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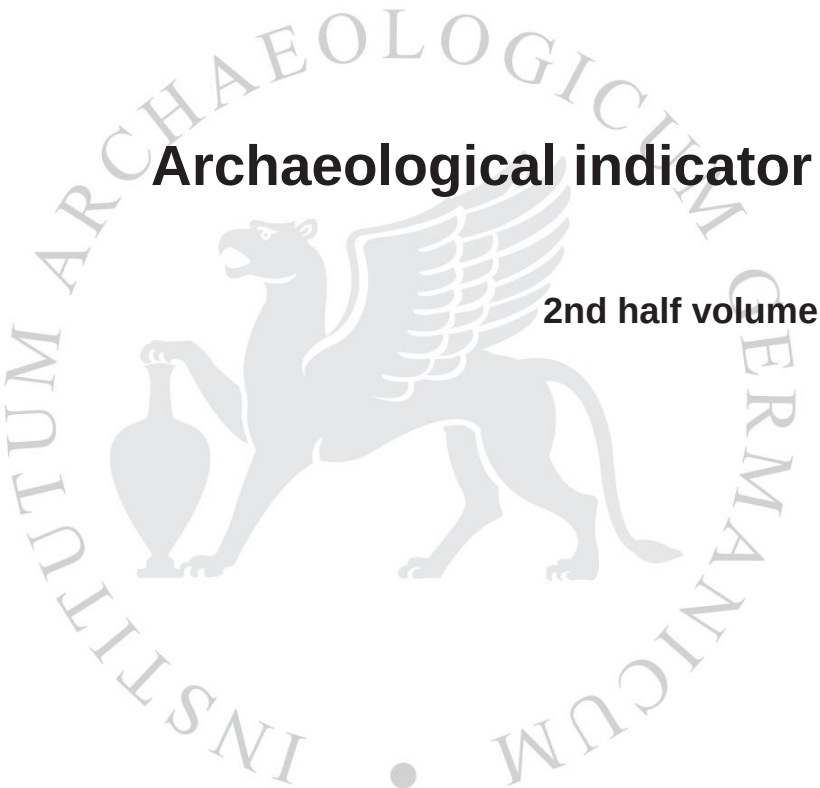

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Felix Pirson

Pergamon - report on the work in the 2014 campaign

with contributions from Martin Bachmann, Jérémie chameroy, Burkhard emme, Benjamin Engels, Ercan Erkul, Barbara Horejs, Sarah Japp, Anneke Keweloh, Eric Laufer, Rebekka Mecking, Bogdana Miliÿ, Arzu Öztürk, Peter Pavúk, Wolfgang rabbel and Wolf-rüdiger Teegen

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introduction

The work of the Pergamon excavation in 2014 focused primarily on the research program on the Hellenistic residential city as an overall urban organism. The focus was on the excavations in the newly discovered suspected rock sanctuaries on the western slope and the investigation of the southeast necropolis, both of which were completed. The same applies to the survey on the western slope of the city mountain and Boz Tepe to the west. A second field campaign took place as part of the German-Turkish cooperation project to research the Lower Agora. A new beginning was the systematic geophysical prospection of the burial mounds of Pergamon and a survey of the ancient port network of the Kane Peninsula (Kara Daÿ). The extensive restoration work in the Red Hall and the Gymnasium continued. The following will provide a brief overview of the various work areas and their most important results (Fig. 1. 2), which will provide better orientation

are listed here in the order in which they were discussed in the text:

Pergamum

- Archaeological map and 3D models
- The western slope of the city hill and the adjoining suburban area
- The eastern slope of the city hill and the adjoining suburban area
- New research on the Lower Agora
- Research on the bathing complex in the area of city excavations
- The Roman lower city and the burial mounds in front of the city

The surrounding area of Pergamum

- The prehistoric surrounding area survey
- The new survey on the Kane Peninsula (“Kane Regional Harbor Survey«)
- Visual relationships in the western valley of the Kaikos

Individual studies and processing

- Old excavations and architecture
- Found material
- Epigraphy
- Current research into the processing of finds: Italian imports in the Persian ceramic repertoire
- The found coins
- The anthropological-palaeopathological studies 2014

Preservation

- Conservation work in Pergamon in 2014

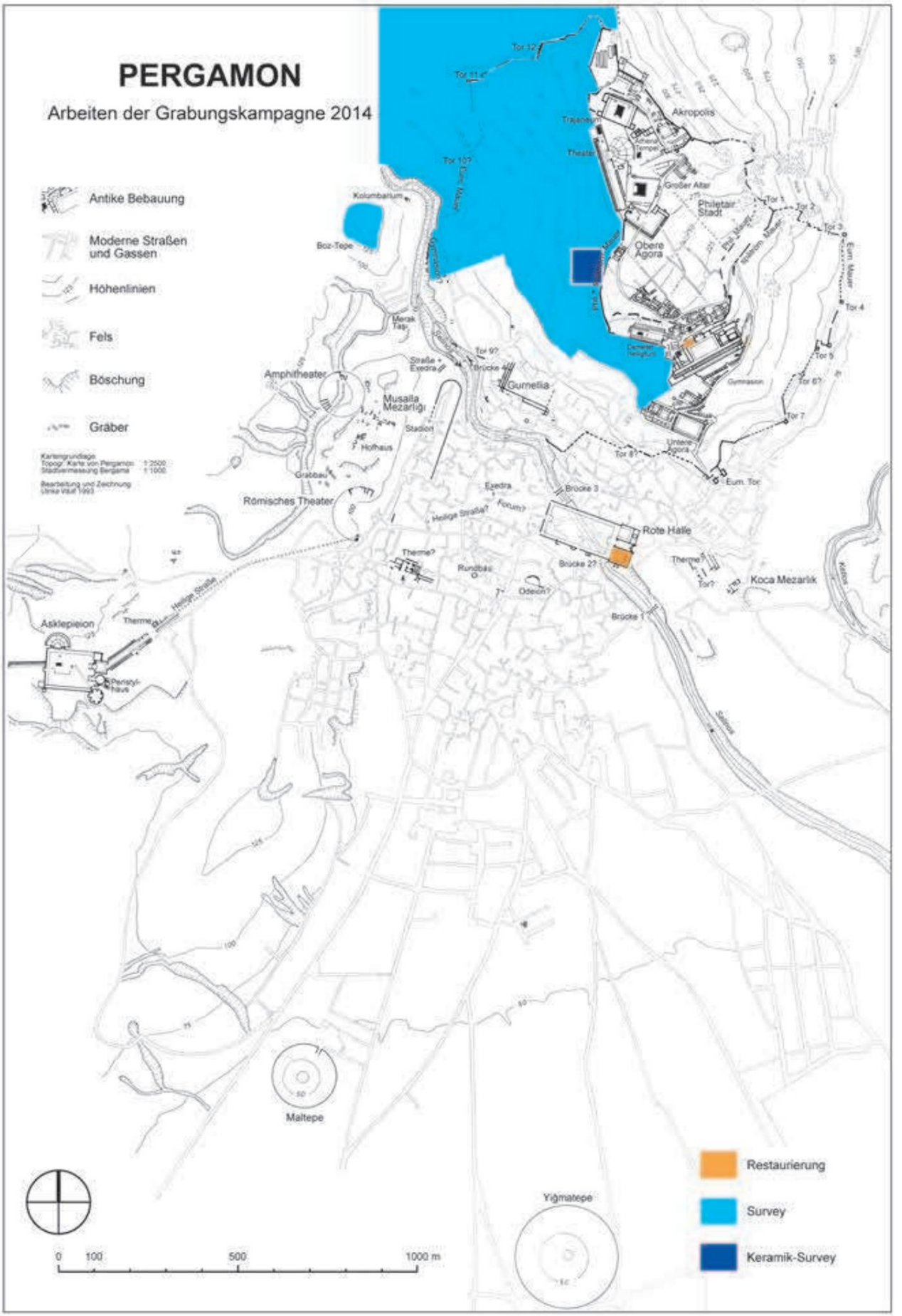


Fig. 1 Pergamon, total work areas in 2014 (M. 1: 15,000)

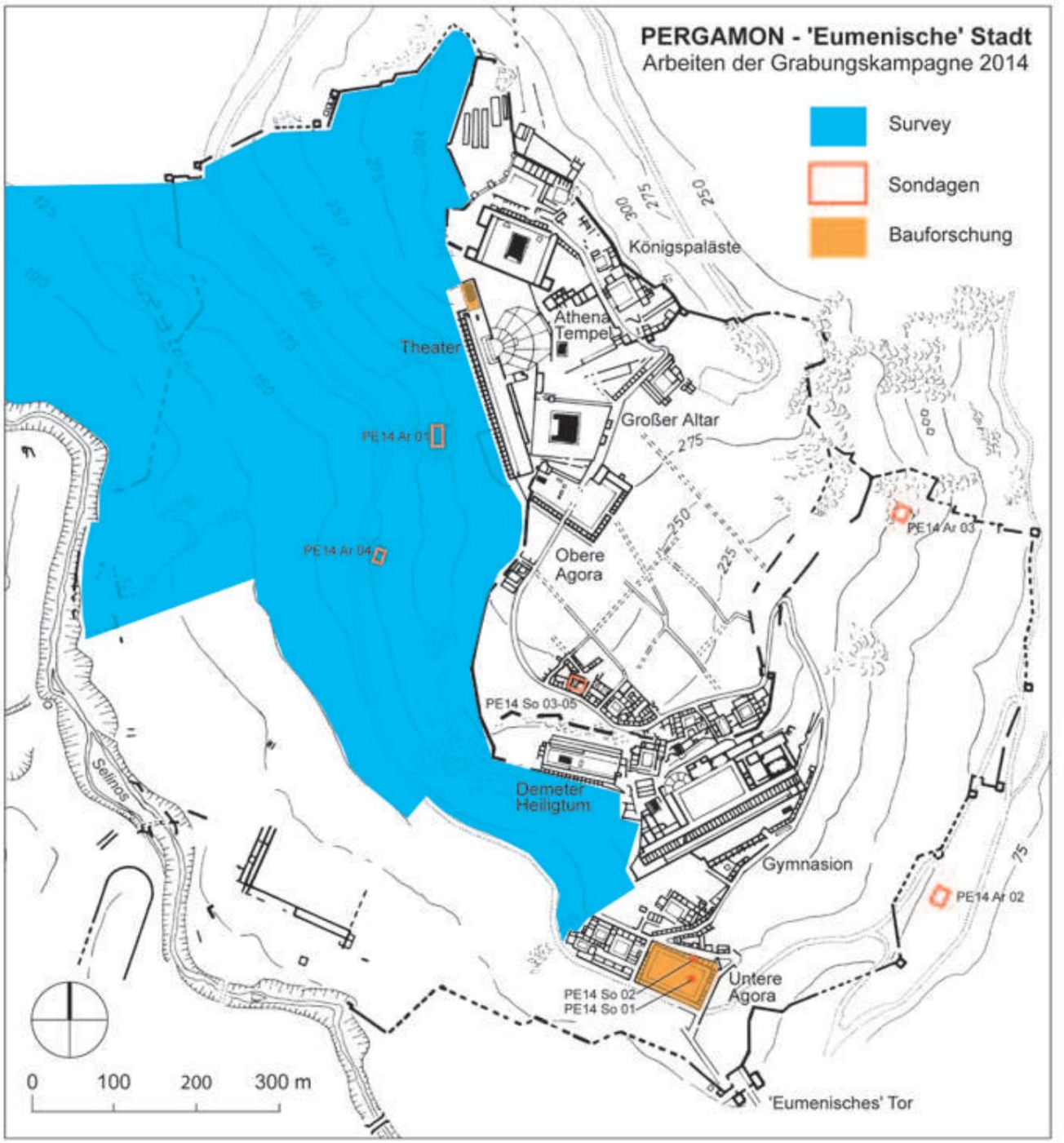


Fig. 2 Pergamon, work areas 2014 Eumenian city. Excavations, survey and building research (M. 1: 7500)

The long overdue inscription of Pergamon in the UNESCO list of world heritage sites as "Pergamon and Its Multi-Layered Cultural Landscape", which was decided in June 2014 at the 38th meeting of the World Heritage Committee in Doha, should not go unmentioned at this point. The cooperation of the responsible Turkish institutions with the Pergamon excavation of the German Archaeological Institute can be seen in several respects as a success of bilateral efforts to protect and preserve cultural heritage.

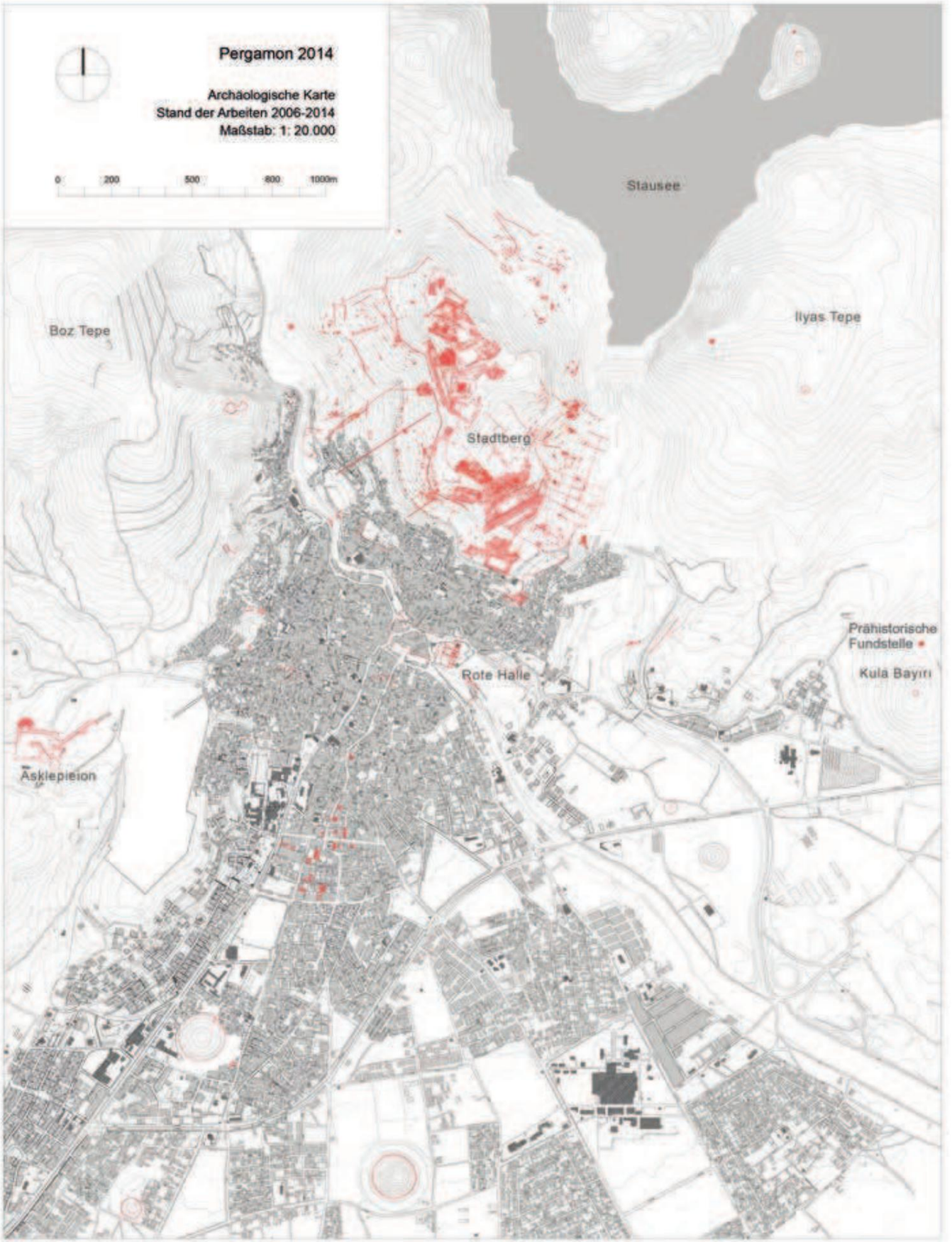


Fig. 3 Pergamon, the new archaeological map. as of 2014 (M. 1: 20,000)

Fig. 4 Pergamon, 3D reconstruction of the ancient buildings on the city mountain. View from the west

Pergamum

Archaeological map and 3D models

By measuring an approximately 500 m deep strip of terrain as the northern end of the new archaeological map of Pergamon, the recording of the topography could also be completed (Fig. 3)1 . This completes the work on site. The contour lines obtained from heterogeneous sources are currently being adjusted to each other. The next step is to standardize the plan in archaeological and cartographic terms and to coordinate the layout of the map, existing model and reconstruction model (see below). At the same time, the final work steps are currently being carried out on the existing model of the city mountain in Pergamon2 . The most recent results of the survey and excavation work on the western slope were in turn incorporated into the update of the 3D reconstruction model of the city hill (Fig. 4)3 .

The western slope of the city mountain and the adjoining suburban area

Survey

After ten field campaigns (2005–2014), the archaeological city survey of Pergamon was provisionally completed. Future work, especially on the Roman remains in the basement of the so-called
Greek Quarter (Talat Paÿa Mahallesi) on the southern slope of the city hill or in the Ottoman old town would make sense, would have to be designed as components of a new research program.

This year's work on the western slope of the city mountain (Fig. 1) included supplementing the documentation of building remains within the Hellenistic fortifications, a ceramic survey and expanding the study area to include the suburban area and the eastern slope of Boz Tepe west of the city mountain.

Of the numerous new construction findings that were discovered during the detailed documentation of the remains mapped in 2012, a sewer with stone cover plates in the extreme north of the city is particularly significant, as it is due to the nature of the cover plates (1.55 m × 0 .70 m × 0.95 m) allowed the reconstruction of another stairway parallel to the city fortifications (Fig. 5, Street 21).

1 Pirson 2007, 13. This project is being carried out in cooperation with the Institute for Geomatics at Karlsruhe University of Applied Sciences and the Institute for Geodesy at the Karlsruhe Institute of Technology. Both institutes are also involved in the documentation of archaeological sites in the area surrounding Pergamon (see below).

2 Both work steps are carried out by Ulrike Klein (Karlsruhe).

3 In cooperation with the Chair of Representation Theory (Dominik Lengyel) at the Brandenburg University of Technology Cottbus, where the uniform layout of the map, existing model and reconstruction model is also developed.

