli's study provided an important starting point, and this study takes Ismaelli's research one step further by examining the Pamphylia region in particular. The ancient restoration practices of the cities in the region were

[55] ANDREOTTI *et al.* 2023, 71–79.
[56] ANDREOTTI *et al.* 2023, 71–80.
[57] It should be noted that an archaeometric study should also be carried out on the Perge samples. Such a study will enable the comparison of the analyses in the Tripolis and Perge samples. Differences or common points of the material used in the application will be identified. Thus, important results can be shared for two different regions and cities.

examined, and new findings were obtained based on archaeological data. In the future, chemical analyses of ancient restoration materials will provide a better understanding of these practices and allow for comparisons of restoration techniques with modern restoration practices.

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Structure	Class of Technique Applied	Feature of the Technique	Historical Process of Repair
Perge, Theater	Type A	Assembling the broken blocks with ∏-shaped iron clamps.	Late 2nd century AD
Perge, Bath-Gymnasium Propylon	Type A	Joining architrave blocks with metal clamps.	3rd century AD (?)
Perge, South Bath-Gymnasium	Type C	Adding a new part on the molding of a vertically oriented wall architrave and using adhesive.	3rd century AD (?)
Perge, Colonnaded Street	Type E	Joining vertically elongated marble pieces using adhesives and mortar.	Unknown
Side, Gymnasium, Emperor Hall	Type A	Joining vertically broken architraves with metal clamps.	3rd century AD
Side, Great Nymphaeum	Type C	Removing the damaged part of a tooth-cut pediment and adding a new part.	3rd century AD (?)
Side, Gymnasium	Type C	Tooth-cut cornice and addition of a new piece on the first fascia of the wall architrave.	3rd century AD
Side, Gymnasium, South Stoa-Back Wall	Type C	Removal of the damaged parts of the back wall of the south stoa and repair with new stones.	Late 4th – early 5th century AD
Laodicea, North Agora	Type A	Joining the vertically broken architrave with metal clamps.	Unknown
Hierapolis, Theater	Type A	Joining the vertically broken architrave with metal clamps.	Late 2nd century AD
Smyrna, Agora	Type A	Joining the architrave with metal clamps.	Unknown
Nysa, Theater	Type A	Reinforcement of vertically cracked architrave with metal clamps.	Late 2nd century AD (?)
Nysa, Theater	Type A–2	Repair of broken architraves and cornices with metal clamps.	Late 2nd century AD
Laodicea, Temple A	Type C	Removing the crown of the architrave and adding a new piece.	Unknown (Late 2nd century?)
Hierapolis, Gymnasium	Type A–1	Joining broken blocks with metal rods.	Late 1st century AD
Hierapolis, Temenos Portico	Type B–1	Re-cutting contact surfaces by creating small steps.	Mid 1st century AD
Hierapolis, Temple of Apollo	Type C–1	Placement of cubic elements in place.	Unknown
Hierapolis, Marble Portico	Type A–2	∏-shaped blocks fastened with iron clamps.	2nd century AD
Hierapolis, Marble Portico	Type C–3	Insertion linked to small tenons.	Mid 2nd century AD
Hierapolis Marble Portico	Type D–1	Reinforcement of the cornice end with metal rods.	Unknown
Hierapolis Apollo Sanctuary	Type D–1	Blocks joined by vertical metal bars.	Unknown
Aphrodisias, Sebasteion	Type A–2	Joining broken architraves with ∏-shaped clamps.	Late 1st century AD
Ephesos Hadrian's Gate	Type A–2	Architrave reinforced with metal clamps.	2nd century AD
Ephesos, Doric Façade	Type B–2	Steps reinforced with metal clamps and the use of glue.	Unknown
Ephesos, Library of Celsus	Type C–1	Repair of the library architrave with new pieces.	2nd century AD
Sardis, Artemision	Type C–2	Use of new pieces with wavy edges.	Late 2nd century AD
Ostia, Africano Column	Type C–2	Column repair with the additions of the Grandio Africano.	Mid 2nd century AD

The points to be considered when reading the table are as follows:
Building Name: Identifies which building is being repaired.
Technique Classification: Classifies the restoration technique used.
Specificity of Technique: Describes the specific restoration method applied.
Historical Process of Repair: Gives information about the period in which the repair was carried out.
P.S. This is a sample table. It needs to be refined and any errors corrected for future research.