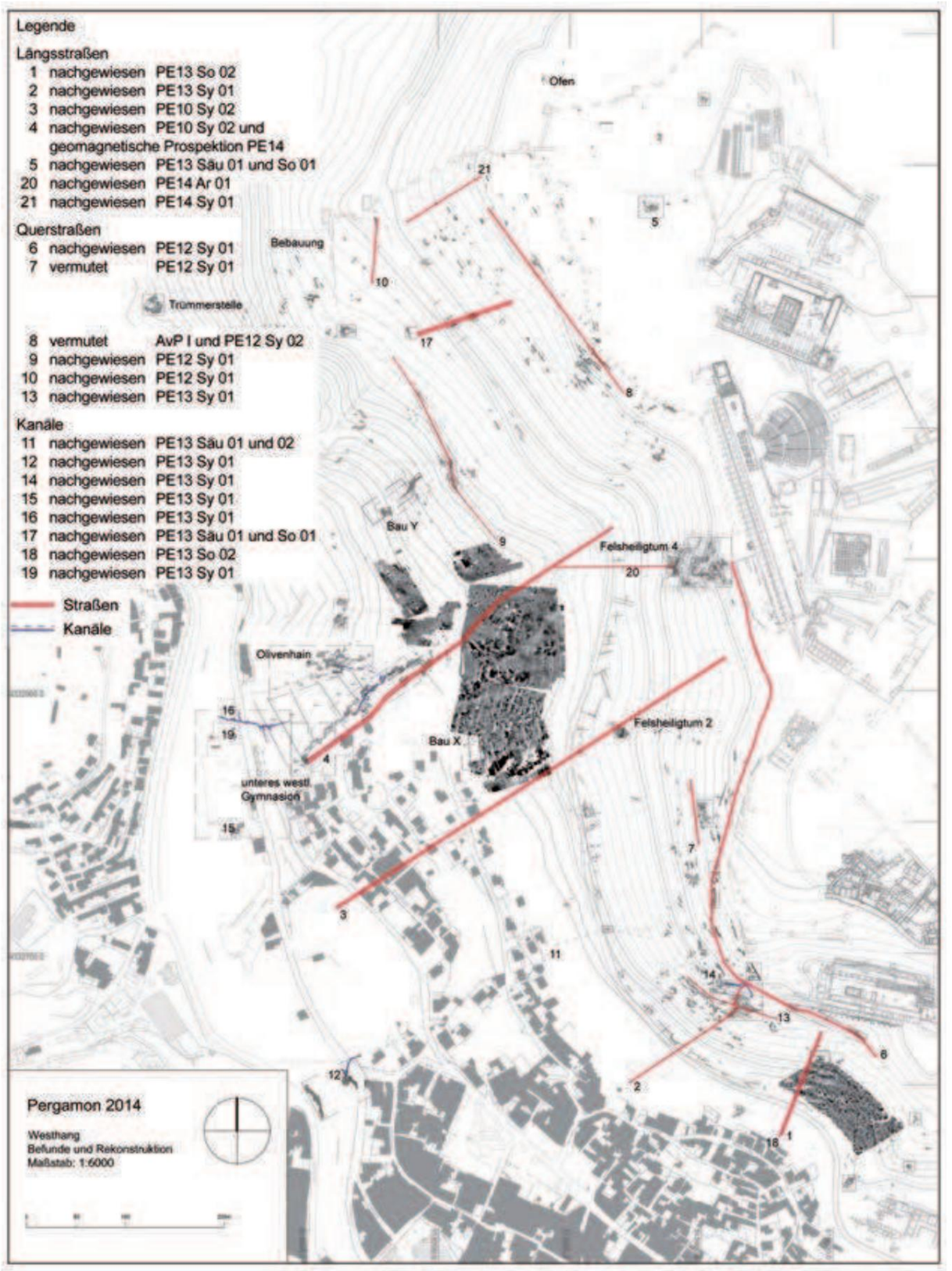


Fig. 5 Pergamon, Stadtberg. Western slope: structural findings, geophysical prospections and reconstruction of the route. as of 2014 (M. 1: 6000)

6

7

Pergamon, city mountain. Western slope

Fig. 6 Stairs. View from the southwest

Fig. 7 (modern?) lime kiln. View from the west

To the southwest of building AA4, which was researched last year, the remains of a staircase were documented (Fig. 5, site 2), which, due to its width of 1.01 m and the relatively complex stonemasonry, certainly does not belong to an alley, but rather to one (Private) building fits (Fig. 6). This finding makes it clear once again that we can expect high-quality development even in the steepest areas of the western slope.

The inspection of the suburban area on the western slope of the city hill covered an area (Fig. 1) that is bounded to the east by the boundary of the 2011 campaign survey area , in the north by a characteristic depression on the foothills of the northwest slope, bordered in the south by the Eumenian city wall and in the west by the Selinos valley (Bergama Çayÿ).
When examining this area, it became problematic that foot traffic and visibility varied so greatly between individual zones that no coherent picture of the suburban area could be obtained. Nevertheless, some observations were made that significantly enrich our knowledge of the use of the immediate area in front of the ancient city.

Below the rugged quarry area northeast of the upper northwest gate, a pear-shaped oven (diameter approx. 2 m) made of rubble stone masonry was found (Fig. 5. 7). It is probably the (modern?) lime kiln, where, according to Alexander Conze, “marble splinters were still seen recently”6 . No wall findings were observed here, which on the one hand is probably related to the ancient quarrying7 in this area, but on the other hand could also be a result of the very heavy vegetation.

However, evidence of loose suburban development has emerged in the steep and rocky terrain below the Lower Northwest Gate (Fig. 5). In addition to slope retaining walls, there are wall corners or corresponding rock formations as well as gullies in the rock, which is why we can assume that they are ancient building structures.

Towards the river valley, this zone is closed off by a rocky spur on which there is a wall support in the rock and a collection of 30 to 40 carefully crafted andesite blocks (approx. 1.00 m × 0.50 m × 0.30 m) with lifting and clamping holes were (Fig. 5. 8). The dimensions of the wall supports in the rock and the cuboids appear to be approximately coordinated. However, the supports have only been preserved sporadically, so there is no

4 Pirson 2014, 105–109 Fig. 6–10.
5 Pirson 2012, 184–189 Fig. 11.
6 Conze et al. 1912/1913, 204. The analysis of slag on the furnace wall showed that it was essentially melted rock material. Archaeometric conclusions about the intended use of the oven are therefore hardly possible. A slightly increased calcium oxide content in the slag could be related to the use of the kiln for burning lime (according to investigation report 15-009 from February 9, 2015 by the Curt-Engelhorn-Zentrum Archäometrie GmbH; editor: Ernst Pernicka and Joachim Lutz as well as further written communications from J. Lutz, to whom I am very grateful).

7 Conze et al. 1912/1913.

8th

9

Pergamon, city mountain. Western slope

Fig. 8 Site 4, collection of cuboids. View from the west

Fig. 9 orthostat block from the crepis of a tumulus(?)

complete floor plan can be reconstructed. Two flights can only be connected to form a south-facing corner. In any case, the findings suggest a massive Hellenistic building. If one takes into account its position directly above a bottleneck between Stadtberg and Boz Tepe, which adjoins it to the west, an interpretation as an upstream tower or small bastion to secure the southwest side of the city against access from the north becomes obvious. As an alternative, a grave building might be conceivable, although there are no convincing parallels for this from Pergamon, ie Hellenistic monuments made of ashlar masonry. On the western northern slope, however, building elements from a Hellenistic period were observed (Fig. 9), which most likely come from an architecturally designed tumulus and thus indicate a necropolis in this area.

The ceramic survey (Fig. 1) focused on a strip of terrain between the Upper Agora and the modern road, which offered very good ground visibility as a result of a fire. In addition, the distribution of finds in this area is not obscured by extensive heaps of excavation rubble. The aim was to gain an initial idea of the quantitative distribution as well as the qualitative and chronological range of the material found in a central area of the western slope. By using the method already used on the eastern slope of the Stadtberg8, the comparability of the results is guaranteed. During the inspection, significant differences in the density of ceramic scattering were found, with the highest concentrations observed in the less steep, upper sections near the Philetairian city wall. Since the evaluation of the found material was only carried out in 2015, no results can be presented at this point.

The investigation of the eastern slope of Boz Tepe did not reveal any clear evidence of ancient use (Fig. 1. 5); Clearly ancient finds are completely missing there. This is a significant difference from ÿlyas Tepe, which borders the city hill to the east and was examined in several campaigns9 . This year's inspection of Boz Tepe was intended to establish comparability between the eastern and western suburban areas.

In addition to two terrace walls and some rock excavations, a west-east oriented circular system with an internal diameter of approx. 38 m (Fig. 4. 10) was observed at Boz Tepe. The system is operated by two circular

8 F. Schäfer in: Pirson 2009, 156–160.
9 Pirson 2007, 40 f.; Pirson 2011, 141–143; Pirson 2014, 139 f.

Fig. 10 Pergamon, Boz Tepe. Ring-shaped complex with a central rock on the right, in the background the city mountain. View from the west

segments of double-shell quarry stone masonry, which start from a larger rock formation in the east and end at two smaller formations that serve as entrances. The nature of the masonry, which is modernly raised in places, does not speak against the dating of the complex to ancient times, but cannot confirm this either. The most plausible use seems to be in connection with livestock farming.

Excavations

The excavation work in this year's campaign on the western slope of the city mountain included, in addition to the above-mentioned cleanup at Stairgasse 21 and a cleanup at survey site 1, two excavation areas in the area of suspected rock shrines (Fig. 2).

After the suspected rock sanctuary 4 was discovered at the foot of the large rock spur on the western slope of the city mountain in 2012 and excavations began in 2013, the work in this campaign was completed (Fig. 11. 12)10 .

Access to the approx. 8 m deep terrace, which was mainly artificially carved out of the rock or its weathering material, was from the west via an approx. 1.65 m wide staircase, the top section of which is between the two rooms 1 and 2 in the north and the one in The development that was not excavated further this year runs in the southern half of the excavation area in 2013 and 2014. The alley ends to the east at the rock wall, which is designed here as a simple niche. The originally covered main channel 1 of the alley could be traced to the southern border of excavation area 1, ie to the edge of the rock terrace. A little above, branch canals from the north and south flow into it.

There is another inlet in channel 2, which runs behind or under rooms 1 and 2, which form the presumed sanctuary.

Both rooms are surrounded by very simple quarry stone walls and the natural rock. The northern border of Room 2 could not be exposed

10 We would like to thank the Fritz Thyssen Foundation for the Promotion of Science, which has already supported the investigation of the rock shrines on the eastern slope of the city mountain, for their generous support. The project is carried out by the author together with Güler Ateÿ (Heidelberg/Mainz).

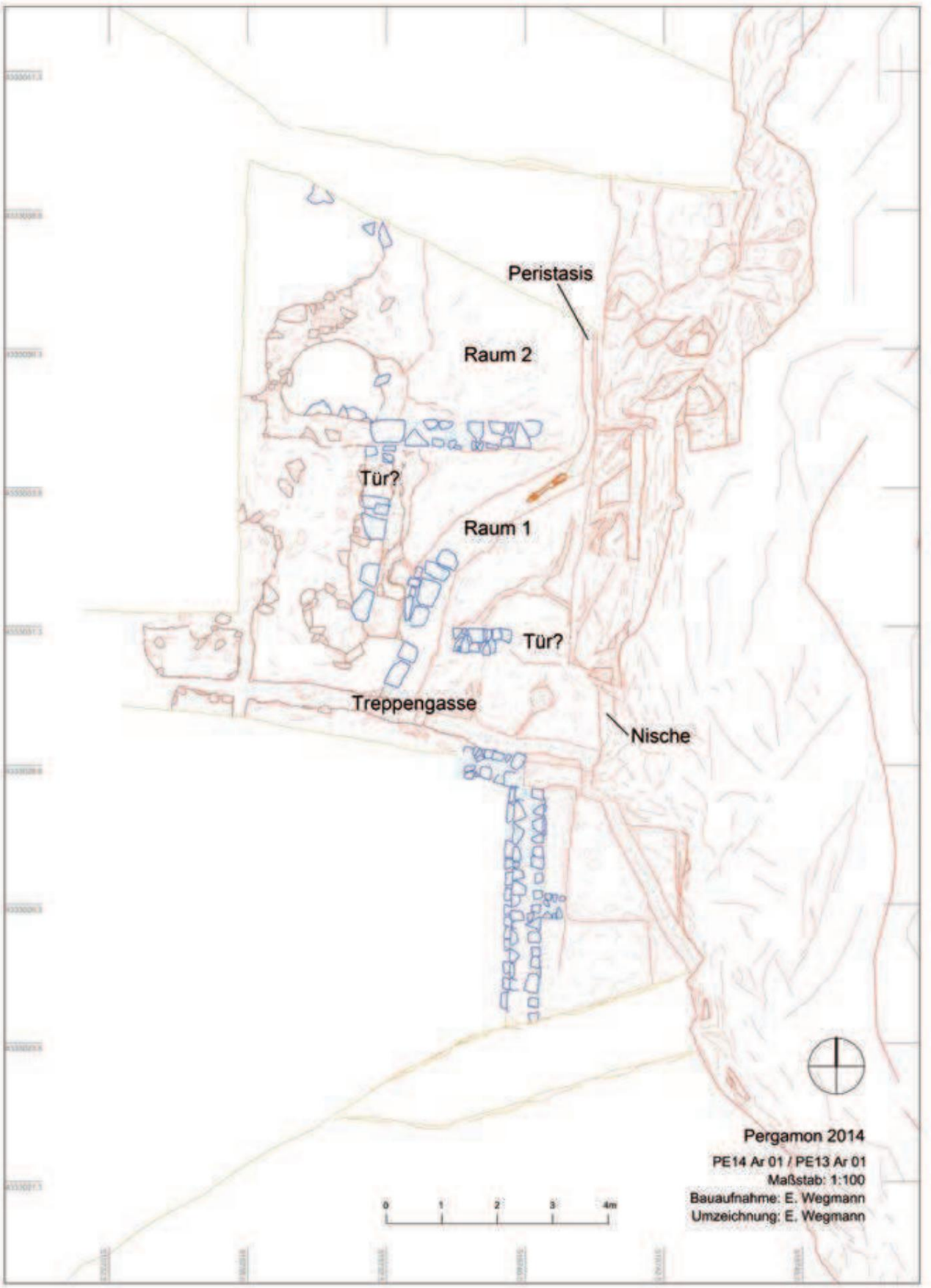


Fig. 11 Pergamon, Stadtberg. Western slope, area 1 (presumed rock sanctuary 4). Plan (M. 1 : 100)

Fig. 12 Pergamon, Stadtberg. Western slope, area 1 (presumed rock sanctuary 4). View from the west

become. The removed rock wall served as the back wall of room 1, while room 2 was closed off with a wall that is no longer preserved today and ran immediately west of the peristasis (see below). The worked rock served as the floor, and in a second phase of room 1, a horizon made of rammed earth. While room 1 is cut by channel 2, in which a clay pipe is laid in a bed of brick chippings, the channel in room 2 acts as a peristasis between the east wall of the room and

the carved rock face. A corresponding measure to keep dry is missing in room 1, but was apparently unnecessary here, as a channel above the room in the rock wall intercepted the water. The continuation of the peristasis of room 2 as a channel through room 1 is an indication of the connection between the two rooms. This is also supported by its development:
Room 1 was accessible from the west via a door from the terrace in front, which opens onto the alley to the west. Another door could have been placed in the southeast of the room, ie directly next to the niche.
Room 2 was apparently open to the terrace in its full width, which is why we assume that both rooms are accessed together from the west. They were most likely to be covered by pitched roofs sloping towards the valley.

While the base areas of rooms 1 and 2 are entirely made from the rock, the terrace in front consists, on the one hand, of compacted weathering material (so-called köveke), and on the other hand of artificial fortifications such as wall B004 and embankments made of sharp-edged, freshly broken andesite boulders we partially excavated - which is why the impression of a pit in front of room 2 is created in Figure 12.

They were probably created when the rock was removed and were immediately used to fill the area. The structural design of the heavily eroded terrace is through the southern section of a canal

which flows from the terrace into the main channel of the stairway. The branch canal and the terrace continue further south beyond the stairway, but were not followed further by the excavation there.

The excavation has provided the following information about the use of the rooms of the presumed sanctuary: In room 1, between the

13

Pergamon, city mountain. Western slope, area 1 (presumed rock sanctuary 4)

Fig. 13 Hellenistic bowl with graffiti (M. 1: 2)

Fig. 14 Fragment of a Hellenistic terracotta (portrait of a goddess?; M. 1: 2)

Fig. 15 Fragment of a Hellenistic terracotta (eros; M. 1: 2)

A heavily ash-containing layer was encountered on the artificially worked rock bottom and the upper access level. Due to its clear limitation to the room itself, it is unlikely to be the result of a damaging fire, but rather demonstrates the targeted use of fire. A relatively large amount of cooking utensils were found in the earth above and its underlining, which indicates that the room was used accordingly. In addition, fragments of drinking vessels - especially Skyphoi - and bowls were observed.

14

In room 2 the rocky floor is slightly higher than in room 1, but corresponds to the younger running horizon of rammed earth. In the following usage horizon, the proportion of cookware is lower than in room 1.
The concentration of white-ground goods, including two fragments of a pyxis, is striking. Also noteworthy is a stone bowl that sat directly on the rock floor. The room's inventory also included a completely preserved bowl (Fig. 13), which has a graffiti made up of six letters or (number) symbols, the interpretation of which has not yet been completed11 . The chronological focus of the ceramic finds from both rooms lies in the 1st century BC. BC, some forms date back to the 1st century AD. This chronological approach, which corresponds to the period of use of the rock shrines on the eastern slope12, is also supported by the coin finds (see below).

15

The very high proportion of terracotta fragments in the find material is particularly significant for the interpretation of the finding (Fig. 14. 15). A total of 241 fragments were recovered from area 01 in 2014, of which almost 70 were from the most recently described findings. If one looks at the distribution of all terracotta fragments measured in situ from area 01 - ie
approx. 40%, while approx. 60% of the small finds were only discovered during sieving - (Fig. 16), the concentration in the area of rooms 1 and 2 is unmistakable, which supports the assumption of a connection between the distribution of finds and Use of space speaks.

The evaluation of the terracottas is still ongoing, but it is already becoming apparent that their thematically relatively unspecific and wide-ranging composition finds a parallel in the ensembles of finds in the rock sanctuaries on the eastern slope. In addition to several female heads (Fig. 14) - including probably goddesses - there are sitting dolls, erotic figures (Fig. 15), dancers and various unidentifiable body limbs.

step.

Other finds worth mentioning are three complete woven weights and nine fragments of woven weights - a genre that is also well represented in the so-called grotto sanctuary13. Various lead objects or remains, including three weights (Fig. 17), provide a further parallel

on the find spectra from the suspected rock sanctuaries on the eastern slope14 .

11 According to the current status of the discussion, it is most likely a question of proportional figures in monetary and weight drachmas, which, however, cannot yet be convincingly related to the vessel or its use. Jürgen Hammerstaedt (Cologne) as well as Klaus Maresch (Cologne), Gregor Staab (Cologne), Dieter Hagedorn (Heidelberg), Sebastian Prignitz (Berlin), Victor Walser (Munich) and Wolfram Weiser (Cologne), from whom the attempt at interpretation given above I am very grateful in this context.

12 F. Pirson - G. Ateÿ - B. Engels, The newly discovered rock shrines on the eastern slope of Pergamon - an inner-city cult center for Meter Cybele?, in: K. Sporn - M. Kerschner - S. Ladstätter (Ed.), Nature – Cult – Space. files of the international colloquium Paris-Lodron-University Salzburg 20-22. January 2012 (Vienna 2015) 288. 292 f. 297 f.
13 Pirson et al. O. (note 12) 292.
14 Pirson et al. O. (note 12) 282.