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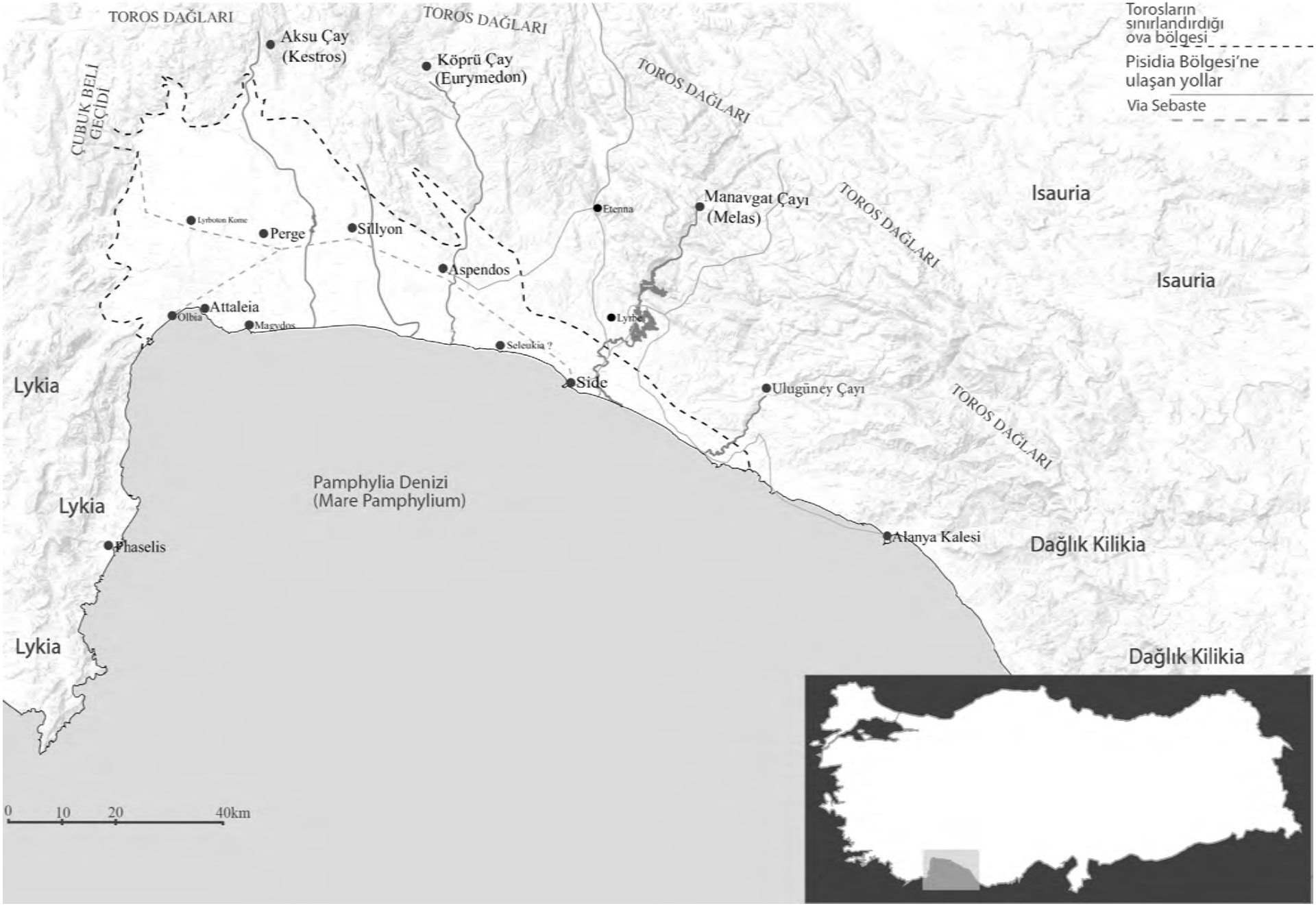

Fig. 1. Location and topographical map of Pamphylia (after YURTSEVER 2021a, Fig. 1).

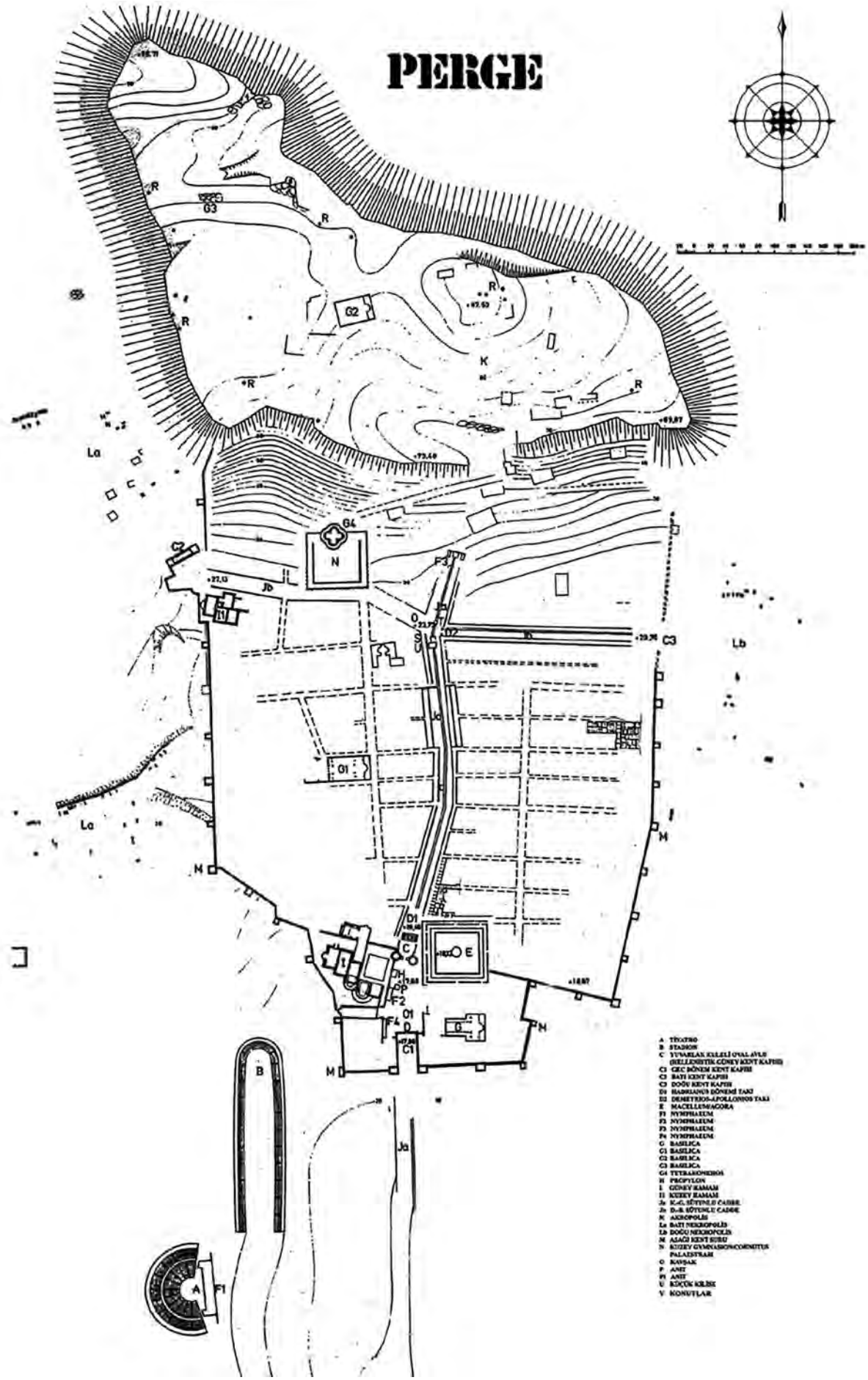

Fig. 2. Perge city plans (after ÖZDİZBAY 2008, 867, Fig. 2).

Fig. 3a. Ancient repairs on the structural elements of the Perge theater.

Fig. 3b. Ancient repairs on the structural elements of the Perge theater.

Fig. 3c. Ancient repairs on the structural elements of the Perge theater.

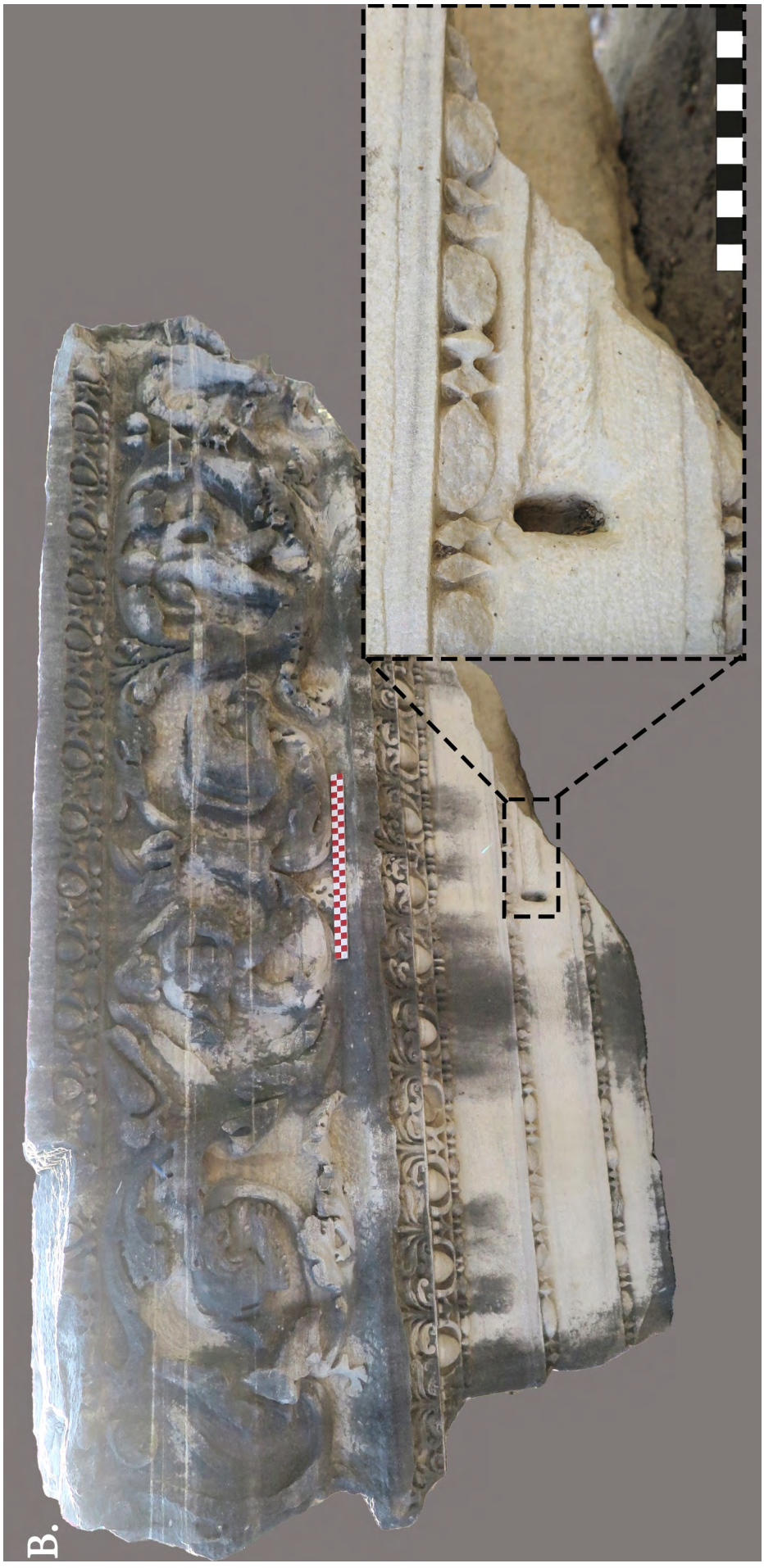

Fig. 3d. Ancient repairs on the structural elements of the Perge theater.