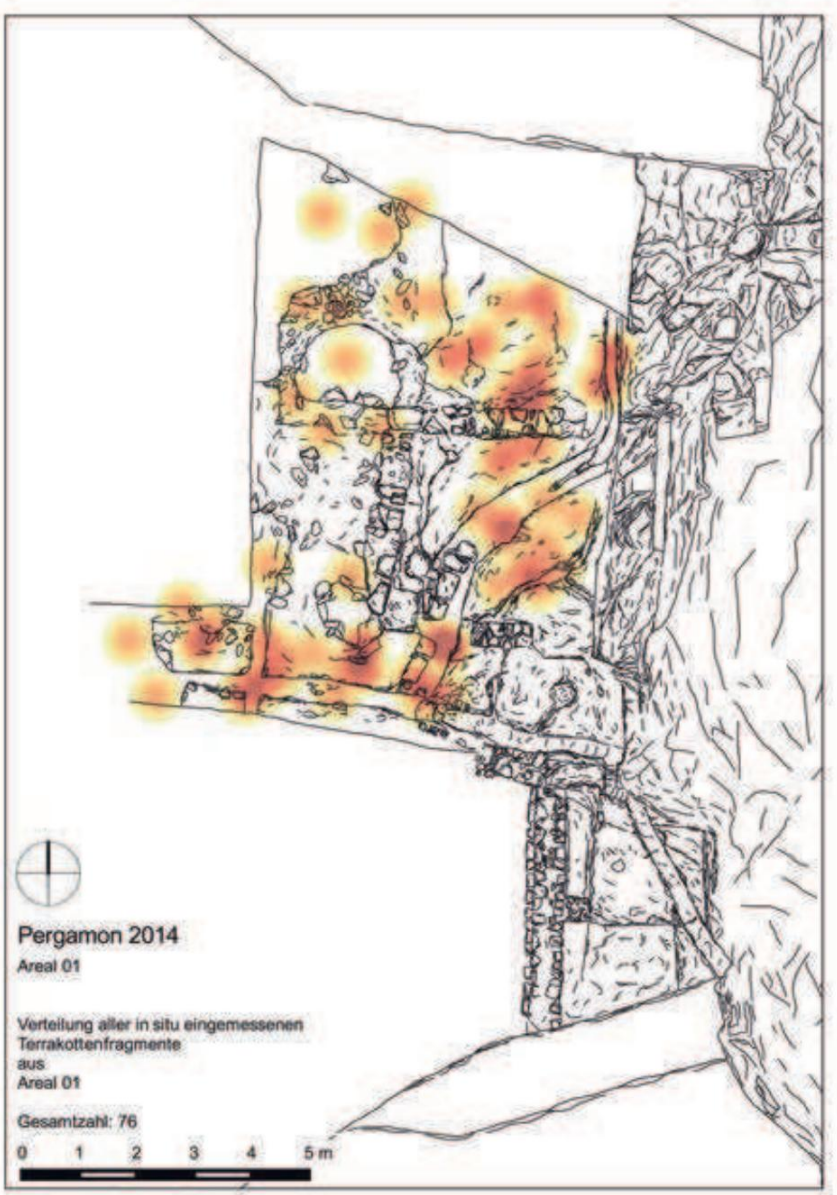


Fig. 16 Pergamon, Stadtberg. Western slope, area 1 (presumed rock sanctuary 4). Distribution of all terracotta fragments measured in situ

Fig. 17 Pergamon, Stadtberg. Western slope, area 1 (presumed rock sanctuary 4). Lead weight with stamp (rosette; size 1:1)

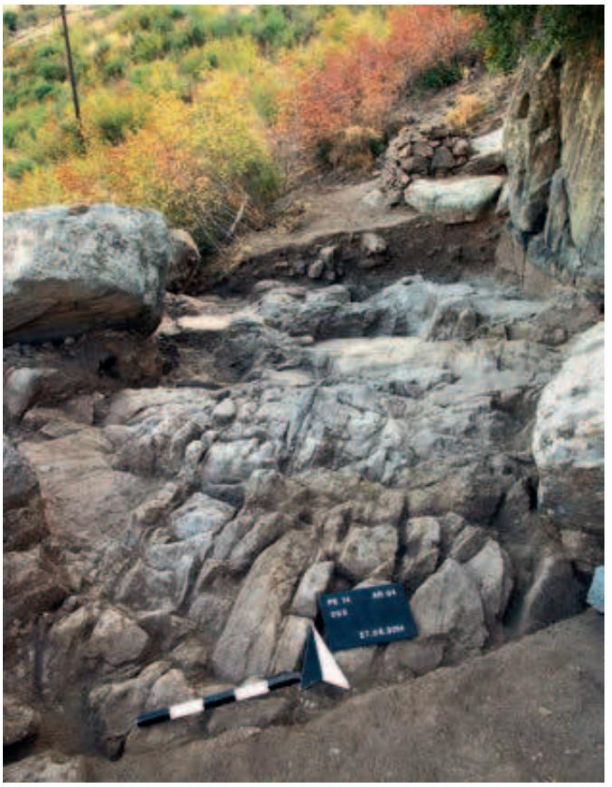
Based on the results of this year's excavation, the following can now be stated about the purpose of the facility: its exposed position with an excellent view of the Kapÿkaya sanctuary, the existence of several identically aligned rock niches, e.g. T. were not accessible for practical use, and the presence of water suggests that it could be interpreted as a cult site. However, water does not seem to have played a special role in the cult itself; The water flowing over the rock and along its sides is 'only' diverted, not collected or otherwise staged. Further positive indications for the cultic interpretation are the disproportionately high proportion of terracotta fragments and the parallels to the rock shrines on the eastern slope, both in the composition of the find material and in the period of use.
On the other hand, the place is not suitable as a place to live because of the risk of falling rocks and it cannot be used as a production facility using water because there is no continuous water supply

Fig. 18 Pergamon, Stadtberg. Western slope, area 4 (presumed rock sanctuary 2). Plan (M. 1 : 125)

given is. We can therefore assume with some certainty that a simple cult site existed at the foot of the prominent rock spur, which referred to the numinous powers of the impressive natural monument in the urban space. Room 1 could have been used periodically to prepare meals as part of the cult, while in room 2 - among other activities - votives were placed, which were visible but also protected thanks to the presumed opening of the room to the west.

As part of the project to research natural sanctuaries in Pergamon and the surrounding area, another potential cult site on the western slope was examined. The presumed rock sanctuary 2 was identified in the 2010 survey based on a very carefully crafted niche in an otherwise natural rock face15; It is located on the route of Stair Street 3 (Fig. 5), which at this point apparently leads over a rock terrace up to 7.25 m deep. The excavation in area 4 was aimed at verifying the cult site and street (Fig. 18–20). While the latter could be clearly proven based on signs of wear and significant work in the rock - ie both smoothing and depressions for the use of paving stones - the findings in the area around the niche are less clear. But there is a podium-like elevation in the rock below

15 Pirson 2011, 132 Fig. 67. 68.



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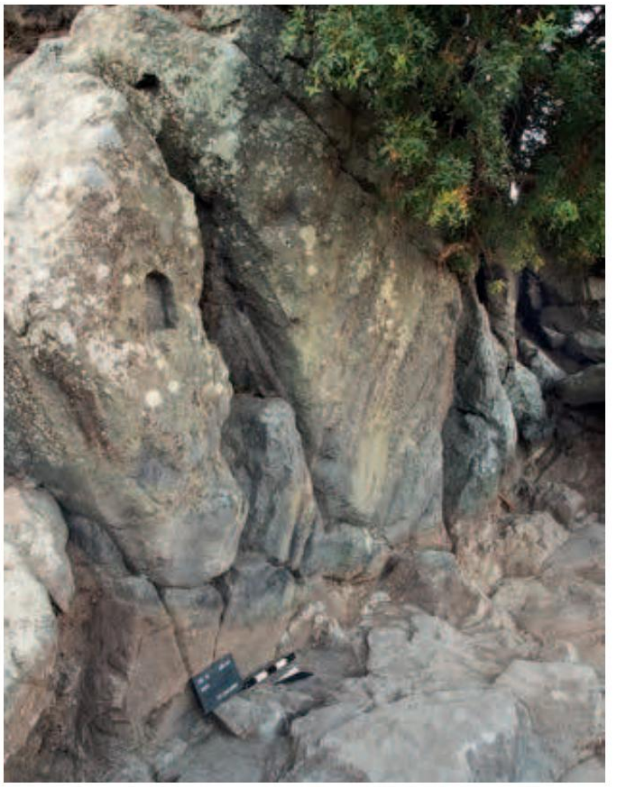

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Pergamon, city mountain. Western slope, area 4 (presumed rock sanctuary 2)

Fig. 19 surface of the road. View from the south

Fig. 20 Rock wall with a rock niche (left), underneath an artificial rock bench with a work for an altar (?; left of the photo plate). View from the northwest

Fig. 21 Fragment of a Hellenistic terracotta (bull?; M. 1: 1)

of the niche and a rectangular depression worked into this elevation (Fig. 18. 20; dimensions approx. 45 cm × 50 cm × 5 cm) towards a small altar directly below the niche.

Within the barely significant and always modernly mixed find material, the fragment of a terracotta that was found directly below the rock niche stands out (Fig. 21). The depiction of a bull (?) could be the remains of a votive from the niche or its surroundings.

The attractiveness of the square, which is reminiscent of sacral idyllic images of late Hellenism or the early imperial period16, results not least from the shady function of the rock wall into which the niche is incorporated. After a strenuous climb up Stair Street, the residents and visitors of Pergamon were able to linger here before continuing on their way to the theater. In the heat of summer, such a rest may have been reason enough to thank divine powers.

Geophysical prospecting

After geomagnetic prospections on the western slope in the 2007, 2008 and 201217 campaigns, the last accessible areas were to be examined in this campaign. When selecting them, it became clear once again that the steepness of the terrain, dense vegetation and the modern settlement, which is increasingly expanding into the ruin area, with sources of interference such as metal fences and rubbish, greatly limit the possibilities of geomagnetic prospecting

16 sz BH by Hesberg, The Munich Peasant Relief, MüJb 37, 1986, Fig. 6. 24.

17 Pirson 2008, 85–87 Fig. 4; Pirson 2009, 132 f. Fig. 4; Pirson 2013, 97 f. Execution of the work by Eastern Atlas GmbH & Co. KG. Geophysical prospecting and measurement technology (Berlin).

limit. Nevertheless, by slightly expanding the measuring areas to the north in 2007 and 2008, it was possible to trace the course further down the valley

Road 4 visible above ground should be extended to the northeast (Fig. 5), which is evident in the measurement image by the absence of otherwise densely scattered anomalies. Due to this observation, the course of the road had to be corrected: it now jumps slightly to the northeast for a second time, thus taking into account the relief of the terrain in this part of the western slope from the valley (olive grove) in the southwest and the depression of the theater in the north -east, through which it apparently runs further up the slope.

At least the new, small-scale measuring areas in the northwest could further confirm the dense development in this part of the western slope.

Results. General considerations on the urban development of Pergamon at the transition between Hellenism and the Roman Empire

After completing the archaeological field work on the western slope of the city mountain as part of the current research program, it can be stated that the assessments of the settlement structure and history that have been formulated in recent years18 have been confirmed.

The evidence of two further stairways (Fig. 5, Nos. 20 and 21) with widths of approx. 1.60 m shows that routes that had no aesthetic significance for the cityscape and did not perform any higher-level functions within the transport system, but Like No. 20, which probably only served to access a specific destination (Rock Sanctuary 04), were designed accordingly. Together with the observation of a further jump in the route of Street 4, this fits in with a relatively organic development and development of the western slope that follows the requirements of the very difficult terrain. On the other hand, the route from Stair Street 3 - whose orientation towards the main entrance of the theater terrace was once again confirmed - over an at least 7 m deep rock plateau with a simple cult site (Rock Sanctuary 2) testifies to the special functional and aesthetic importance of individual axes.

But even the findings described last cannot change the impression that the eastern slope of the city hill with a regular system of wide streets was designed to have a more representative urban appearance than its western counterpart19 (Fig. 3). In addition to the somewhat more favorable topographical conditions, the reason for this could have been the positioning of the large Hellenistic gymnasium as a key monument of the Eumenian city expansion above the eastern slope and facing the Kaikos valley, where the main traffic routes ran, the large burial mounds were placed and the most important agricultural ones cultivated areas. A preferred orientation to the south and east is also expressed in the comparison between Boz Tepe and ÿlyas Tepe, which flank the city hill to the west and east respectively: While for Boz Tepe there are at best indications of agricultural use in antiquity can (see above), there were two burial mounds and a presumed sanctuary of the Meter-Kybele20 on the group of hills consisting of ÿlyas Tepe and Kula Bayÿrÿ. In the Roman Empire, the tide seems to have turned in favor of the western side: through the expansion of the lower city and the construction of the new center consisting of theatre, amphitheater and stadium directly opposite the western slope, it became more attractive in the overall urban structure21. These considerations are, of course, still of a very preliminary nature and will need to be further deepened in the future.

18 Pirson 2013, 98; Pirson 2014, 121 f.

19 Pirson 2009, 160 f. Fig. 7; Pirson 2010, 160; Pirson 2011, 121 f. Fig. 58; F. Pirson, Hierarchization of Space? Considerations on spatial organization and its perception in the Hellenistic Pergamon and its surroundings, in: F. Pirson (ed.), Manifestations of power and hierarchies in urban space and landscape, Byzas 13 (Istanbul 2012) 206–208; F. Pirson, Hellenistics Dönem Pergamonu'nda Kentsel Alan ve ÿehircilik. Urban Space and Urban Planning in Hellenistic Pergamon, in: Pirson – Scholl 2014, 208–225.

20 see note 9.

21 Pirson 2014, 138.

The same applies to the following thoughts on the chronology of the expansion of the eastern and western slopes. With the dating of the presumed rock sanctuary 4 to the 1st century BC. A temporal connection to the corresponding facilities on the eastern slope is established in the 1st century BC. In this case, we had previously assumed that its development occurred after the construction of the Eumenian city fortifications in the first half of the 2nd century. v. BC gradually started from the Lower Agora towards the north and in the 1st century BC. BC had reached the middle section of the slope22. The most intensive use of the rock sanctuaries on the northern eastern slope23 occurred during the same period. Ulrike Wulf has shown in detail how the troubled times of the 1st century unfolded. v. BC could have had an impact on the development of Pergamon's residential development in the area of the old town, where first extensive destruction and then large-scale reconstruction can be proven24. Due to the now increasingly probable dating of the Lower Agora only to the late 1st century BC. From the 1st century BC to the early 1st century AD (see article B. Emme - A. Öztürk), the turbulent transition phase between Attalid rule and the Roman Empire gained even greater importance in the urban development of Pergamon. Because we now have to assume that, contrary to what was previously assumed, larger parts of the eastern slope were only built in the 1st century BC. BC were opened up. For the western slope there is at least evidence of expansion in the 1st century BC. BC: In addition to the dating of Rock Sanctuary 4 (see above), the intensive footfall even of its northern areas is evidenced by the filling of the canal of Brückengasse 17 (Fig. 5), which at the same time suggests the task of routing the route and possibly its construction25. The construction of the Lower Agora would then come at the end of this development and could be a response to needs

at new market areas or another public center.

What could be the reasons for the apparently massive expansion of the city?

1st century BC to have been within the boundaries of the Eumenian city wall? Mar-tin Zimmermann was responsible for settlements and cities such as Atarneus or Hatipler Kalesi as well as several fortresses in the western valley of the Kaikos and on the Kane (Kara Daÿ) peninsula in the 1st century BC. BC with punitive actions by the Romans from 85 BC. BC after the victory over Mithridates VI. associated26. But even in Elaea, where there was no interruption in settlement in the late Hellenistic period, there is a noticeable decline in the material found for the 1st century BC. BC - 1st century AD compared to the older and younger eras27. This could be an indication of a reduction in the population in the 1st century BC. BC, which was only balanced again in the high imperial period. If one takes into account the dependence of the expansion of Elaias on the military and economic needs that we have proven

Hellenistic residential city of Pergamon and the Attalid dynasty28 ,

It would not be surprising if there had been a population decline there too, at the latest as a result of the Mithridatic Wars. The very poor state of preservation of the city walls of Elaia can be seen as an indication that they were demolished by the Romans29, especially since Elaia had a central strategic position for Pergamum. And in the port city of Kane, whose investigation began this year (see the article by E. Laufer), there are signs of a decline in activities after the end of Hellenism. The question therefore arises as to whether the evident changes in the settlement structure of the area surrounding Pergamon in the 1st century BC. BC - which have so far only been found in the western valley of the Kaikos that we examined, but could be repeated in its eastern half - triggered the increasing development of the eastern and western slopes of the Pergamene city mountain and the associated establishment of rock sanctuaries. The hypothesis of one

22 Pirson 2009, 161.
23 see note 12.

24 U. Wulf, The city excavation 3. The Hellenistic and Roman houses of Pergamon, AvP 15, 3 (Berlin 1999) 200–203.

25 Pirson 2014, 117.

26 M. Zimmermann in: Pirson 2010, 181 f.; M. Zimmermann in: Pirson 2011, 152 f. 158. F. Pirson – M. Zimmer-mann, Pergamon ve Çevresi: Ekonomik Kaynaklar, Taÿra Yerleÿmeleri ve Siyasi Gücün Temsili. The Region of Pergamon – Economic Resources, Rural Settlements and Political Prestige, in: Pirson – Scholl 2014, 157–160. see also

J. Lorentzen, The city wall of the Hellenistic Pergamon. New findings on construction and demolition as well as the importance of urban development and fortification, in: Report on the 47th conference for excavation science and building research in Trier (Dresden 2014) 102–104 on the presumed demolition of the Eumenian city fortifications of Pergamon in this context.

27 Pirson 2010, 201 f.

28 Most recently F. Pirson, Elaia, the (maritime) satellite of Pergamon, in: S. Lad-stätter - F. Pirson - Th. Schmidts (ed.), Ports and port cities in the eastern Mediterranean from antiquity to Byzantine times. Colloquium Istanbul May 30 – June 1, 2011, Byzas 19 (Istanbul 2014) 339–356.

29 Lorentzen a. O. (note 26) 103 f. with note 20.

The population shift from the surrounding area to Pergamon and its certainly diverse causes need to be discussed in more detail elsewhere. However, it should already be pointed out that the growth of Pergamon in connection with changes in the microregion should not be viewed as a one-off event as a result of the events in 85 BC. May imagine. Rather, we should assume longer-term developments, such as the significant decline in settlement activity in places like Atarneus or Hatipler Kalesi or their conversion of cities into Attalid fortresses as early as the 2nd century BC. 30 BC and could therefore have influenced the expansion of Pergamon under Eumenes II.31. Likewise, the establishment of the province of Asia after 133 BC could also have been established. BC and the experiences of the Aristonikos revolt until 130 BC. 32 BC led to the abandonment of fortified places and the move to Pergamum. The extent to which archaeological evidence can contribute to a better understanding of these complex developments in the future depends not least on the further precision of the ceramic chronology, which so far often does not allow differentiating between the historical framework data mentioned here.

The eastern slope of the city mountain and the adjoining suburban area

Excavations in the so-called banquet house

In the course of investigations into the rock shrines on the northern eastern slope of Pergamon, sections of a complex were uncovered in 2010, which we have, with reservations, reconstructed as a banquet house33. Their use is probably in the context of the ensemble of several rock sanctuaries (Fig. 1). Due to the exceptionally steep slope, it is not possible to completely uncover the building, but at least the presumed main room 4, in which remains of a Hellenistic wall decoration with imitation ashlar in stucco were found, should be further examined. We hoped that this would provide us with further information on the interpretation and dating of the building.

The exposure of the space, which was buried up to 4.70 m high on the slope side as area 03 (Fig. 22. 23), resulted in a complicated sequence of collapse, backfill and alluvial layers, which will be briefly discussed below.

The ground level - a running horizon made of rammed earth - has so far only been measured in two soundings in the middle of the room and in the southeast corner at 182.09 above sea level. NN can be reached. The rest of the room is still covered with an approximately 40 cm thick layer of earth, which could contain found material from the last phase of use.

The top layer of humus and two layers of slope rubble were followed by a first wall collapse at approx. 3.00 m above the ancient access level, which, judging by its location, came from the north-west or rear wall of the room. It is embedded in another layer of rubble that extends to approx. +2.20 m. Below this, several backfill layers of similar composition were removed up to approx. +0.90 m, but they could not always be clearly separated from each other, so we have to assume that there was a backfilling process.

Since they z. Some of the buildings were heavily riddled with charcoal and contained a lot of burnt animal bones and ceramics, but no traces of fire could be observed on the walls. There is some evidence to suggest that the ruined room was filled with fire rubble, which could be accessed via the street immediately above 23 might have brought it from further away.