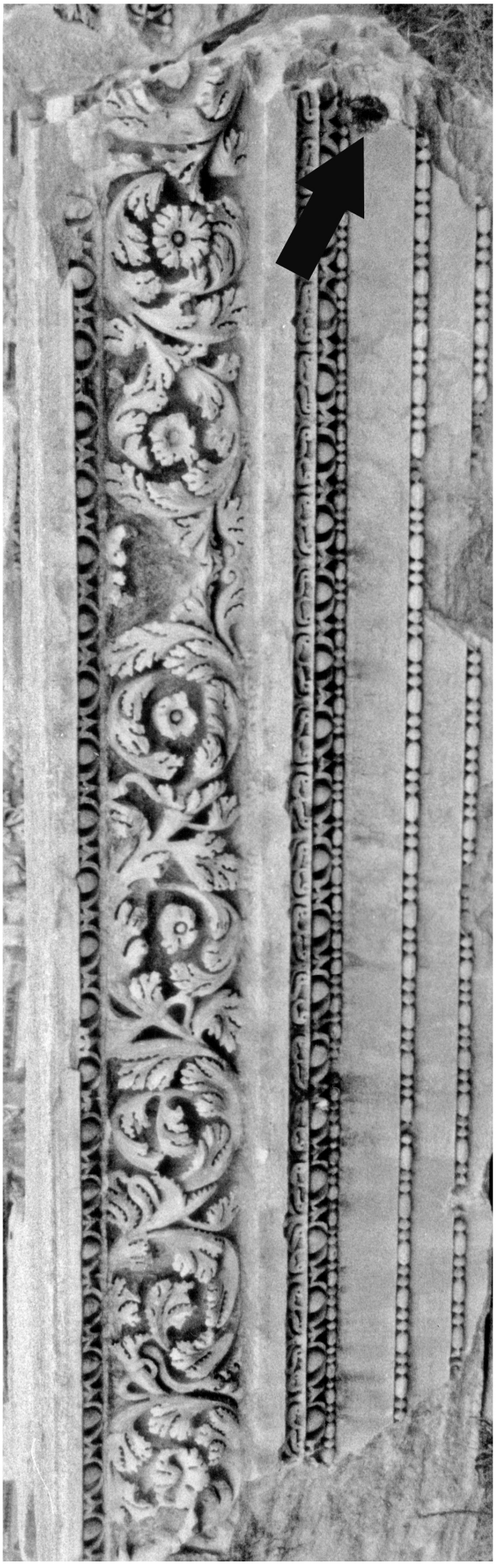

Fig. 3e. Ancient repairs on the structural elements of the Perge theater.

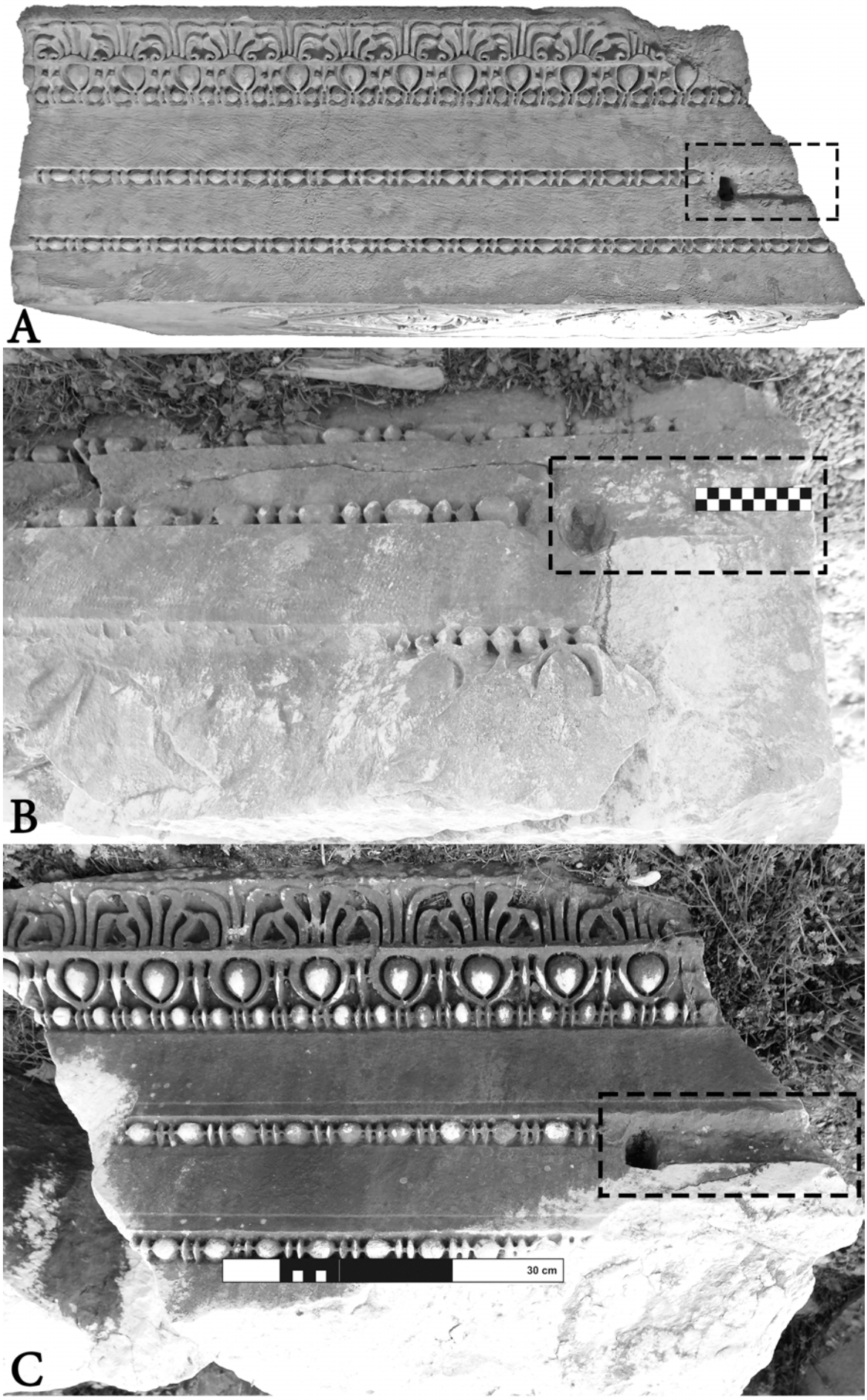

Fig. 4a-c. *Antique* repairs on structural elements of the propylon of the South Hammam-Gymnasium at Perge.

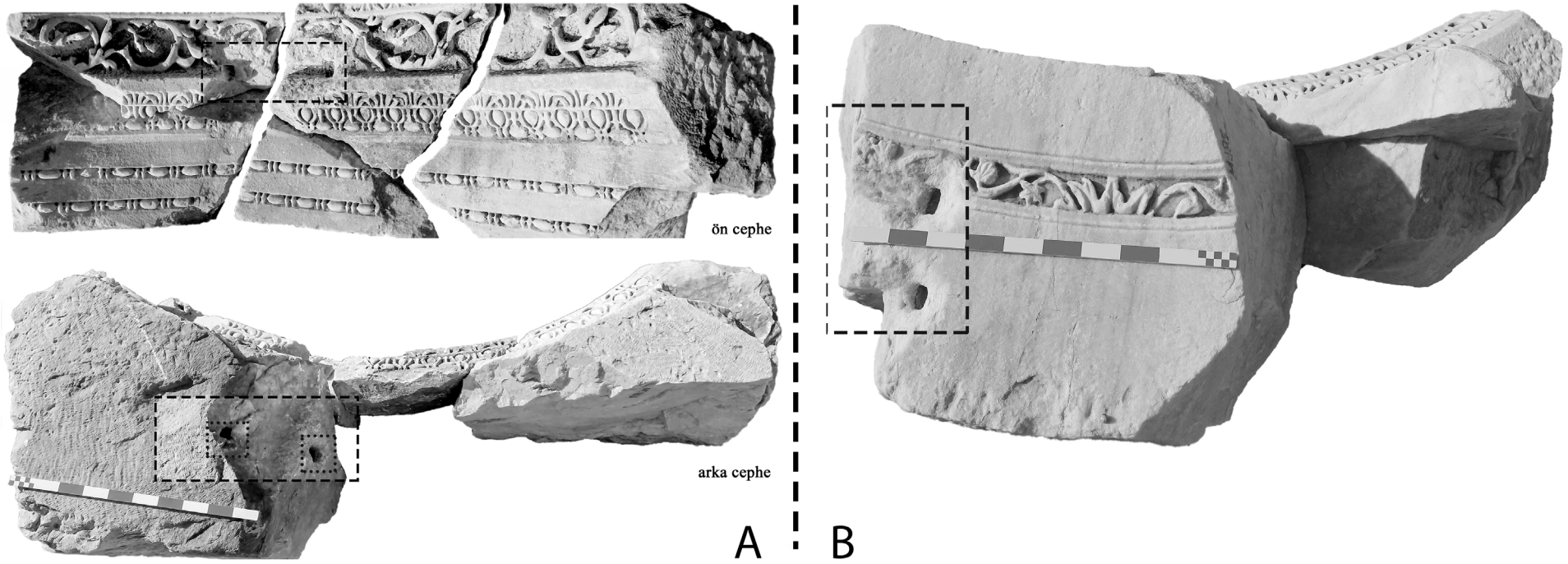

Fig. 5. Repairs found on the architraves of the emperor's hall of the Gymnasium in Side.