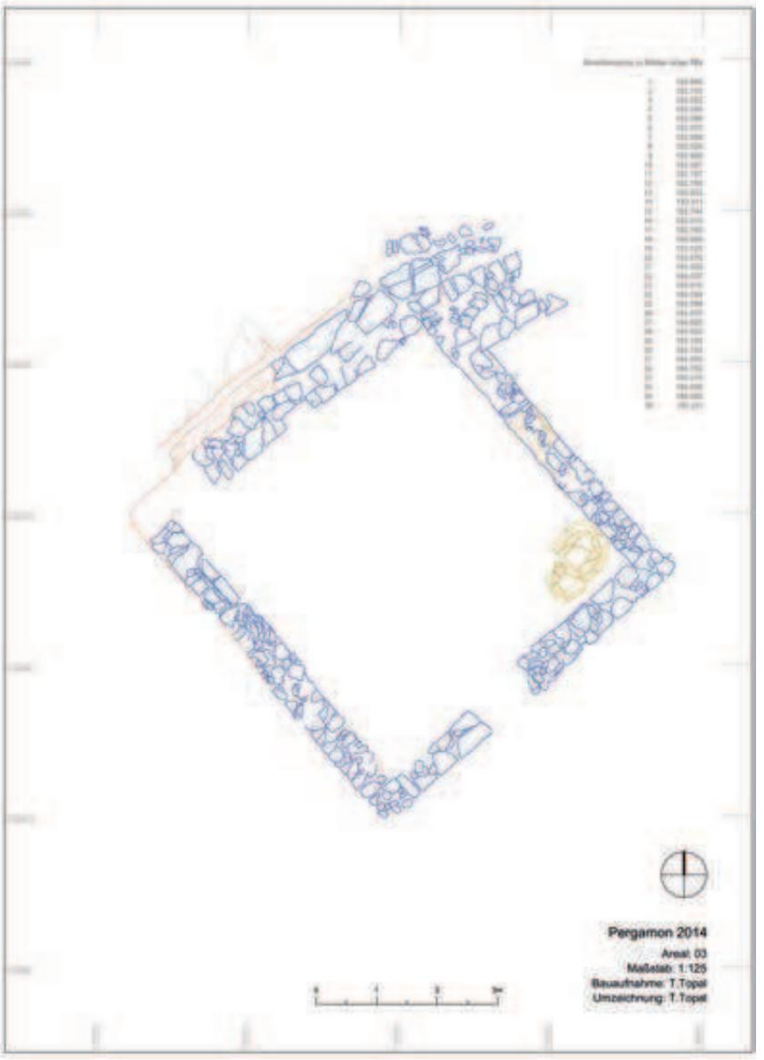
In addition to numerous large-format ceramic fragments, what stands out above all

30 M. Zimmermann in: Pirson 2011, 156–158; Pirson – Zimmermann a. O. (Note 26) 157.

31 Or vice versa: see M. Zimmermann in: Pirson 2007, 128, who describes the expansion of Pergamon under Eumenes II and Attalos II into a “new” "Center of special attraction and political weight in the region" as one of the possible reasons for the beginning of the withdrawal of the population from Atarneus in the 2nd century BC. Chr.

32 see Ch. Marek, History of Asia Minor in Antiquity (Munich 2010) 320–333.

33 Pirson 2011, 103–110.



Pergamon, city mountain. eastern slope, area 3 (presumed banquet house)

Fig. 22 Plan (M. 1: 125)

Fig. 23 View from the south

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The many small finds come to mind, which can only be shown here in a selection (Fig. 24–26)34. Particularly numerous fragments of collapsed wall decoration were found along the walls of the room in these layers.

This is followed by the collapse of the southeast wall and a layer with numerous ceramic fragments and roof tiles that reached up to approx. +0.43 m. This is the top layer of destruction, which could still contain remnants of the inventory of the room or an upper floor. An iron finger ring with a high-quality cameo (Fig. 27) was recovered from it.

The following layer of earth, which overlies the walking horizon, appears to be relatively poor in foundation and could have been washed in or blown in after the room was abandoned but before the roof collapsed completely. After evaluating the material found from the layers described here, the history of destruction and filling of the area will probably be able to be reconstructed in detail.

The excavation revealed a square room measuring 5.20 m × 5.20 m (Fig. 22. 23), which is significantly less deep than assumed in the reconstruction published in 201135. This will also have consequences for the restoration of the entire system. The rear wall has been preserved up to a height of approx. 3.33 m, while the southeast wall on the valley side only has a few layers of stone. All walls are made of a characteristic mix of quarry stone and ashlar technology. As expected for a banquet room, the entrance is slightly off-centre or shifted to the southwest; However, the initial situation has not yet been fully clarified. In the central axis of the room, a niche (57 cm × 86 cm × 26 cm) is embedded in the back wall at approx. 2.25 m above the running horizon (Fig. 28). Their location clearly speaks for a representative use such as: B. the installation of a smaller than life-sized sculpture. The surprisingly well-preserved wall decoration also testifies to the high quality of the room. Bases, orthostats, cuboids and the presumed frieze zone are still present in situ, especially on the southwest and northeast walls (Fig. 28, 29).

The upper zone will probably also be able to be reconstructed using fragments of slender half-columns and a fragment of an Ionic capital. This means that room 4 of the presumed banquet room is one of the best-preserved examples of Hellenistic wall decoration in the so-called
First Pompeian style recorded in Asia Minor. After the room has been completely uncovered and the wall decoration has been cleaned and reconstructed in the 2015 campaign, it will be presented in more detail in the upcoming preliminary report. In order to adequately secure the important finding,

Pergamon, city mountain. eastern slope, area 3 (presumed banquet house)

Fig. 24 Hellenistic terracotta (boy with dog; M. 1: 2)

Fig. 25 Hellenistic clay lamp (M. 1: 2)

Fig. 26 spore made of bronze (M. 1: 2)

Fig. 27 Iron finger ring with gem (nike with tropaion and palm branch on ship's bow; M. 1: 1)

34 Its composition and dating should be compared with the material recovered in 2010 from the southwest adjoining rooms of the suspected banquet house, which were also characterized by a high number of finds: Pirson 2011, 107 Fig. 33. 34.

35 Pirson 2011, Fig. 35.

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Pergamon, city mountain. eastern slope, area 3 (presumed banquet house). room 4

Fig. 28 rear wall with central wall niche. View from the southeast

Fig. 29 northern corner with remains of wall decoration in masonry style

Fig. 30 View of the shelter building over room 4 from the south

Fig. 31 Eastern corner with hip bathtub

36 I am very grateful to Monika Trümper (Berlin) for discussing this finding.

37 On the excavations up to 2013 see Pirson 2014, 138 with note 70, 71.

The construction of a protective structure began immediately after the excavation (Fig. 30).

Representative wall design, a floor made of rammed earth and the decentralized location of the entrance certainly fit with the assumed use as a banquet or dining room. However, the discovery of a clay hip bathtub (Fig. 22. 31)36 in the southeast corner of the room points in a completely different direction, although it could also belong to a secondary phase of use. This is supported by the remains of an ephemeral construction made of clay bricks in its surroundings, as well as the - unsuitable - combination with a floor made of rammed earth. However, the relationship between the bathtub and the rest of the room's furnishings will only be clarified once it has been completely exposed in the 2015 campaign.

Excavation of the southeast necropolis

The southeast necropolis of Perga-mon37, discovered in 2007 and further researched in 2011, was to be uncovered as completely as possible in the 2013 and 2014 camp

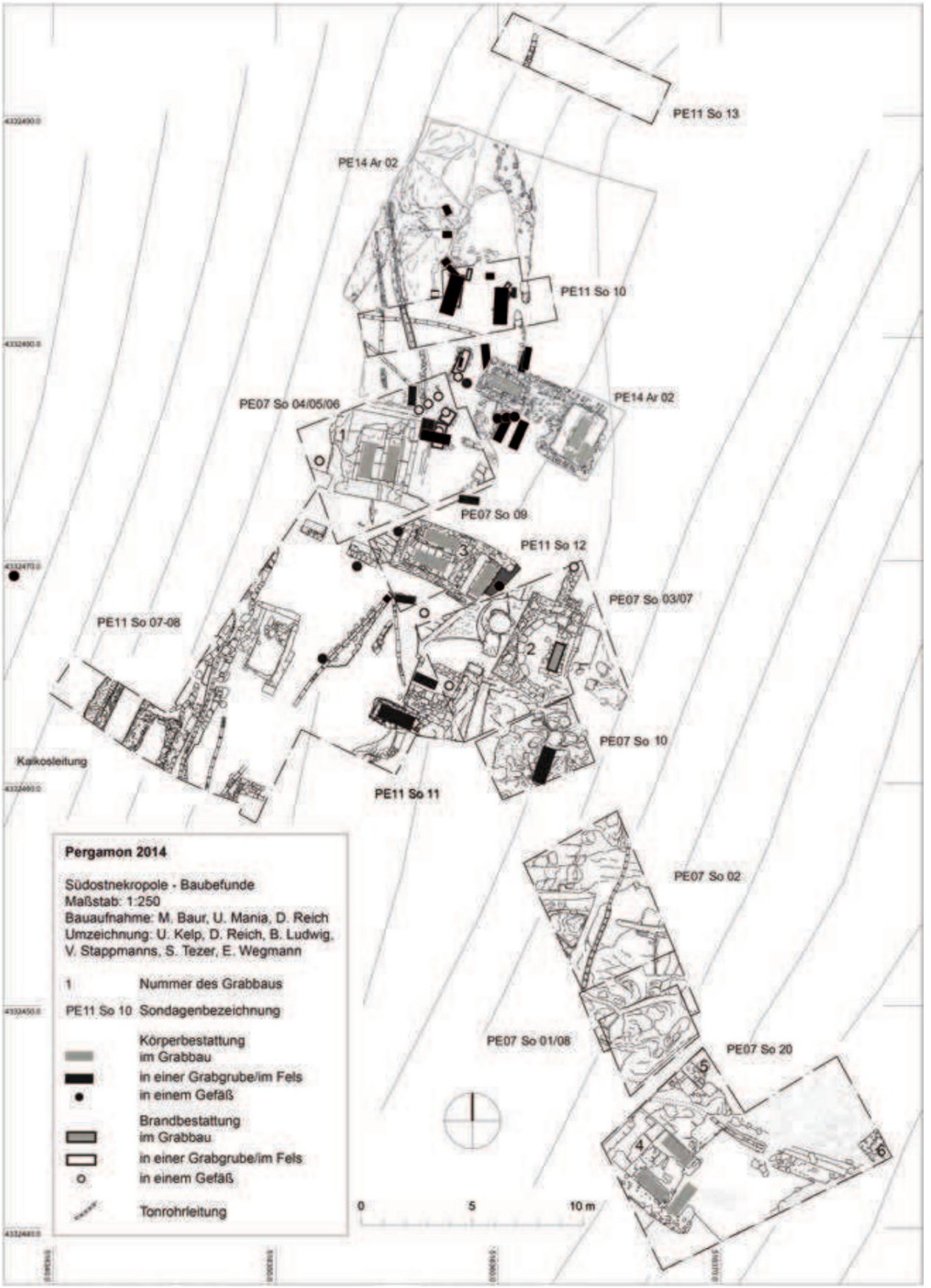

Fig. 32 Pergamon, suburban area. southeast necropolis. Plan (M. 1 : 250)

Fig. 33 Pergamon, suburban area. Southeast necropolis, view over the 2014 excavation area from the southeast

become38. With the completion of the work in 2014, which focused on the southern part of the approximately 12 m × 10 m area opened last year as Area 2, this goal was achieved. After removing the rubble layers prepared in 2013 and exposing the graves, the northern and southern boundaries of the core area of the southeast necropolis can now be clearly defined with several grave buildings (Fig. 32. 33). Northeast of the grave b and 8, an area that could no longer be excavated due to time constraints was examined using geo-radar (Fig. 32)39. There, following the grave construction, several anomalies became apparent, which are probably other burials. The anomalies thin out to the north, thus once again confirming the observation that the necropolis did not continue north beyond the large rocky outcrop on the western edge of Area 2. As the excavations in the 2007 campaign have already shown, to the east there is a rocky step down the slope without burials, on which perhaps a road ran towards the east gate (Gate 5). Only on the next lower level of terrain can grave structures be found again. For the area above or west of the excavation area, however, we had to revise our previous assumptions and now assume that the necropolis will continue up to a maximum of the Eumenian city wall.

A vessel burial was accidentally found a little above the cutting boundary (Fig. 32) and in the western profile of the excavation area, the beginnings of a block settlement indicate another grave construction.

With the completion of this year's work, the excavation project ends, so that the last-mentioned findings remain reserved for investigation by subsequent generations in the sense of an archaeological reservoir. The findings uncovered so far are also sufficient to be able to assess the necropolis with regard to the length of time it was occupied, grave types, burial customs, grave cult and grave goods ensembles. In the 2014 campaign alone, 27 graves and five other possible burials were identified. This means that we have 66 graves with around 132 deceased people in the southeast necropolis of Pergamon, as numerous multiple burials w If we add skeletal remains and teeth from destroyed burials, we have to assume up to 227 people died.

38 For the work in the 2013 campaign, see Pirson 2014, 138 f. We are very grateful to the Gerda Henkel Foundation for their generous support of the work.

39 By the Institute for Geosciences (Wolfgang Rabbel) at Kiel University.

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Pergamum, suburban area. southeast necropolis

Fig. 34 brick slab grave (tomba cappucina) **12 from the northwest**

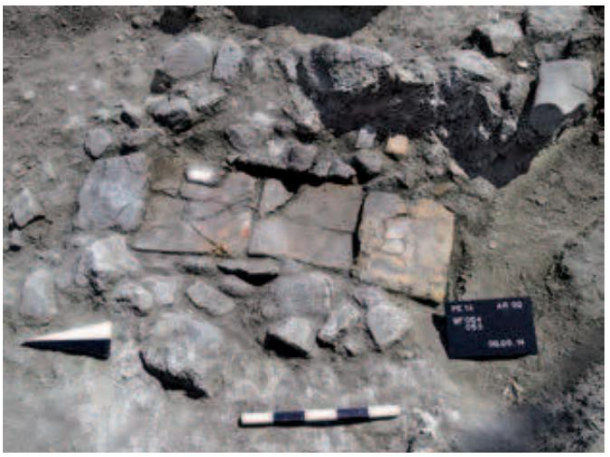
Fig. 35 Grave building 7, multiple burial 14 from the east

The graves discovered in this campaign include cremation and inhumation burials as well as isolated biritual burials. There are earth and vessel burials, graves with stone or brick settings (Fig. 34) and two grave structures (Fig. 32, 33, 35, 37). In addition to the grave contexts, in the area of grave building 8 and in the surroundings of the cluster

The bustum graves 11 (Fig. 36) contain around 21 references to cult activities or Celebrations at the grave can be observed in the form of layers of ash, animal bones and clay lamps. The bustum graves also allow the cremation process to be reconstructed down to the last detail and also offer the culturally-historically revealing combination of a female deceased with two fetuses; For a detailed presentation of the anthropological and paleopathological work, see the report by W.-R. Teegen. Deposited *cippi* were found in two places, which gives an impression of the handling of older burials and their markings. A *cippus* placed next to the cover of the lowest burial in grave building 8

(Fig. 37) could indicate that the rectangular enclosure with a barrel at the end was only subsequently created around the grave, which was originally only marked with a ***cippus* .**

The additions (Fig. 38. 39), which are usually presented as ensembles in their The original location was documented (Fig. 40), and in addition to the particularly common glass bottles and clay balsamariums, also include clay dishes, clay lamps, coins (see below) as well as jewelry and costume components.
The finds recovered from the graves this year once again confirm the socio-historical location of a large part of those buried in the southeast necropolis in the middle strata of Pergamon's imperial society.



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Pergamum, suburban area. southeast necropolis

Fig. 36 Bustum grave **11 from the west**

Fig. 37 grave building 8, cover of grave 22 from the west. At the top right is the cippus

Fig. 38 grave building 8, grave goods inventory from grave 22

Fig. 39 grave building 7, inventory of grave goods from multiple burial 14

Fig. 40 grave building 8, grave 22 from the west

For the chronology of the necropolis, essential new information was gained from the material found, but also from the systematic radiocarbon dating of skeletal remains. Grave building 8 (Fig. 32, 33, 40) can be identified using a coin from the period between 40 and 60 AD as an accessory.

The burial of the main burial (Fig. 38) probably dates back to the 1st century AD. Apparently only after the collapse of the half barrel, which we can reconstruct as a cover for the complex, were several additional burials made. Grave building 7 (Fig. 32, 33, 35) has an astonishingly long period of use. At least ten individuals were buried in its brick-built grave, ranging in age from neonates to adolescents to adults of both sexes. The glass vessels and a clay bowl that were deposited at the end of the burial site's use belong to the 3rd century AD (Fig. 39). The oldest burials could be dated to the Augustan period based on 14C samples; This large time span could also explain the appearance of a Hellenistic coin in the tomb. However, there is some evidence to suggest that these early burials were subsequently incorporated into a younger grave building, which can be placed relatively chronologically after grave building 8. While we thus grasp the early phase of the necropolis, it marks an imprint from the middle 4th century. AD (Constantius II/

Julianus Caesar, 355–360 AD) from grave 15 of the 2011 campaign 40 the end of the occupancy. We expect more precise information on the length of time the necropolis was occupied and the construction of individual graves from the pending evaluation of the find material and the 14C dating of further selected skeletons from single and multiple burials. The potential of the latter method, in particular for the absolute dating of the occupancy sequences in the multiple burials, is already impressively supported by the results already available (see article W.-R. Teegen).

In addition to the graves and grave buildings mentioned, there were also again in 2014 Various structural findings were uncovered that have no direct connection with the use of the site as a necropolis (Fig. 32, 33).
First of all, there are several clay pipes that are both older and younger than the adjacent burials. Most of them are already known from the excavations in 2007 and 2011 and therefore no longer need to be presented in detail here. This meant that the culturally and historically informative parallel use of the south-eastern slope, on the one hand, as a burial site, and, on the other hand, for bringing water from a - admittedly only hypothetically assumed - collector of the Kaikos pipeline and/or from the spring area on the northern eastern slope could be confirmed again41 .

The most striking architectural finding is the double-shell wall B001, which has been preserved over a length of approx. 5 m and is up to 0.85 m thick (Fig. 32. 33). It runs roughly in a north-south direction and almost follows the edge of the slope. The use of spolia and sinter fragments from the Kaikos pipe indicate a relatively late creation of this slope retaining wall, which intercepts earth material that overlies the grave layer.

The polygonal wall B013, which rests on or is placed in front of the rock and was found to be approximately 2.5 m long (Fig. 32. 41), dates back to a much earlier phase (Fig. 32. 41). It could be another remnant of an older suburban development before the site was used as a necropolis; Corresponding findings were already observed in the excavations in 2007 and 201142. We hope to be able to make the dating of this wall more precise by evaluating the material found from the adjacent layers.

40 Pirson 2012, 194 Fig. 26.
41 Pirson 2012, 190–193.
42 U. Mania in: Pirson 2008, 112–114; Pirson 2012, 193.

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Fig. 41 Pergamon, suburban area. southeast necropolis, polygonal wall B013 from the southeast

new research on the Lower Agora

This year's work on the Lower Agora focused on the eastern courtyard area and the adjacent rooms. At the same time, the material found from the previous year's investigations was evaluated43. The following will provide a brief overview of the type and scope of the work. The preliminary results are then summarized in a separate section on the chronology of the plant.

Sondages

Even before the work began, a striking foundation line made of light gray andesite blocks was observed in the eastern courtyard area of the Agora, which runs for a length of approx. 8 m in a north-south direction before it turns to the west at its northern end, where it ends after 2 m meets a gully that runs here in a southwest-northeast direction (Fig. 42). The foundation structure had already been shown in schematic form in the plan of the old excavation. However, there is no further explanation in Wilhelm Dörpfeld's report for the striking fact that the Byzantine church overlaps the foundation. Therefore, Sondage 1 was built at the angle of the L-shaped foundation on both sides of the foundation of the northern outer wall of the church with the aim of clarifying the dating and purpose of this foundation (Fig. 43). In the course of the excavations it soon became apparent that the area was disturbed by Byzantine graves right down to the deeper layers. An undisturbed earth burial was uncovered south of the church wall. To the north of the same wall, the stone surround of another Byzantine grave made of spolia was already visible before the excavation began, which turned out to be massively disturbed when it was uncovered - presumably due to the old excavation44. This grave enclosure had in turn been sunk into an older grave, which consisted only of a simple earth burial without an enclosure. Since the existing ground was reached below the graves, the area on both sides of the church wall did not provide any dating material for the construction of the L-shaped foundation.

43 B. Emme – A. Öztürk in: Pirson 2014, 127-131.

44 The cursory reference to graves without grave goods implies that at least some of the superficially visible graves with a border were excluded from the old excavation: W. Dörpfeld, The Works on Pergamon 1900–1901. The buildings, AM 27, 1902, 33.

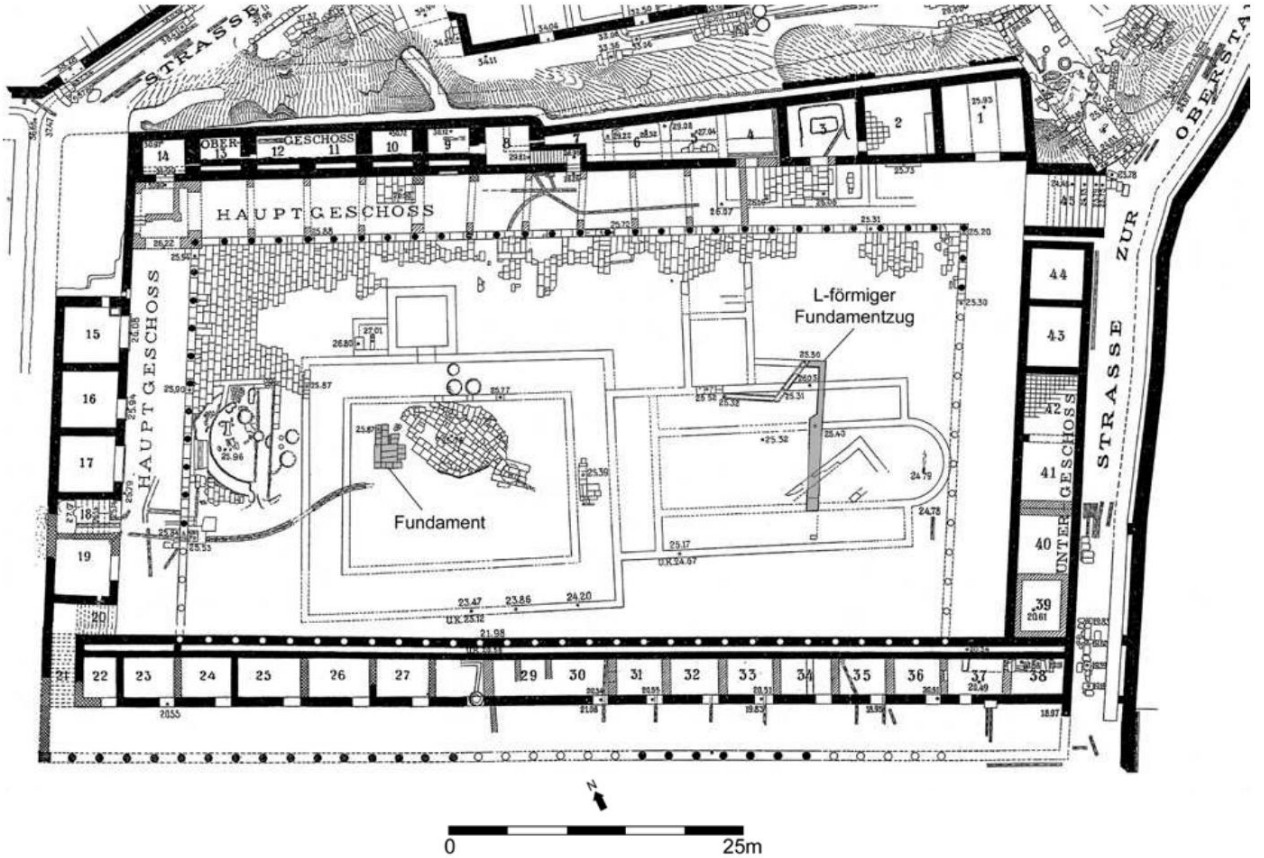


Fig. 42 Pergamon, Stadtberg. Lower Agora, plan according to Wilhelm Dörpfeld. Presumably ancient structures in the yard gray tinted, in the east the L-shaped one Foundation pull

The southern section of the probe also did not yield any dating material, but it did provide important insights into the construction of the L-shaped foundation. As was no longer comprehensible in the northern area due to the disturbances, its construction consists of a shell of light gray andesite blocks, which, with a thickness of approx. 50 cm, form the eastern outer shell. The blocks are only roughly smoothed and have no bracket or dowel holes. Some of the cuboids are also heavily weathered on their upper side. This bowl was originally backed on its full length on its western inner side with a backing 60 cm thick made of large-format boulder stone, which consists of light gray andesite and is set in earth mortar. The generous dimensions and the solid construction of the structure as a whole indicate that the foundation was originally supported by a structure with a...

The wall must have been of considerable size with a thickness of approx. 1 m. The further shape and function of this structure can be discussed in view of the Due to the poor state of preservation, we can only speculate for now. Due to its location and nature, it can be assumed that the associated building is older than the hall complex of the Lower Agora (see below).

A second sounding (2) was undertaken in the eastern area of the northern courtyard south of room 3. The old excavation had already observed an installation of three chambers here, of which the middle one was equipped with a slab covering made from reused slabs of courtyard paving (Fig. 42). The primary aim of the work was therefore to obtain dating material for late installation. Given the PE13 So 05 probe carried out last year in the western area of the North Hall, there was also the expectation that deeper areas would be undisturbed

Fig. 43 Pergamon, Stadtberg. Lower Agora, sondage 1 after completion of the excavation work. View from the east

Fig. 44 Pergamon, Stadtberg. Lower agora, sondage 2. north profile with two successive filling layers

To cut layers of the hall floor from the construction period and in this way to further specify the dating of the first construction phase of the Agora.

Below the late pavement, a massive fill layer with a high proportion of large-sized fill material was initially encountered (Fig. 44).
This was followed by a second, significantly lighter layer of filling, which, based on its level, presumably shows the lining of the original hall floor. When this layer was removed, a strand of clay pipeline was exposed at the northern and southern cutting edges.
Finally, it seems remarkable that, in contrast to the probe carried out last year in the western area of the North Hall, PE13
So 05 no dense sequence of several running horizons could be detected in the eastern part of the north hall45. A possible explanation is the early abandonment of the eastern section of the Agora North Hall, which can be deduced from other observations (see below).

45 B. Emme – A. Öztürk in: Pirson 2014, 130 Fig. 38.

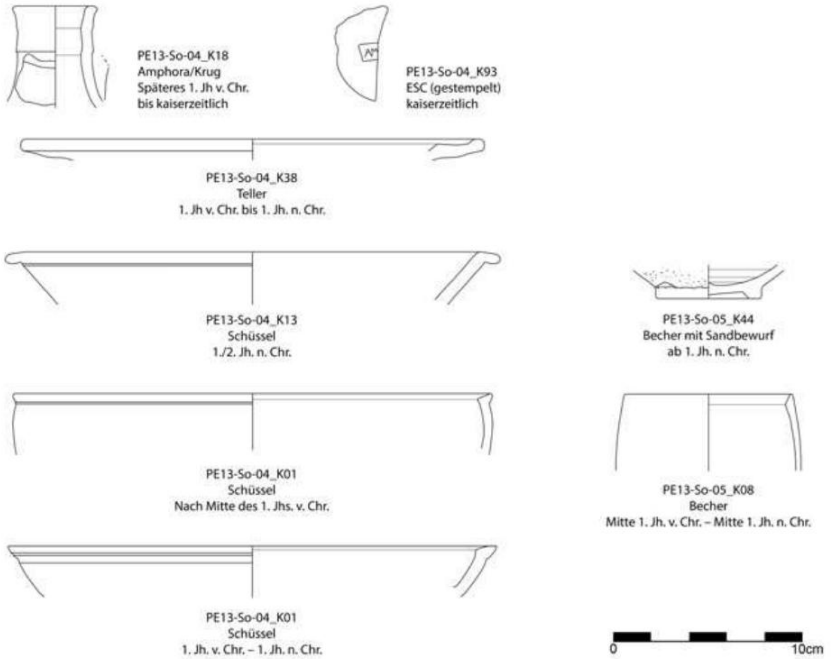


Fig. 45 Pergamon, Stadtberg. Lower Agora, late Hellenistic-Early Imperial period ceramic finds from subfloor findings from the sound of the 2013 campaign (M. 1 : 4)

Find processing

Important results for the dating of the first construction phase of the agora were obtained by processing the find material from the previous campaign. The corresponding results are briefly summarized here.

Sondage PE13 So 03 in the western courtyard area provided only small amounts of datable material from undisturbed layers. However, individual sherds indicate that the earliest construction work in this area dates back to the late Hellenistic to early imperial period. The most recent piece from the layer referred to as the terracing of the courtyard area is the fragment of a rotella handle from Eastern Sigillata C, which can date back to the early imperial period46 .

In Sondage PE13 So 04, the lining of the original floor was removed in the northeast corner of room 3747. Numerous fragments of Eastern Sigillata C from the underlining indicate that the soil dates to the late Hellenistic period (Fig. 45)48. Two strands of a clay pipeline were also found under the floor, the pipe sections of which were based on the typology developed by Kai Wellbrock can be attributed to the dovetail-shaped foot socket type D. The type was found elsewhere in the city in building contexts that date back to the middle 1st century BC. 49 BC. Small quantities of Eastern Sigillata C-Ware and a lamp fragment were also recovered, pressed into the surface of the soil, dating from the late 2nd century BC. BC can extend into the early imperial period. The significance of this observation arises from the structural context of the findings mentioned. Contrary to the assumption expressed in the previous preliminary report that the floor could possibly be assigned to a later repair50, there is in all probability a construction period context. Contrary to what is suggested in the plan of the old excavation (Fig. 42), the eastern wall of room 37 does not appear to be secondary in any way in its technical preparation made of carefully crafted cuboids, although it is the one that has been preserved

46 For terminology see B. Engels – S. Japp – A. Keweloh in: Pirson 2012, 251–255.

47 B. Emme – A. Öztürk in: Pirson 2014, 128 Fig. 36.

48 Furthermore, an amphora stamp: […] ÿÿÿÿÿÿ. See Ch. Börker – J. Burow, The Hellenistic amphora stamps from Pergamon, PF 11 (Berlin 1998) 116 No. 536–538 (dated to the 3rd quarter of the 2nd century BC).

49 K. Wellbrock in: Pirson 2012, 103–105.

50 B. Emme – A. Öztürk in: Pirson 2014, 129.

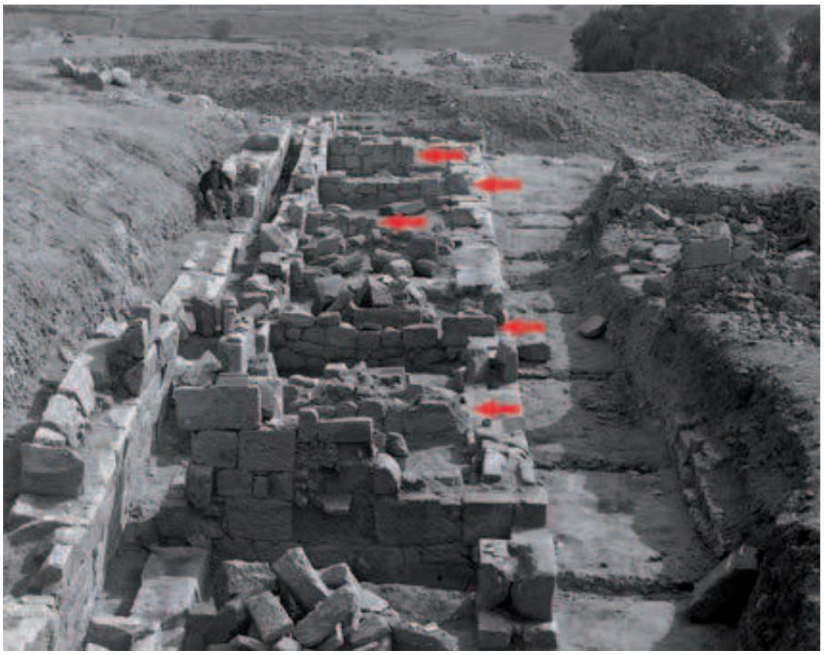


Fig. 46 Pergamon, Stadtberg. Lower agora, south hall immediately after the excavation with details of the secondary transverse walls made of roughly worked stone material (arrows). Opinion from the west

the lowest layer of the wall is not integrated into the rear wall. In contrast, the transverse walls in the central and western part of the south hall, which were actually drawn in secondary, had rough masonry using spolia at the time of the excavation (Fig. 46). There is therefore no reason to assume that the found material from the floor area of room 37, which can be dated uniformly down to the lowest layers, should not be attributed to the first construction phase of the complex.

As part of the PE13 So 05 probe, two findings were removed in the western part of the north hall that are important for the chronology of the complex. This involves lining the hall floor and filling the foundation pit for the stylobate of the courtyard halls (Fig. 45). From the first-mentioned finding comes a fragment of a jug with sand thrown on it (late 1st century BC - 1st century AD).
In addition to fragments of Eastern Sigillata C, fragments of (early) imperial-era kitchen and storage vessels also come from the stylobate backfill that was certainly built at the time. The found material from the area of the north hall also points to the building being dated to the 1st century BC. BC/early 1st

Construction work In the 2014 campaign, construction work on the Lower Agora focused on the eastern part of the complex. The work on the findings plan that began last year as well as the drawings of the structural members continued. A view of the eastern terrace wall was also created.
The ongoing work is providing initial insights into the construction process, which, against the background of the aforementioned dating, shed new light on the development of Pergamene architecture at the transition from Hellenism to the Imperial period. Three important aspects are building materials and technology as well as the organization of the construction

The building material of the Lower Agora consists exclusively of local building materials. The andesite used in the basement and main floor was the predominant building material in Pergamum at all times. This applies to both

51 More on the following B. Emme – A. Öztürk, The ›Lower Agora‹ of Pergamon. The Organization of a Major Building Site in Roman Asia Minor (in press).

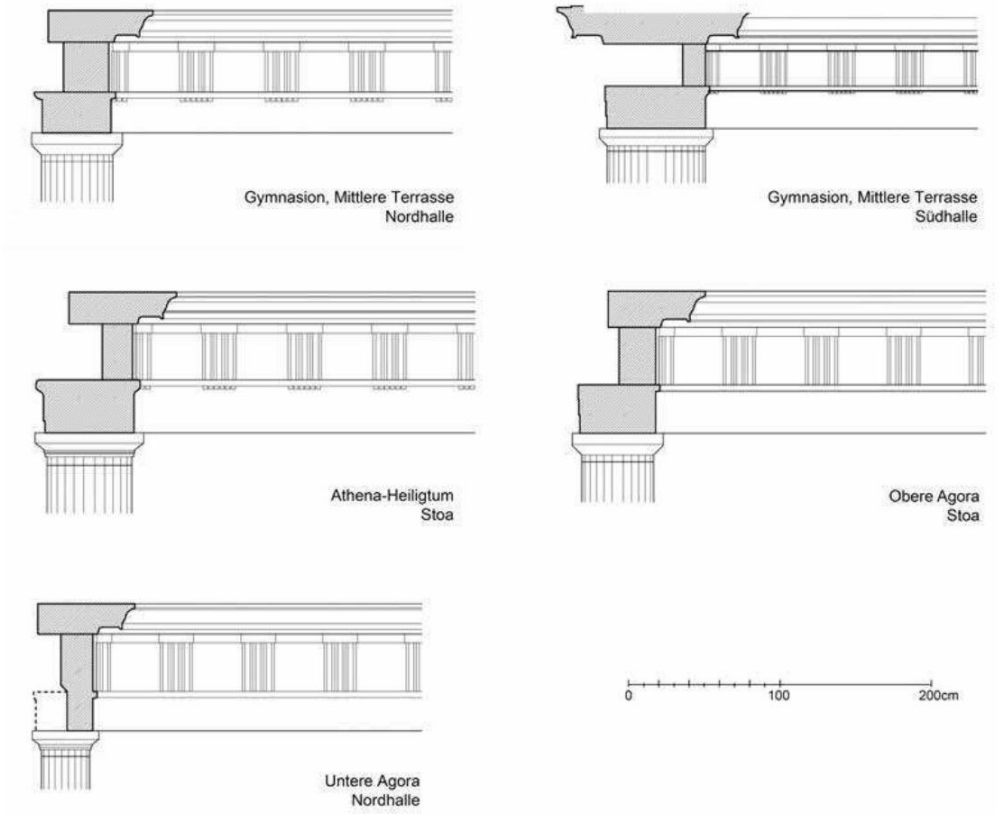
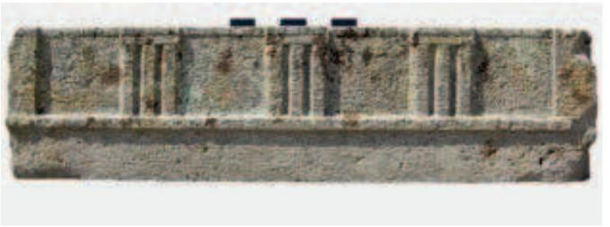


Fig. 47 Pergamon, Stadtberg. Lower Agora, compilation of Hellenistic beam constructions (M. 1: 50)

for the Hellenistic stone buildings on the city hill as well as for numerous caementicium constructions from the Roman imperial period. The limestone used for the upper floor has also been found in Pergamon since the late Classic period. The material was probably quarried on the south side of the Pergamene Plain and therefore also represents a local material52 . Unlike later public buildings of the High Imperial Period, no marble was used in the Agora. However, the use of white limestone on the upper floor suggests that a color contrast between the two components of the facade was intended. A similar solution using imported white marble is shown in the nearby house of Consul Attalos53. Wood also played an important role as a building material, as can be seen from the way the beams were constructed (Fig. 47). The architraves have an inlay a few centimeters deep on their back up to half the height. Dörpfeld had already rightly assumed in his reconstruction of the building that this preparation must have served to accommodate a second beam, which lay at the back of the architrave and served as a support for the crossbeams.

The small dimensions of the incorporation on the backs of the architraves allow us to conclude that these beams with a reconstructed cross section of approx. 25 cm × 25 cm must have been made of wood. This, as well as the stone cut of the architrave blocks, shows a striking difference compared to the construction method of royal colonnade architecture in Pergamon (Fig. 47). In High Hellenistic buildings, the architrave and triglyphone were usually worked separately. At the same time, the stone architraves from the royal period reach the full depth required to serve as supports for the cross beams of the upper floor and the adjoining roof structure.