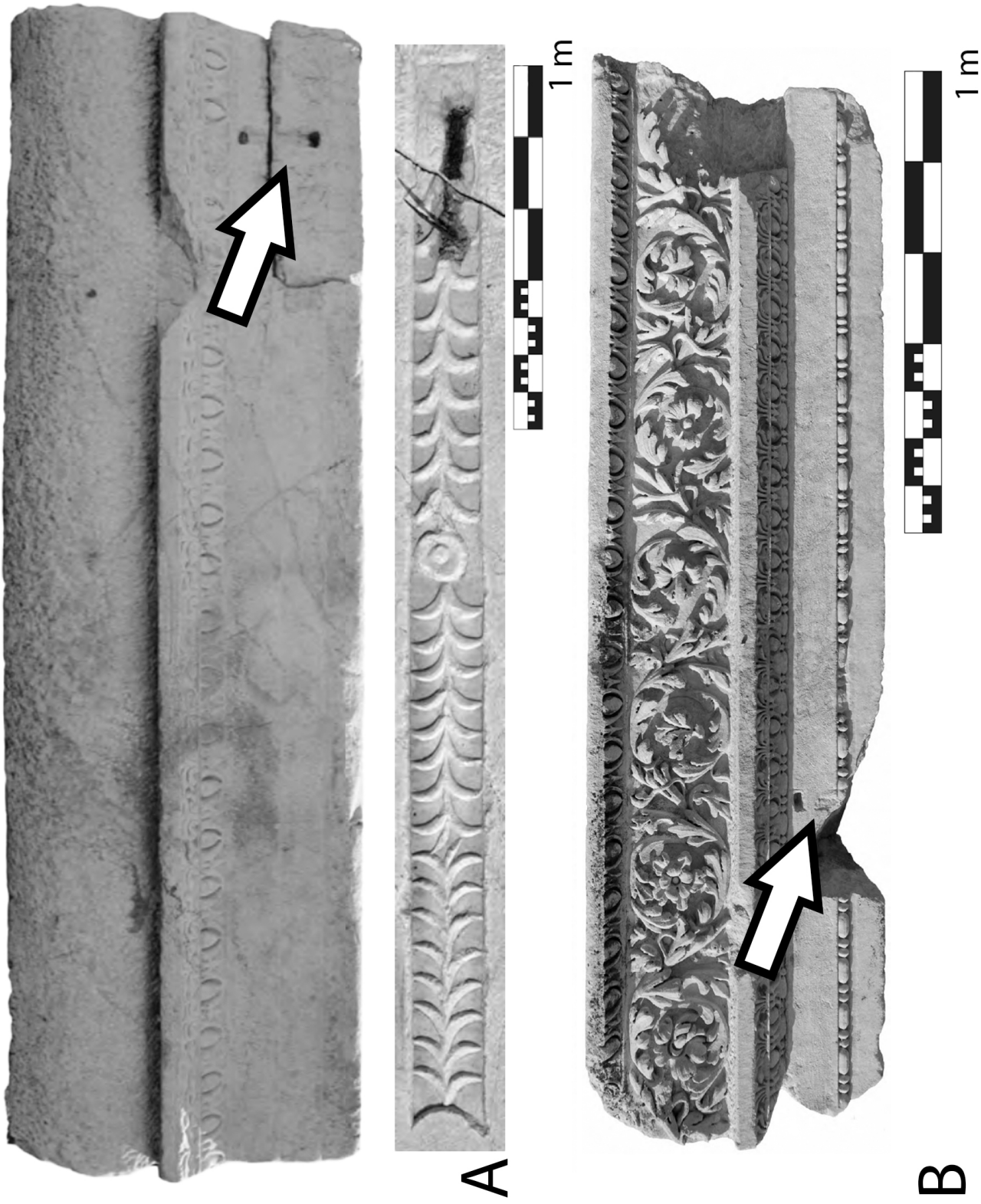

Fig. 6a-b. Repairs on architraves found at Laodicea. **A:** Repair marks on an architrave found in the south stoa of the North (Sacred) Agora. **B:** Repair marks on an architrave from the west stoa of Temple A (after YENER 2019, Pl. 57, 77).