52 Pirson 2012, 243.
53 W. Dörpfeld, The work on Pergamon 1904–1905. The buildings, AM 32, 1907, 167–189.



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Pergamon, city mountain. Lower Agora

Fig. 48 Architrave block with incomplete triglyphs at the butt joints

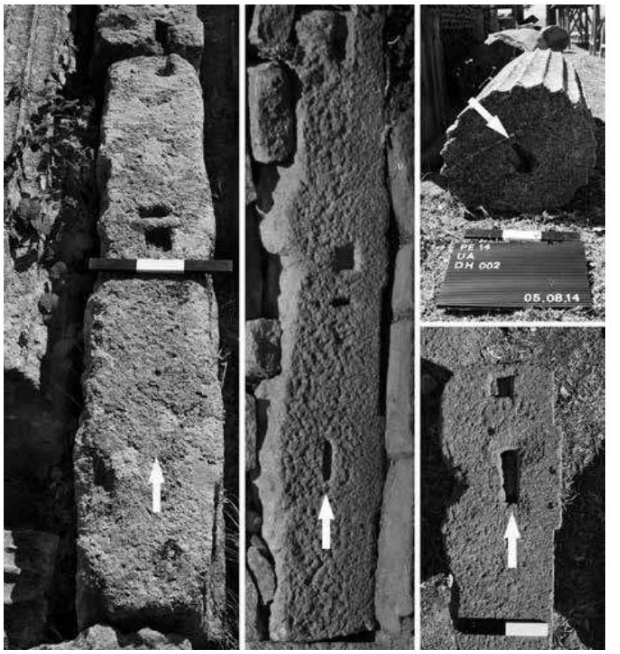

Fig. 49 Architrave blocks and drum of a column from the upper floor with varying lifting holes

49

to serve structure. Although the materials used and the stone technology used are in a clear Hellenistic tradition, the details of the construction technology of the Lower Agora can certainly be distinguished from those of royal period buildings. Based on the previous investigations, further statements can be made about the construction process. This will be illustrated using two examples.

The triglyphone is divided into four metopes, to which three whole and two half triglyphs correspond (Fig. 48). In contrast to the three full triglyphs, the two side triglyphs are not fully executed in the majority of the surviving blocks. The shape of the triglyph is simply laid out and roughly smoothed, but the glyphs themselves are not elaborated. This type of preparation can initially be explained by the work process. The triglyph running over the butt joint could naturally only be worked out after the offset, when the two associated blocks were in their final position. The fact that this last step was omitted allows interesting insights into the organization of the construction process. Apparently, apart from the detail described, the architrave blocks were worked out on the ground and then moved. However, there was no final revision of the visible surface of the building. The workflow reconstructed in this way leads to the question of the offset of the structural members in general. Based on the few completely preserved architrave blocks, three variants of lifting techniques can be distinguished (Fig. 49)54. On the one hand, there are two types of wolf holes that differ significantly in size (11 cm × 1.5 cm and 13 cm × 4-5 cm, respectively).

In addition, blocks without a wolf hole must also be proven, for which a different type of lifting must be assumed, for example with a simple sling.

54 To wolf holes in Pergamum see most recently W. Aylward, Lewises in Hellenistic and Roman Building at Pergamon, in: M. Bachmann (ed.), Bautechnik in ancient and pre-ancient Asia Minor, Byzas 9 (Istanbul 2009) 309–322.

Further considerations regarding the question of the construction process can be illustrated by the columns on the upper floor. The columns on the upper floor were usually made up of two to three drums. Under

	in total	with lever hole	without lever hole	Lever hole unclear height	
lower drums 7		0	4	3	1.70-1.88 m
upper drums	13	6	2	5	0.51-1.25m
Position unclear (fragments)	3	0	0	3	not clear

Table 1 Pergamon, stadtberg. Lower agora, columns of the upper floor. Distribution of the wolf or lifting holes across the different types of drums

The lower drums have consistently larger dimensions and therefore a greater weight (Table 1). At the same time, wolf holes can only be found on the tops of the smaller, upper drums. For the construction process, this observation shows that only the smaller drums were brought into their final position using a crane. The lower drums, on the other hand, were probably raised by tilting (Fig. 50). The construction process reconstructed in this way allows two further conclusions.

On the one hand, a work process with a strong division of labor can be assumed. A first group was probably responsible for moving the lower drums, while a second group moved the upper drums using a crane. On the other hand, it can be assumed that the lower drums were not hoisted from the courtyard of the complex to the upper floor. Instead, given the topographical situation, it is reasonable to assume that the work parts were delivered directly to the upper floor of the building via a ramp on the north side of the complex from nearby Burgweg (Fig. 42). The crane required to move the upper drums could therefore also have been set up directly on the upper floor. Against the background of the dating of the complex, the ongoing investigations provide an insight into the organization of a large Pergamene construction site in the transition phase between Hellenism

and early imperial period.

chronology

A main focus of the 2014 campaign was the relative chronological development of the Lower Agora. This focus of the investigations resulted from the location of the work in the eastern courtyard area. Since this area and the adjoining courtyard halls contain particularly dense structures,

have different time periods, the sequence of the individual phases can be particularly clearly highlighted here. At this point there should therefore be a brief

An outline of the construction and usage history of this area will be given, insofar as this can be recorded on the basis of the new investigations. Although the essential features of the sequence of construction phases had already been correctly recognized by Dörpfeld, numerous detailed observations resulted in important clarifications that, above all, significantly changed the picture of the later phases of use of the Agora.

In the first construction phase, the Lower Agora was built as a courtyard with the surrounding halls and the associated rooms. Finding material from the previous year's surveys, which comes from construction-era findings, dates back to the late 1st century BC. to the early 1st century AD (see above). The paving still preserved in places in front of the north hall is secondary. As in the 2013 campaign in front of the western courtyard hall, missing statue bases in the courtyard pavement were also found in 2014 in front of the columns in the eastern section of the north hall

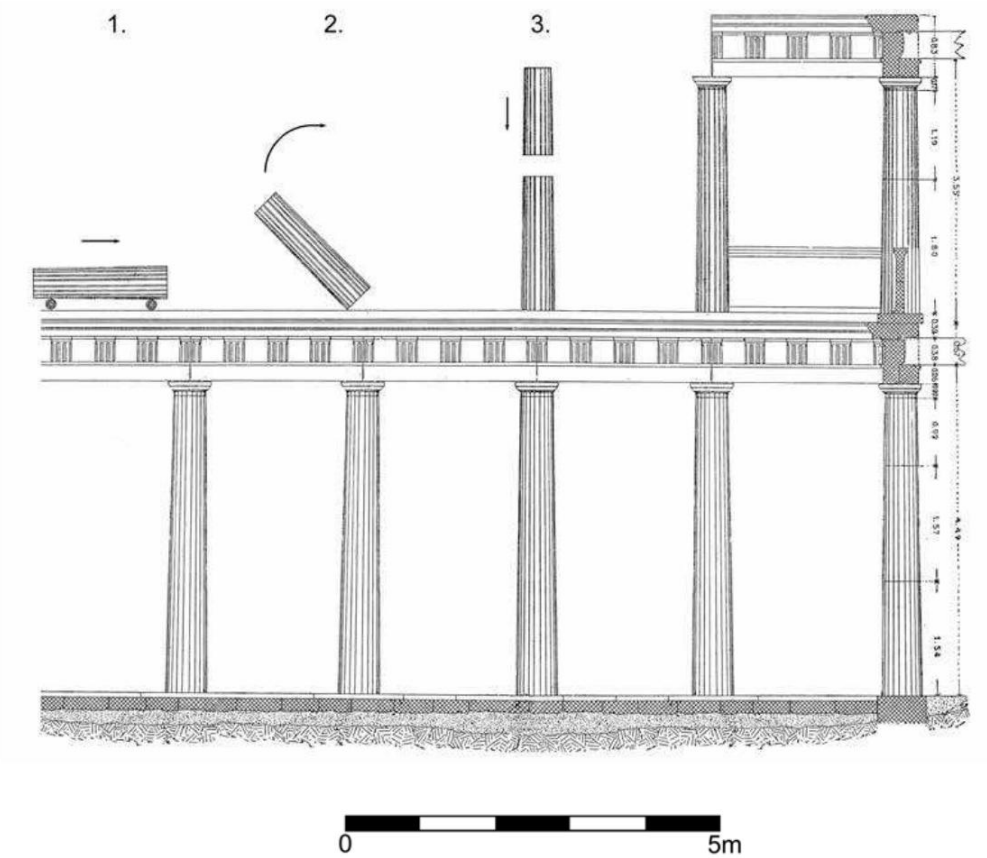

Fig. 50 Pergamon, Stadtberg. Lower Agora, reconstructed construction process with the offset of the columns on the upper floor (M. 1: 100)

Fig. 51 Pergamon, Stadtberg. Lower Agora, north hall. Inclusions of removed statue bases in the secondary courtyard pavement as well as indication of the dowel holes of the lost columns of the courtyard colonnade (arrows)

were lined up (Fig. 51). In the area mentioned there are traces of at least seven monuments. Different than in the West

The gaps in the paving in the eastern courtyard area caused by the removal of the statues were not closed with subsequent paving slabs, which is an important indication of the further usage history of this area. This circumstance corresponds, among other things, with the in

Sondage PE14 So 02 observed the absence of several floors in the eastern part of the north hall (see above).

The chronological position of the L-shaped foundation train located in the central eastern courtyard area is currently uncertain, as no find material from undisturbed ancient layers could be obtained from the PE14 So 01 probe. Possible clues for dating arise from the location and technical preparation of the foundation. According to its orientation, the eastern wall of the building ran in

approx. 11 m distance parallel to the front of the eastern courtyard halls (Fig. 42). If, contrary to the reconstruction at Dörpfeld, one assumes that the preserved large block in the south forms the southeast corner of the architecture, this also results in a conspicuous axial position for the associated building within the courtyard55. The foundation and the courtyard halls were therefore related to each other. The use of local material, which was likely to have been available on the site in the form of boulder rock before the start of construction work, or which could have been quarried directly on site with little effort in the form of light gray andesite, suggests that the L-shaped architecture is older . In contrast, the architecture of the courtyard halls with their pink andesite shows a significantly higher level of effort

when purchasing materials, as this material is not available in the Lower Agora area. There is therefore reason to assume that the hall complex was built as an enclosure for an older building, but no further statements can currently be made about its shape and function.

The second construction phase of the Lower Agora is characterized by massive intervention in the existing building structure. As already recognized by Dörpfeld, massive pillars were installed in the western part of the north hall, which were braced against each other with belt arches (Fig. 42, hatched)56. At the level of room 4, the construction was completed by a retracted transverse wall. There are no further pillar foundations in the part of the north hall to the east. In addition, the northeastern courtyard area shows clear signs of subsidence. On the one hand, the stylobate slopes sharply towards the east in its eastern third. On the other hand, the surface of the stylobate plates in this section has a clear slope towards the south. The preserved courtyard pavement in front of the stylobate also shows corresponding subsidence, the slabs of which are also significantly more fragmented than is the case in the western courtyard area. The toichobate on the northern rear wall of the hall also leans eastward.

Overall, the subsidence appears to be so significant that this must have resulted in serious construction problems for the emerging architecture of the courtyard colonnades. With regard to the construction of the transverse wall at the level of room 4, there is reason to assume that with the construction of the pillar architecture in the western area of the north hall, the eastern part of it was effectively abandoned. It is possible that part of the hall architecture in this area had already collapsed and was not restored

built up.

While the eastern section of the northern courtyard probably at least

was partially abandoned, rooms 1–3 in this area continued to be used. In the case of rooms 1 and 2, the response to the changed surface levels resulting from the subsidence was to provide the doors with a stepped construction. In the case of room 2, it is a wide step made up of four blocks that were bracketed together (Fig. 52). The high degree of wear on the front edges

55 The smaller block recorded in the plan of the old excavation, which according to Dörpfeld should form the southern continuation of the structure could not be identified in the current investigations. However, the larger cuboid referred to here as a corner block indicates, primarily due to the careful processing on its southern side surface, that the south side of the associated building has been reached at this point.

56 Dörpfeld a. O. (Note 44) 29 f.

Fig. 52 Pergamon, Stadtberg. Lower agora, room 2. Southern front of the room with original door reveal (1), secondary threshold (2) and subsequent door addition (3)

points out that the rooms were heavily frequented during the subsequent use phase.

A third construction phase is marked by the installation of a series of rooms in the eastern part of the north hall. These measures are accompanied by further interventions in the existing structure of the facility, so that one can speak of an extensive renovation, which, given its character, must have permanently changed the use of the facility as a whole. The original door on the south side of room 2 was filled with two blocks and a door to room 3 was broken instead (Fig. 42. 52)57. The doors on the south side of Room 3 and Room 4 were significantly narrowed (Fig. 42). A group of three additional rooms was also presented to both rooms. Of these, the middle one has the paving mentioned above made of reused slabs of courtyard paving, so that it is presumably a small courtyard that functioned as a central distributor for the surrounding rooms. The structures created by these construction measures therefore probably formed living spaces58 .

The still outstanding evaluation of the found material from Sondage PE14 So 02 gives hope for a dating of these construction measures.

A fourth construction phase is the construction of the Byzantine church in the courtyard area. Only foundation features of the church itself have survived, as can be seen from the level of the upper edge of a sill block of the northern door that is in situ. However, the poor quality masonry of the foundations should not obscure the fact that the furnishing of the rising building using marble spolia can certainly be described as elaborate, which corresponds to the generous dimensions of the building. In the course of the campaign, several presumably associated structural members were identified, including monolithic column shafts made of gray-blue marble and a hexagonal profiled base plate made of white marble, which is probably attributable to the church's ambo. With the construction of the church, a phase of use follows that is largely defined by the creation of graves that take the church into account due to their location. Several of these graves were recorded in the area of Sondage 1 (see above).

What seems remarkable is that these are simple earth burials without enclosures. From a chronological perspective, this raises the question of

57 Both measures are not listed as secondary in the plan at Dörpfeld, see Fig. 42 here.

Klaus Rheidt was able to demonstrate 58 floor plan-typologically comparable structures for the residential buildings of the late Byzantine period: K. Rheidt, Die Byzantini-sche Wohnstadt, AvP 15, 2 (Berlin 1991) 205–207 (type b).

whether the simple earth burials were later replaced by graves with borders made of spolia material. The latter variously cut the foundations of the church and thus form the last verifiable phase of use of the area from a time when the church must have been abandoned and dilapidated for a long time59 .

Finally, with regard to the chronology of the area, it is extremely noteworthy that the walking level in the Lower Agora area has only changed minimally over the long history of use of the area. Elevations in the rooms in the north wing, but also in the basement of the south hall, have a maximum circumference of 50 cm. In the courtyard area, however, the walking level of the church and the upper edge of the latest graves are still approximately at the level of the hall stylobate of the late Hellenistic period. Given the conditions at the start of the excavations, this finding appears extremely remarkable. Dörpfeld emphasizes that a large terrace had already been identified in the area of the Lower Agora before work began60. However, the photographs taken during the excavation work indicate that the area was buried to at least a man's height in places61. The earth material removed from the old excavation is therefore likely to be rubble that only slipped into the area of the agora after the Byzantine settlement at the site was abandoned - presumably due to the decay of the terraces above, such as that of the Attalos House.

BE – A.O.

Research on the bathing complex in the area of urban excavation

As part of the processing and presentation of the Roman bathing complex in the city excavation62, which was excavated between 1973 and 1975 under the direction of Wolfgang Radt, a total of three probes (So 3-5) were carried out again (Fig. 1), which helped to clarify new questions about water supply. and disposal as well as for the heating system63. With the help of the probes, various modifications to the sewer system as well as a relatively late relocation of the boiler room on the south side of the courtyard were confirmed.

The Roman lower town and the burial mounds in front of the city

Documentation of construction site findings

As in previous years, in 2014 architectural findings were documented for inclusion in the new archaeological map and the GIS-Pergamon in a preparatory excavation at the Bergama Museum64 .
This was again a continuation of the southwest necropolis of the Roman lower city, which had already been discussed several times in the Ertuÿrul Mahallesi65. In the southern area of the plot, in addition to a stone ostothèque, two simple grave buildings facing west-east with grave shafts made of brick masonry and surrounds made of quarry stone masonry were uncovered. It could not be determined whether, like grave building 7 in the southeast necropolis (see above), they were also used for multiple burials. A northeast-southwest oriented double wall in the north of the plot, which forms a brick canal in which a clay pipe runs, could still be ancient in origin.

FP

59 Rheidt a. O. (Note 58) 182–184 Fig. 35.

60 W. Dörpfeld, unpublished excavation diary 1900, p. 8: so-called. »South Terrace«.

61 See the archive recording DAI-ATH-Pergamon_119.

62 see, most recently in detail, Pirson 2006, 73 f.

63 The following statements are based on the processor's report Sarah Japp (Berlin).

64 Work management: Nilgün Ustura, local management: Uÿur Ayhan and Gökçe Özçoban. We would like to thank everyone involved for their collegial cooperation. The following information is based e.g. T. on the report from the Bergama Museum.

65 Most recently Pirson 2014, 140 f. with note 79.

Fig. 53 Pergamon, burial mound. Yiÿma Tepe, aerial view

Geophysical prospection at Yiÿma Tepe and X-Tepe66

With a diameter of approximately 160 m and a height of approximately 30 m, the Yiÿma Tepe tumulus, located in the southern urban area of Bergama, represents a challenge for investigation using geophysical methods (Fig. 53).

The measurements in August 2014 were intended to show which methods can be used beneficially. Since very small target objects were sought in relation to the size of the mound, the standard geophysical methods in archeology appeared to be of only limited success. In order to be able to make statements about deeper structures, seismic methods were used in addition to geoelectrics, magnetics and radar.

Initial results show stratification and strong lateral inhomogeneity above the base of the tumulus.

The significantly smaller X-Tepe (height approx. 15 m, diameter approx. 50 m) was geophysically examined for the first time in 201067. The measurements at that time were completed in this measurement campaign by magnetic, geoelectric, radar and seismic measurements.

During active seismic measurements, an impulse, e.g. B. released into the ground via a hammer blow. This vibration propagates as a wave on the surface and in the ground and is transmitted at interfaces.

broken and reflected between different rock layers. Sensors, so-called geophones, record the vibrations of the waves traveling through the subsurface. Based on the transit time and the strength of the received pulses, conclusions can be drawn about interfaces, e.g. B. between

66 The geophysical prospections (Christian Albrechts University of Kiel, Institute of Geosciences, Department of Geophysics. Head: Wolfgang Rabbel) are carried out as part of the project »From the grave mounds the ruler to the necropolises of the citizens: Modern funeral archeology in the service of researching social stratification and local identities in the Hellenistic Pergamon and the cities of the Aiolis - NekroPergEol« (leader: Felix Pirson - Stéphane Verger). We would like to thank Mr. Günther Druivenga and the Geosym company for their on-site support in exciting seismic signals using the Vibroseis method. We would like to thank the Geophysical Equipment Pool (GIPP) of the Georesearch Center Potsdam and the Institute for Geophysics of KIT Karlsruhe for the seismic recording equipment and geophones they provided.

67 W. Rabbel in: Pirson 2011, 143–145.

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Pergamon, burial mound. Yiÿma Tepe

Fig. 54 Hammer impact seismic on the hilltop

Fig. 55 P-wave excitation with two elVIs vibrators

Sediment and solid rock, as well as interfering bodies, e.g. B. Remains of walls can be pulled. Seismic measurement methods have the advantage over geoelectrics, radar and magnetics in that target bodies are identified at greater depths can.

For the seismic measurements, 240 10 Hz vertical geophones and 80 3-component geophones were available as receivers. A hammer and two ELVIS vibrators from Geo-sym were used as the source (vertical[P] and horizontal[S] excitation). A vibrator emits a clearly defined signal into the subsoil over a certain period of time via a vibrating plate (Fig. 54. 55).

Prospecting a target body with the dimensions of Yiÿma Tepe is not a standard task. One goal was to create sensible measurement configurations to find. Since the slopes of the tumulus are largely very steep, the measurements were initially concentrated on the flat areas for excitation and recording.

At the base of the tumulus there is a path that goes around the hill (Fig. 53). 240 vertical geophones were placed at a distance of 2 m. P waves were stimulated in 45° sections using two ELVIS vibrators. This was intended to achieve horizontal sound penetration of the hill (Fig. 56 a). In order to be able to make statements about the flank area, P waves were excited on the accessible part of the top of the hill (Fig. 56 b).

**A 24 m × 36 m rectangle was also created on the hilltop, on which the 240 vertical geophones were laid out every meter apart.
Using a hammer and an iron plate, P waves were excited every 2 m between the geophone displays. The rectangular area was measured by turning the geophones over several times. This measurement configuration was used for the 3D reflection seismic investigation of the central area of the tumulus (Fig. 57).**

After testing the accessibility of the hill's flank areas, a profile with 96 vertical geophones was placed across the northern summit at 2 m intervals. The ELVIS-P vibrator was used to stimulate points at the base level and on the flat area of the summit. A 48 m long shear wave profile was also measured at the foot of the profile using a hammer blow. Horizontal geophones were used as receivers.

On the slopes of Yiÿma Tepe, six electrical profiles of 96 m each were measured with 1 m electrode spacing in a Wenner-Alpha arrangement

Pergamon, burial mound. Yiÿma Tepe

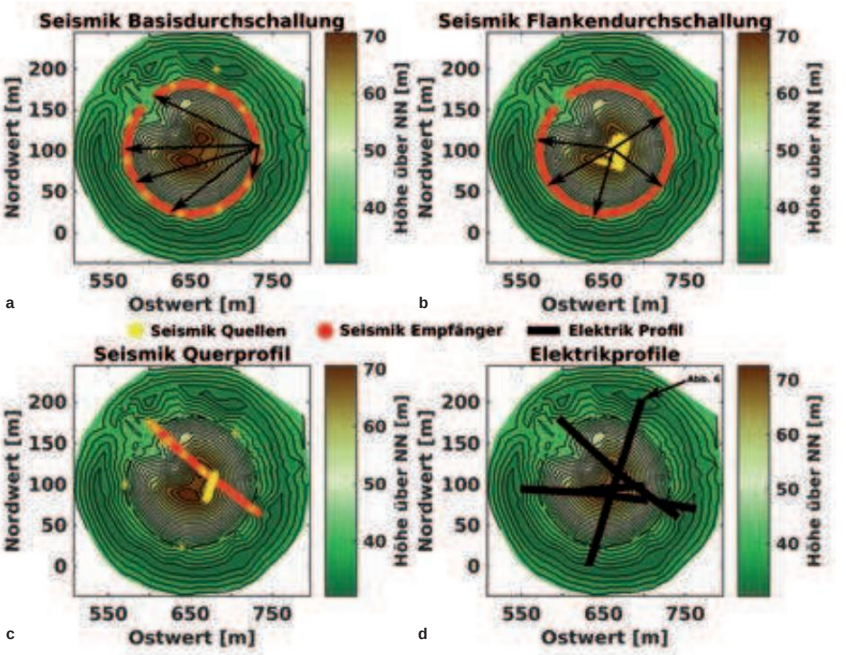


Fig. 56 Overview of the location of the measurement methods used. a: Baseline sound, seismic sources and receivers are located on the path around Yiÿma Tepe; b: Flank sound transmission, sources on the hilltop, receiver on the way around the hill; c: the transverse profile across the hill, springs on the flat areas of the base, flanks and summit; d: History of the electrical profiles

Fig. 57 a display of the reflection seismic grid

three more profiles on the top of the hill to connect these profiles (Fig. 56 d). In the Wenner-Alpha arrangement, a current is fed into the ground via two electrodes. A voltage is measured via two additional electrodes and the apparent specific resistance of the substrate is calculated. The electrodes are at the same distance from each other. By changing the current and voltage measurement

Electrodes can measure different lateral and vertical areas become. Variations in resistance indicate material changes. Over the course of the three weeks, the measurement team became more confident working on the steep sides of the hill, so that further profiles, electrical and seismic, are planned on the slopes in the coming measurement campaign.

The evaluation procedures in seismics are far more time-consuming than those in magnetics and electricity. Especially for configurations with strong

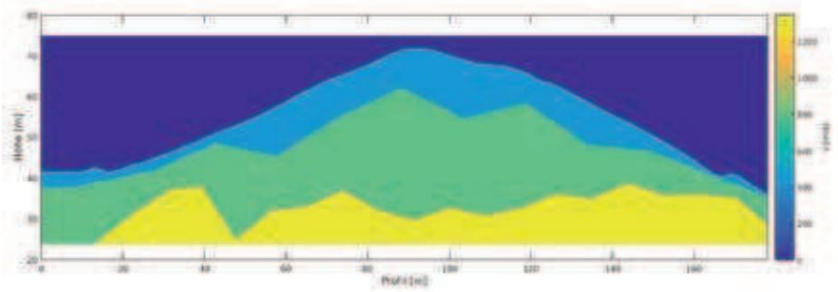


Fig. 58 Pergamon, burial mound. Yiÿma Tepe, simplified model of seismic velocities from the refraction evaluation of the cross-section data

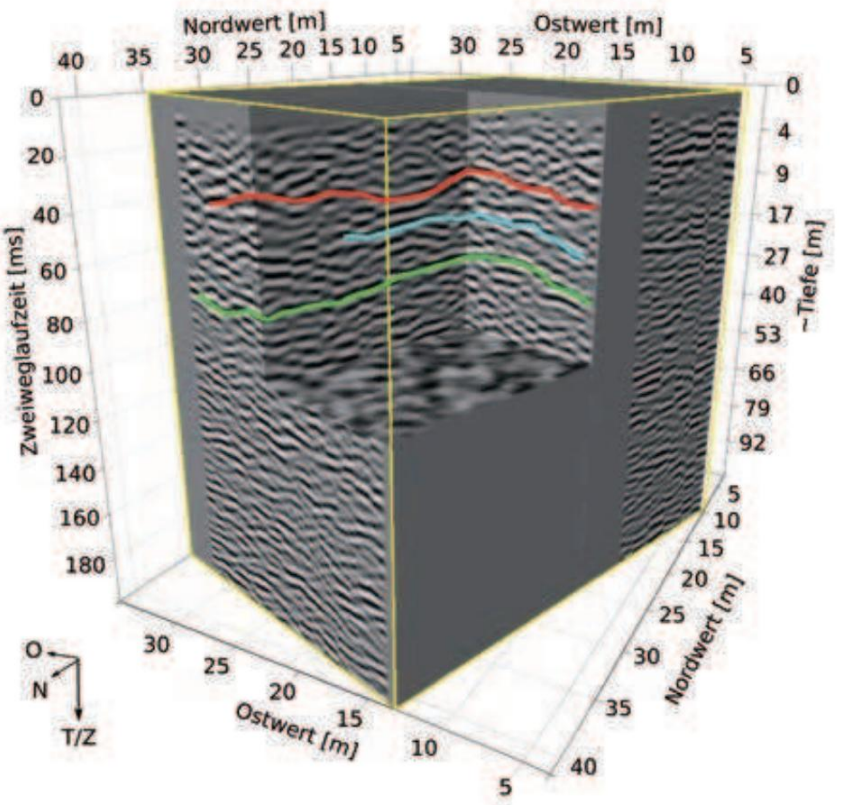
Due to varying topography, as is the case with Yiÿma Tepe, there are still no standard evaluation methods.

The cross profile over the northern summit of the hill was evaluated using refraction seismic methods. The result is a vertical section through the hill along the profile, from which the layer structure can be derived based on the wave speeds (Fig. 58). The P-wave speed is indicative of the consolidation or strength of the piled-up sediment. The layer depths result from the observed travel times and speeds of the waves.

The 3D hammer seismic on the hilltop was evaluated using reflection seismic methods. The impulse of a hammer blow spreads almost spherically through the ground. The compression wave is transmitted to disruptive bodies such as walls or interfaces, e.g. B. geological stratifications. This creates insets in the seismograms. Filtering methods can be used to visually highlight reflections while attenuating disturbing signals such as noise or surface waves.

If the seismic velocities in the subsurface are sufficiently known, the position of layer boundaries or building remains can be determined. The spatial distribution of the geophones allows reflections to be localized more precisely. After data processing, the seismograms can be displayed as 3D volumes (Fig. 59).

The ultrasound measurements of the base of the tumulus and the flanks can be compared with tomography in medicine. An evaluation of the waves arriving at different times provides information about whether areas with higher or lower seismic speeds have been passed through. From this, conclusions can be drawn about more or less consolidated areas, e.g. B. filled pits or solid rock can be pulled against heaped rock material. Hyperbolic signals that extend over several tracks indicate refraction and reflection of the wave from interfering bodies. Figure 60 shows data examples for one “shot” each of the transmission measurements and the flank measurements. Due to the atypical distribution of seismic sources and receivers, the identification of the individual phases is the first task, ie the incoming signal must be assigned to the corresponding route. The direct wave is the one that travels the shortest spatial path from the source to the receiver. In the case of the base transmission, it arrives after the refracted wave that traveled along the base of the hill in the faster layer. Even slower is the surface wave that has traveled along the surface over the top of the hill. Equivalent considerations can be made using the example of edge measurements. Here the direct wave cannot be clearly distinguished from the refracted wave because their arrival times are similar. As is so often the case, the surface wave can be recognized by its large signal strength.



Pergamon, burial mound. Yïÿma Tepe

Fig. 59 Processed 3D cube, created from the reflection seismic measurements on the top of Yïÿma Tepe, cut into the cube for viewing. red, blue, green: course of reflectors that represent material boundaries

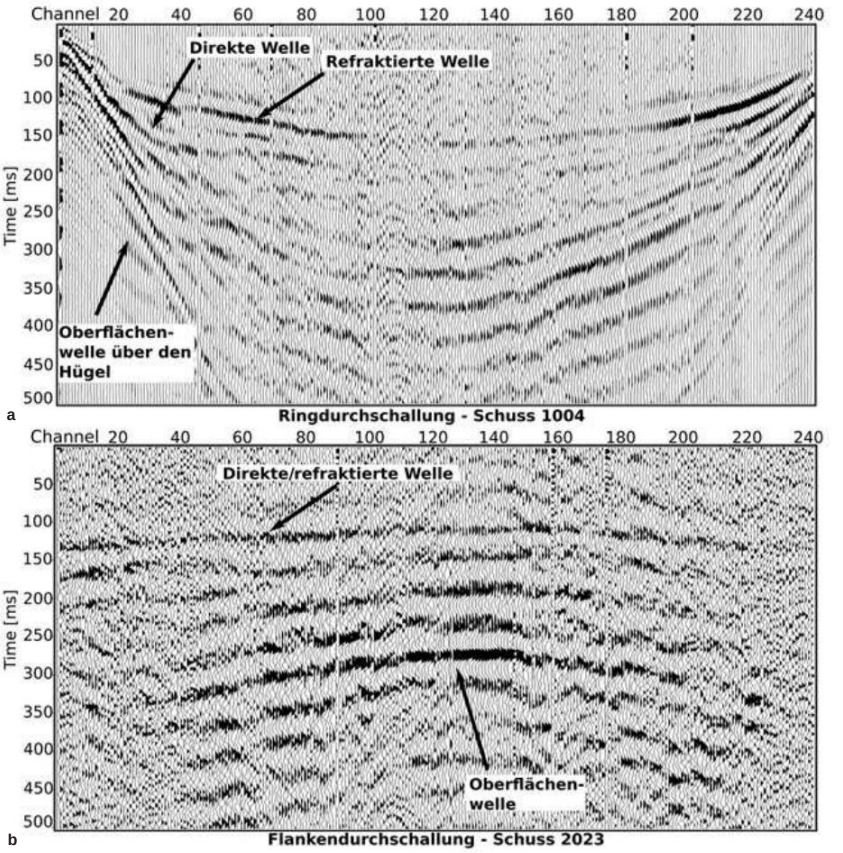


Fig. 60 Example seismograms from the transmission measurements. a: Basic sound transmission; b: Flank transmission

A first goal of the measurements at Yiÿma Tepe was to gain an overview of the measurement arrangements that could be implemented and to determine the effectiveness of individual measurement methods. The refraction seismic evaluation of the cross profiles has shown that the tumulus is made up of several layers (Fig. 58). The summit is covered by a 5-10 m thick, weakly consolidated layer that thins towards the flanks. This is followed by a significantly denser layer with higher speeds, approximately 20 m thick. There may be solid rock underneath or even more densely consolidated sediment. This determination of the seismic velocities is the prerequisite for the evaluation of the reflection seismic measurements and the transmission measurements. The layer boundaries, as seen from the velocity measurements, are not flat but vary laterally along the profile. In the northwestern slope area, the second layer reaches just below the surface and forms a step.

At this level there is also an anomaly in the resistance distribution in the electrical system;

A reflection was identified in the shear wave profile whose depth corresponds to the depth of the layer boundary.
In order to verify the course of the layers, further cross-sections across the tumulus with closer shot spacing are planned this summer.

The reflection seismic results correlate with those of electrical resistivity tomography along a profile across the top of the tumulus.
These electrical measurements confirm that a layer change occurs at a depth of approx. 6 m, which is characterized by higher electrical resistances.

The evaluation of the 3D reflection seismic measurements results in a complex image of the central area of the tumulus (Fig. 59). The location of objects or boundary layers that reflect the seismic waves is represented in the figure by white and black amplitudes of the reflected signals, while gray represents anechoic areas. Estimated depths are indicated on the right vertical axis. Layer boundaries, such as B. at 10 m, can be recognized by surface-connected reflections. For example, the green line between 27 and 40 m marks the transition from the embankment to the natural soil.

In Figure 61, a profile has been cut out of the 3D seismic cube that runs along the electrical profile shown (Figure 61 b). It is marked in which area electrical and seismic overlap. The high resistances in the electrical system at a depth of approx. 6 m are shown in the seismic profile by a strong reflector (Fig. 61 a, red). This is the transition to a second layer with significantly higher seismic velocities.

Both the reflector and the top edge of the electrical anomaly are falling

To the south, the electrical anomaly decreases by several meters, but is still an order of magnitude above average. A trough can be seen at profile meter 106. This is located in the seismic survey

Place a double reflector that forms a lens-shaped structure. Judging by the shape, the electrical captures the hollow, while the seismic also shows the top of the backfill.

The lower edge of the electrical anomaly at approx. 20 m is again marked in the seismic by a reflector (Fig. 61 a, blue). The base, which emerges in the seismic survey through another reflector (Fig. 61 a, green), can no longer be detected with the electrical system.

At the X-Tepe, parallel north-south profiles of the total magnetic intensity were measured using a cesium magnetometer. In order to record signals from greater depths, the gradient formation that is otherwise common in archaeological measurements was omitted.

Pergamon, burial mound. Yïÿma Tepe

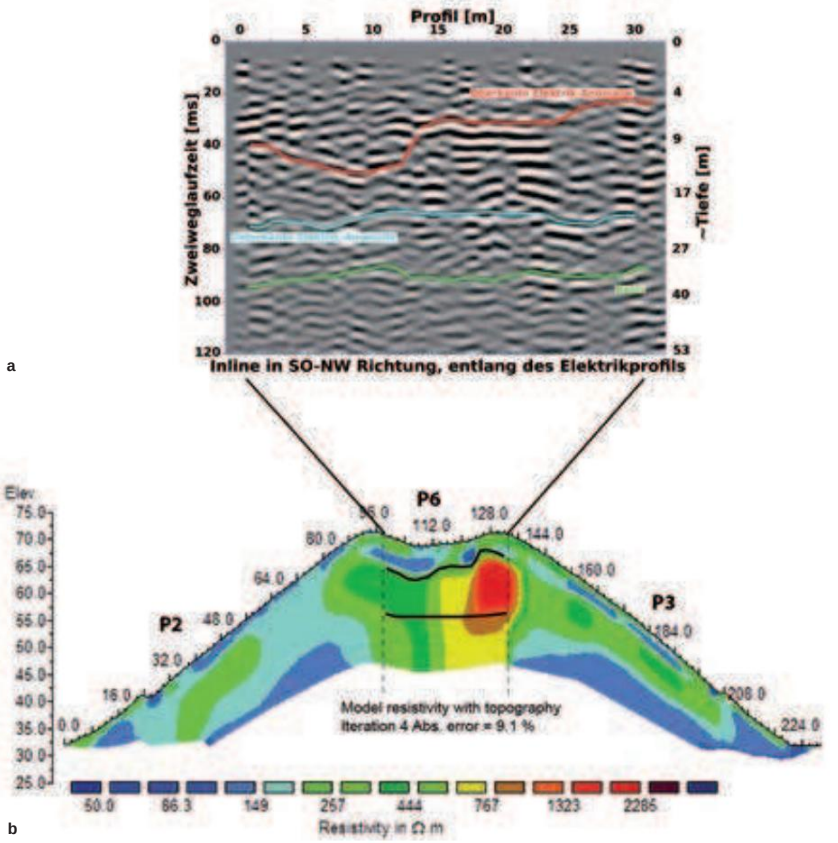


Fig. 61 seismic profile from the 3D cube and electrical profile (see Fig. 59), seismic (a): red: reflector that coincides with the top edge of the electrical anomaly; blue: reflector at the bottom edge of the electrical anomaly; Green: reflector at the base level of the hill

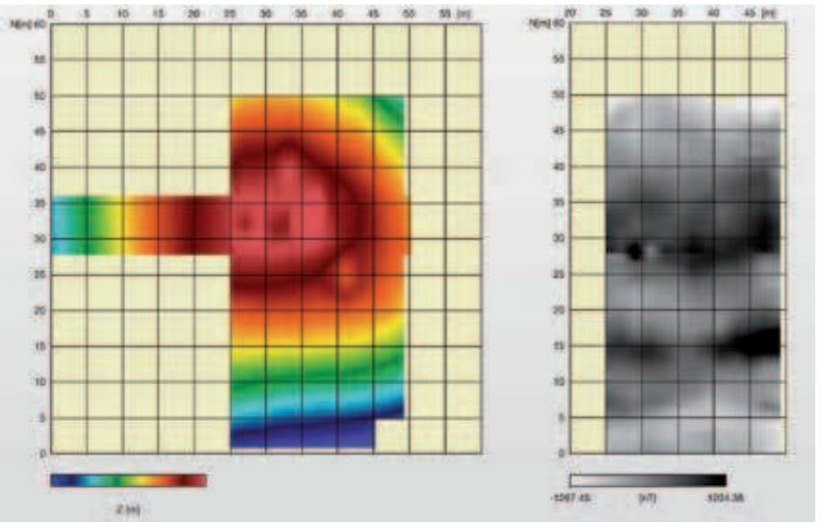


Fig. 62 Magnetic measurements on the X-Tepe, topography and total magnetic field (average value subtracted)

The results are shown in Figure 62. The trace mean value was subtracted from the values. There are anomalies of up to 1000 nT running from west to east, which can only be caused by the andesite fissured bedrock below the X-Tepe and possibly burial chambers made of the same material built into it. The magnetic measurements provide valuable assistance in the ongoing evaluation of the seismic and electrical measurements that have also been carried out.