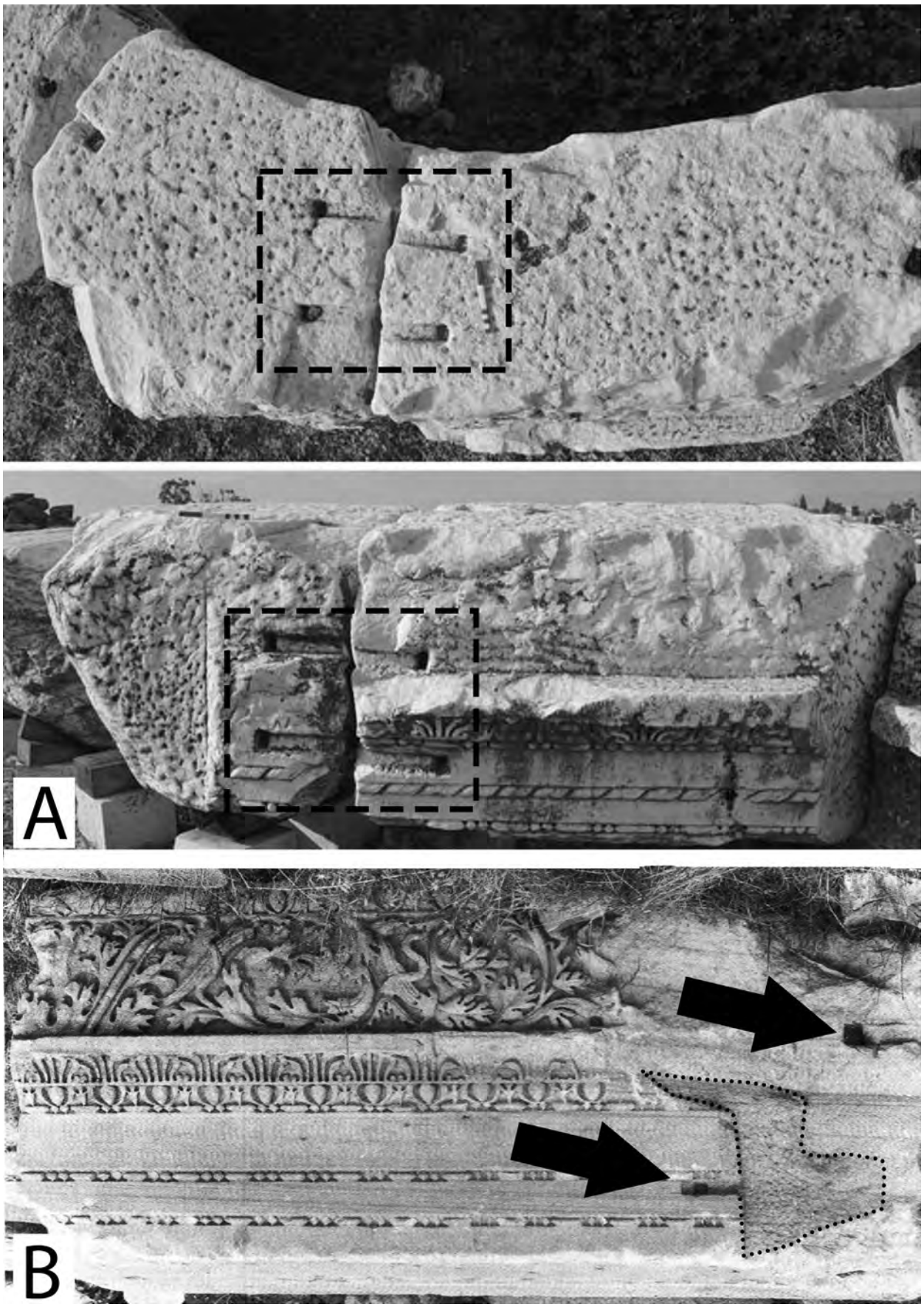

Fig. 7a-b. Repairs on the building elements of the Hierapolis theater and the Smyrna Agora. **A:** Repairs on the upper and front facades of an architrave belonging to the stage building (scaenae frons) of the Hierapolis theater. **B:** Repair marks on the fascia and frieze of an architrave from the Smyrna Agora (after **A:** ISMAELLİ/BOZZA 2016, Fig. 10; **B:** VANDEPUT 2007, Pl. 119, 1).

Fig. 8. Repairs detected on attic-ion type pedestals belonging to the emperor's hall of the gymnasimun in Side (after YURTSEVER 2021a, Pl. 11,3; 27,2).

Fig. 9a-e. Examples of Type C repairs at Perge. **A:** Architrave of the palaestra of the South Bath-Gymnasium. **B-D:** Repairs on the attic-ion type pedestals on the colonnaded street running north-south.

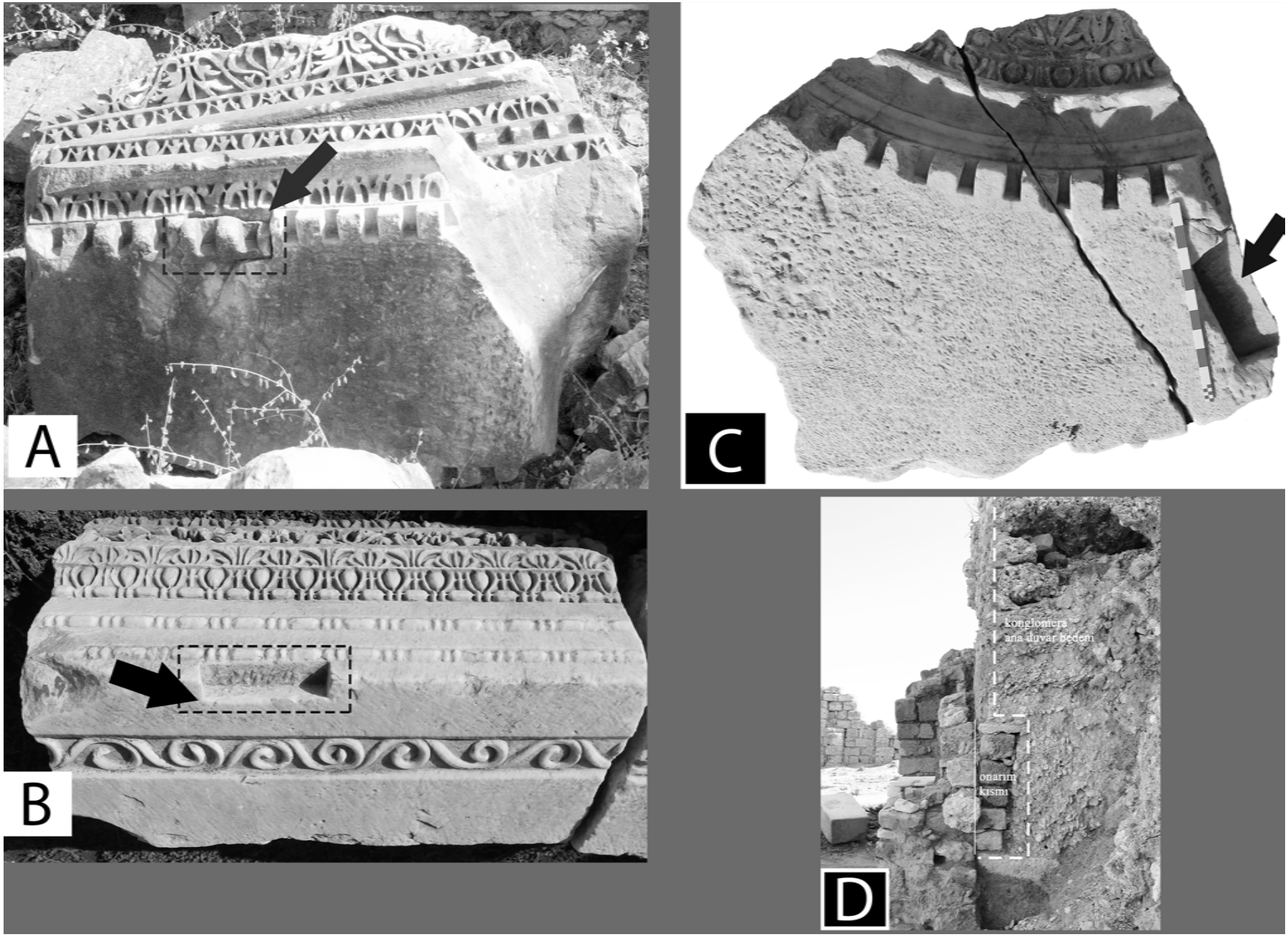

Fig. 10a-d. Traces left by Type C repairs on building elements at Side. **A:** Great Nymphaeum; **B-C:** Emperor's Hall of the Bath-Gymnasium, Side; **D:** Back wall of the South Stoa of the Gymnasium (after YURTSEVER 2021a, Pl. 41, 6; 21, 3; **D:** YURTSEVER 2021b, Fig. 11).

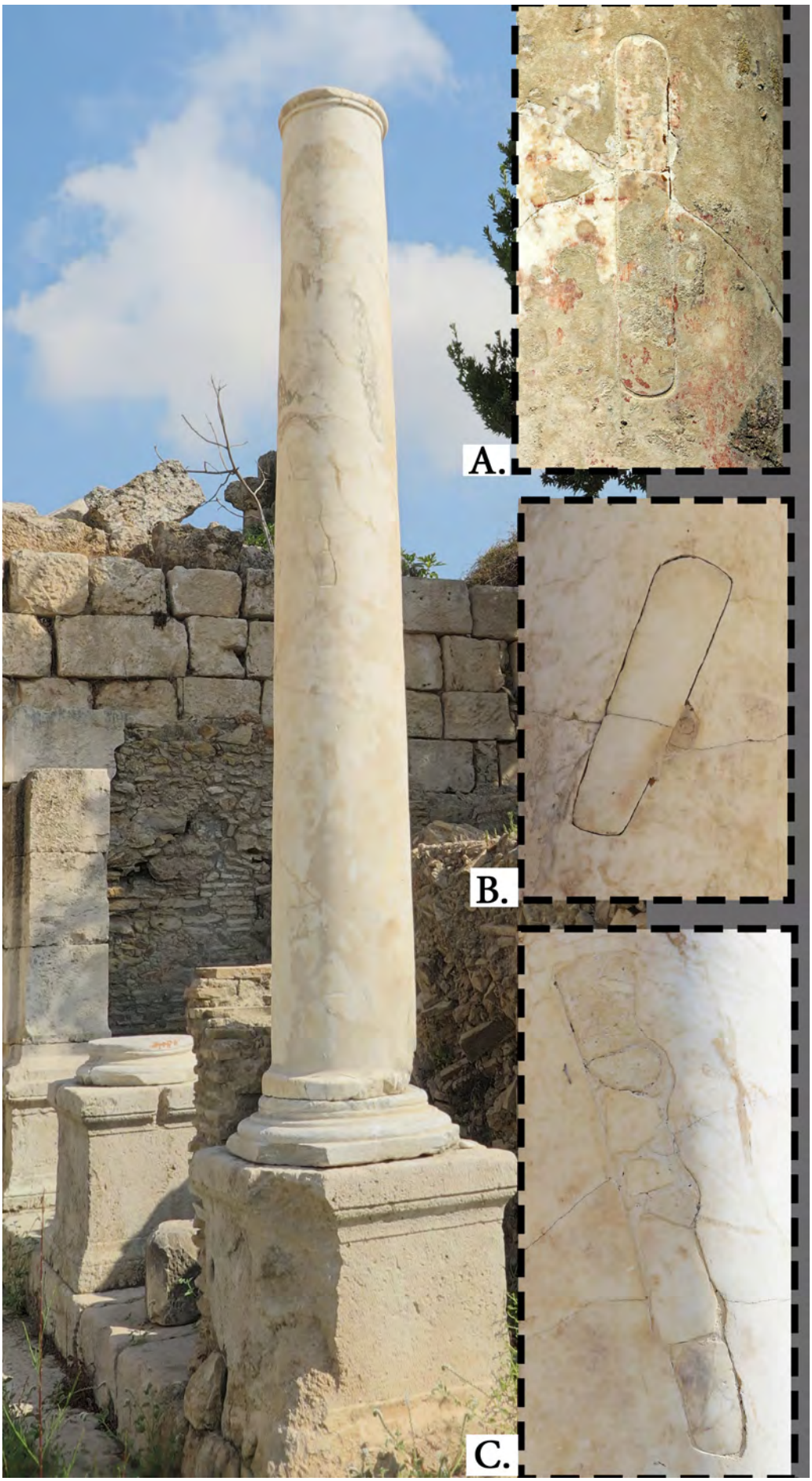

Fig. 11. Repairs on the column in the square leading to the West Gate of the east-west street in Perge.