RM – WR – EE

The surrounding area of Pergamum

The work on the area around Pergamon in this campaign focused on the newly started project “The Maritime Topography of the Ancient Kane Peninsula: A Micro-Regional Approach to the Impact of Harbors and Anchorages on Politics, Economy and Communication of a Western Anatolian Landscape. Kane Regional Harbor Survey", which is part of the European Research Council's "Rome's Mediterranean Ports Advanced Grant". The project in the Kara Daÿ Peninsula area is scheduled to last two years; The results of this year's campaign are reported below.
After the field work of the prehistoric survey in the Kaikos valley was provisionally completed last year, the focus in 2014 was on the processing of finds, which has now also been completed68. Investigations into visual relationships in the western valley of the Kaikos also continued. All three projects are reported on below.

FP

The prehistoric surrounding survey

The new discovery site on Kula Bayÿrÿ

The activities as part of the prehistoric surrounding survey in 2014 primarily included the processing of the find material from the archaeological surveys that had already been completed in previous years. In 2014, another previously unknown prehistoric site was finally added to the sites examined and visited in an interdisciplinary manner between 2008 and 201369 , which lies southeast of the city mountain of Pergamon (Fig. 3)70. The fields on the northern flank of the so-called Kula Bayÿrÿ Tepe could be walked by a small team. The found material discovered exclusively contains cut stone tools or their broken remains. The inspection of the site has shown that large amounts of lithics are widely scattered across the entire area. Since only lithics could be identified and other types of finds, such as ceramics, were completely missing, a chronological delimitation is only possible to a very limited extent. The lithic ensemble from Kula Bayÿrÿ Tepe shows at least the raw materials and types known from other investigated sites in the Pergamene area (see below). The rolled surfaces of the thin and thick cuts, which occasionally show retouching, can be associated with the use of river pebbles or raw materials transported in water. Due to this secondary deposition of raw materials, the cortex is rarely preserved on the devices. In some cases, larger cuts show signs that they themselves were used as a 'core', which is comparable to the material from other sites in this area.

Find processing

The processing of the finds concentrated on the areas of prehistoric surveys in the area surrounding Pergamon that have not yet been completed. This involves the processing of the Lithik71 and the ceramics of the 2nd millennium. v. Chr.72, which was also completed for both in 2014 in terms of documentation and recording on site. This means that all prehistoric find categories from the surveys have now been recorded on site and are being prepared for detailed evaluation and future submission.

68 This year's work under the direction of Barbara Horejs (OREA/ ÖAW Vienna) lasted from August 10th to 16th. and September 1-7, 2014. For information about the employees, see p. 177. The work was most recently funded as part of the ERC project “Prehistoric Anatolia” (ERC 263339), as well as as part of the program for the development of scientific areas at Charles University in Prague (PRVOUK)

No. 12.

69 For the detailed results see below B. Horejs in: Pirson 2014, 141–146.

70 We owe the information about this site to the employees of ÿzmir 2 Numaralÿ Kültür Varlÿklarÿnÿ Koruma Bölge Kurulu Müdürlüÿü.

71 Bogdana Milic (Istanbul).

72 Peter Pavuk (Prague).

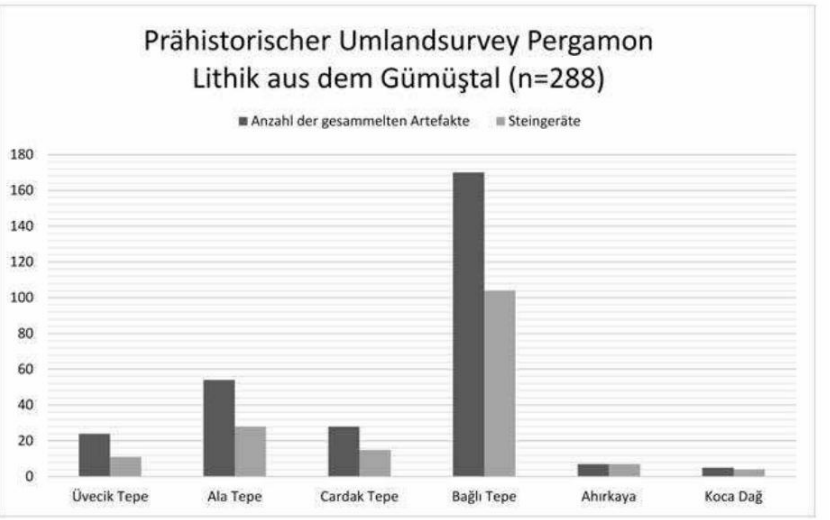


Fig. 63 Prehistoric surrounding survey, lithics from the gümüÿ valley

lithics

The main focus of the analysis briefly outlined here is on detailed typological and technological studies of the cut stone tool industry and a preliminary determination of the raw material of the lithics from the surveys in the Gümüÿ Valley73. For these investigations, various macroscopically determined raw material groups, which are composed of different varieties of chert and silicified tuff, were used.

zen, selected. To accurately determine the origin, mineralogical-petrographic and geochemical trace element analyzes would be necessary. The preservation of the artifacts in their size and that of the natural surfaces on the stone implements indicate the predominant use of secondary deposits, such as rivers. This is supported by evidence of nodules suitable for stone implement production.
The latter could also be collected during the survey. Larger slabs of chert, which were also documented, are a possible indication of a potential chert deposit in the area around the sites visited. Raw pieces that only have one or two negative cuts can be interpreted as evidence of quality tests on the tubers. The first results of the techno-typological studies of the stone tools of the Gümüÿ Valley show the presence of modified stone tools as well as production waste in certain places (Fig. 63).

In general, the inventory from the Gümüÿ Valley shows that stone implements were only marginally retouched for immediate use, but without significantly modifying the basic form.

The entire inventory of Üvecik Tepe (GÜM 1) includes eleven stone tools. The majority of these are composed of retouched cuts, indicating activities such as cutting, scraping and drilling (Fig. 64 a–c).
The largest number of cut stone tools were found during the survey on Baÿlÿ Tepe, of which 104 examples (out of a total of 170) show retouching. The presence of cores and some core edge blades and chips, along with other impact debris, indicates stone implement production on site. The raw materials used at Baÿlÿ Tepe are of better quality than those at the other sites examined. This could also be the higher variance of retouched devices, such as retouched blades (Fig. 64 d), sickle blades (Fig. 64 e), blades with

73 For the geoarchaeological surveys in the Gümüÿ Valley, see B. Horejs in: Pirson 2013, 109–117.

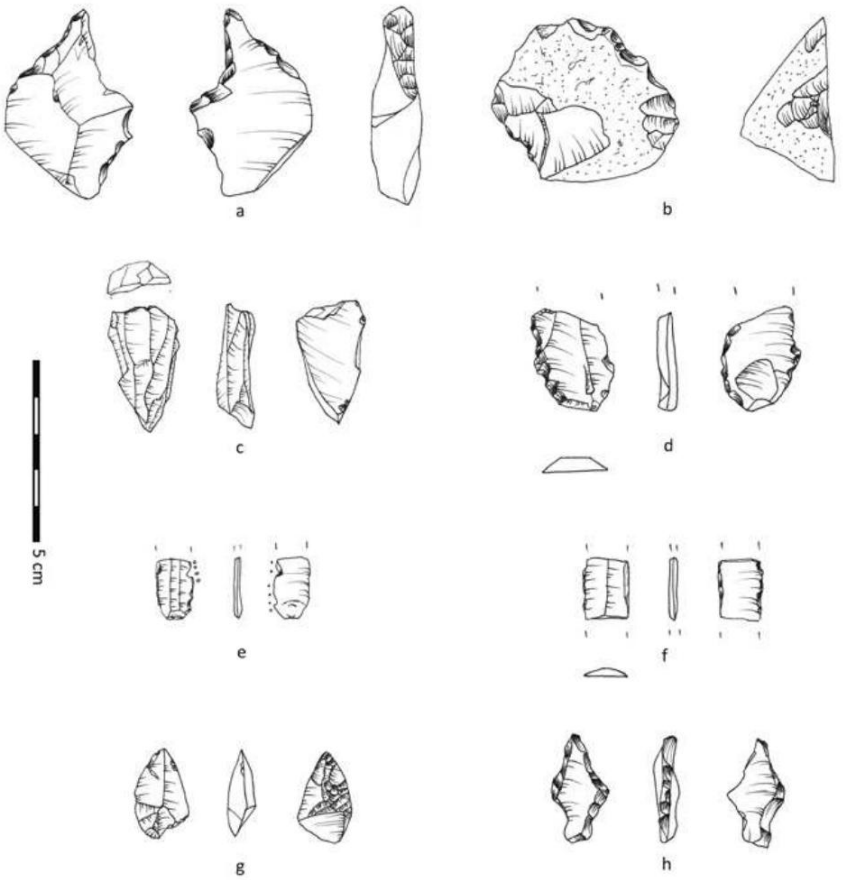


Fig. 64 Prehistoric surrounding survey, stone tools from a: Üvecik Tepe; b: Ala Tepe; cdef g: Baÿlÿ Tepe; h: Yeni Yeldeÿirmentepe (M. 1 : 2)

Explain final retouching, along with scratches and micro-scratches as well as notched devices and drills. Despite this diversity, the pragmatic use of various products related to cutting and repairing the cores still plays a role.

The common presence of conical blade cores and blades (Fig. 64 c. f) in the Baÿlÿ Tepe find material distinguishes this material from the other lithic inventories in the Pergamene area.
Due to this special association of finds and the technological features, parts of this material indicate an earlier settlement of the site. This is confirmed by the previously published ceramic fragments, which are tentatively placed in the Late Neolithic/Early Chalcolithic/ Middle Chalcolithic (7th/6th/5th millennium BC) were dated74. It is the oldest discovery site in the entire area surrounding Pergamon. Some retouched devices, in particular a semi-finished arrowhead with inversive retouching on the ventral side (Fig. 64 g), are more likely to be associated with later periods, such as the Late Chalcolithic/Early Bronze Age (4th–3rd millennium BC). .), which is also confirmed by the ceramics that have already been evaluated75. In summary, the surface material of Baÿlÿ Tepe shows devices from different time periods, which indicates several prehistoric settlement phases.

The material from Ala Tepe (GUM 2, GUM 5, GUM 6, GUM 9) and Çardak Tepe (GUM 3) show a slight difference in the composition of the finds. These contain, among other things, a high number of cortical fragments and tubers (Fig. 65). Together with worn cores, impact debris and fragments of retouched devices, this material points to a

74 B. Horejs, Pergamon and the Kaikos Valley in Prehistoric Times, in: Pirson – Scholl 2014, 113 Fig. 5.
75 B. Horejs in: Pirson 2013, 113–115.

Fig. 65 Prehistoric surrounding survey, Ala Tepe. ensemble of modified and unmodified tees (M. 1 : 2)

Workshop activity within these locations. The repertoire of retouched devices shows a variety of defects, such as scratches, notched devices and even micro-scratches. Cortex cuts with and without retouching (Fig. 64 b) are a frequently encountered characteristic within this ensemble and once again show the pragmatic production of the raw materials with 'ad hoc use'.

Finally, it can be tentatively summarized that the lithics from the Gümüÿ Valley do not indicate specialized stone processing or exceptional equipment production, either in terms of the types of equipment or the raw materials used. Rather, the material reflects the need for devices within the settlements themselves. Due to the lack of exotic materials such as obsidian - as already stated76 - no further statement can currently be made regarding the integration into supra-regional networks of the prehistoric societies of Pergamon . The lithic production in the area around Pergamon can be described by the use of local raw materials for the basic production of the above-mentioned types of devices as well as for some exceptions for blades or possible arrowheads.

Ceramics from the Middle and Late Bronze Age

The processing of the ceramics from the Middle and Late Bronze Age, which began in 2013, includes over 300 fragments from 15 different sites. The largest ensemble with over 200 fragments comes from the surveys at Deÿirmentepe. The number of ceramic fragments from Atarneus (16), Teutrania (15) and Ahirkaya (12; GUM07) is significantly lower. Both the newly picked up finds from the 2008–2013 surveys as well as the old finds, which come from Wilhelm Dörpfeld, Kurt Bittel and Jürgen Driehaus77, were taken into account. The ongoing ceramic analysis project in cooperation with Sarah Japp and Hans Mommsen has now been specifically evaluated, with a few underrepresented products being sampled for a final series of analyses. The joint archaeometry project

76 B. Horejs, Bronze Age settlement patterns in the Kaiko Valley. Interpretations of the first survey results in Surrounding area of Pergamon (Türkiye), in: B. Horejs - TL Kienlin (ed.), Settlement and crafts - studies on social contexts in the Bronze Age. Contributions to the meetings of the Bronze Age Working Group at the annual meeting of the Northwest German Association for Antiquity Research in Schleswig in 2007 and at the German Archaeological Congress in Mannheim in 2009, university research on prehistoric archeology 194 (Bonn 2010) 47–67; D. Knitter – M. Bergner – B. Horejs – B. Schütt – M. Meyer, Concepts of Centrality and Models of Exchange in Prehistoric Western Anatolia, in: W. Bebermeier - R. Hebenstreit - E. Kaiser - J. Krause (eds.), Landscape Archaeology. Proceedings of the International Conference Held in Berlin 6th–8th June 2012, eTopoi. Journal for Ancient Studies, Special Volume 3, 2012, 361-368.

77 J. Driehaus, Prehistoric settlement finds in the lower Kaikos plain, IstMitt 7, 1957, 76–101.

also focuses on the questions for the 2nd millennium BC. BC on the following aspects in order to enable a diachronic overall presentation at the end of the evaluation: distribution of ceramic goods and forms in a regional and diachronic perspective, definition of fine-chronological development tendencies to record the settlement dynamics as well as the identification of potential local to regional production centers in time Differentiation.

The ceramics were first divided into wares: Anatolian gray ware (74%), orange ware (13%), fireclay ware (2%), plain ware (2%), several coarse ware (4%) and two pithos ware (3%). The only clear import is a Mycenaean sherd from the surveys at Atarneus. While the classification of the coarse goods was relatively easy, the fine goods showed a spectrum that could hardly be differentiated into reliable subgroups macroscopically. Due to the lack of closed find contexts, the ceramics were also determined purely typologically, which brought important new insights based on the expertise of the editor through studies of comparative material in Troy and other sites in western Anatolia78. A major concern of this year's campaign was to systematically examine the NAA groups measured by Japp and Mommsen on site in order to determine whether the chemical groupings can also be grasped macroscopically. The results show that some of these chemically defined categories also form macroscopic groups or clusters, which in turn have a certain geographical distribution.

Most NAA groups are concentrated in the lower Bakÿr Çay region, although interestingly the middle Bakÿr Çay sites did not have their own production in the 2nd millennium BC. BC seem to have, although rich production in the Gümüÿ Valley from the Late Neolithic to the Early Bronze Age can at least be chemically proven. The upper Bakÿr-Çay Valley, on the other hand, apparently shows its own production, which is also macroscopically relatively homogeneous, as far as the ancient finds from Ayazköy are informative.

Regarding potential production sites, both chemical studies and macroscopic classification were important.
In the case of orange goods, for example, three makes can be distinguished macroscopically, e.g. T. fit well with the defined NAA groups and can probably be traced back to separate workshops (Fig. 66). An important finding is that although isolated imports can be identified over longer distances within the Bakÿr-Çay Valley, hardly any imports from outside are likely to have come into the region.

On the settlement dynamics of the 2nd century. v. The first preliminary results can be summarized in the 1st century BC: The local MBZ (approx. 2000–1700 BC) has hardly been documented in the material so far, and may be found in Elaia, Grynaion, Çiftlik, Yeni Yeldeÿirmen Tepe, but also in Ayazköy. The late MBZ can be identified in the ceramic ensemble from the Stadtberg in Pergamon, e.g. T. accumulates behind an early defensive wall79. The late MBZ or early SBZ (around 1700 BC) is characterized by the appearance of Anatolian gray ware in round bead-rim bowls and is documented in Atarneus, Deÿirmentepe and Teutrania. A significant increase in settlement density probably took place during SBZ I (approx. 1700 to 1400 BC), which is documented at almost all sites examined in the survey area without exception. This phenomenon can generally be observed in northwestern Anatolia, such as in the Troas80. Just as comparable to the Troad, a decline in the population density in the SBZ II (approx. 14 in which only seven of the 15 sites provided evidence. These include

78 P. Pavúk, Troy VI Early and Middle. Ceramics, stratigraphy, chronology, Studia Troica Monographs 3 (Bonn 2014).

79 W. Radt, The earliest defensive walls of Pergamon and the associated ceramic finds, IstMitt 42, 1992, 163–234; D. Hertel, Preclassic Pergamon and its settlement profile, IstMitt 61, 2011, 21–84.

80 P. Pavúk - C. Schubert, The Troas in the Middle and Late Bronze Age, in: E. Pernicka - CB Rose - P. Jablonka (ed.), Troia 1988-2008: Excavations and Research I. Research History, Methods and landscape, Studia Troica Monographs 5 (Bonn 2014) 864–923.

Fig. 66 Prehistoric surrounding survey, ceramic fragments of the orange ware from Deÿirmentepe and Ahÿrkaya (gUM07) (M. 1 : 3)

Atarneus, Baÿan Tepe, Çiftlik, Deÿirmentepe, Eÿrigöl Tepe, Hatÿpler Kalesi and Ahÿrkaya (GUM07). A trend towards centralization in the settlement pattern can possibly be identified here, which can be recognized as a phenomenon beyond the region of the Pergamene surrounding area. Finally, the end of the 2nd millennium. v. BC again hardly documented and only known from Hatÿpler Kalesi.

BH – BM – PP

The new survey on the Kane Peninsula ("Kane regional harbor survey")

Since 2014, a new survey project has been dedicated to exploring the ancient coastal towns on the Kane Peninsula (Karadaÿ). This barren peninsula is sealed off from the Kaikos (Bakÿr Çay) flood plain to the east by mountain ranges. In ancient times, three cities dominated its coastal strip: Atarneus in the northeast (not far from Dikili), Kane in the northwest (of the same name as the peninsula, near today's Bademli) and Pitane (today Çandarlÿ) on the south coast81. The Kane Coast has hardly been researched archaeologically. Carl Schuchhardt82 mentions some sites on the peninsula, and part of the region is also included in Josef Stau-ber's epigraphic and regional study83. In addition to the research into Elaia over the last few years84, several sites in the interior of the peninsula have also been examined alongside Atarneus as part of the "Chora of Pergamon" project85. The Kane project, which began in 2014, follows on from this to round off the picture of the coastal foreshore of the metropolis of Pergamon. The first five-week campaign focused on the city of Kane86 .

On the topography of Kane

The coastline forms a larger peninsula near today's Bademli and then turns to the south (Fig. 67). An arm of the sea extends south around the peninsula and silts up to the northeast near Bademli. In front of its mouth are the two Arginuses Islands, which belonged to the Chora of the city of Kane87. This itself lies on a small headland that extends into the sea north of Bademli and has bays to the east and west

81 On Atarneus, most recently M. Zimmermann in: Pirson 2012, 209–211. On Pitane C. Schuchhardt in: A. Conze – O. Berlet - A. Philippson et al., City and Landscape, AvP 1, 1 (Berlin 1913) 99 f. Map with the ancient sites in the region: Pirson 2012, 203 Fig. 40.

82 C. Schuchhardt, Preliminary report on a tour of the Pergamene landscape, proceedings of the Royal Prussian Academy of Sciences in Berlin, Phil.-hist. Class 53, 1887, 1209-1211; Schuchhardt a. O. (Note 81) 99-102. 118 f.

83 J. Stauber, The Bay of Adra-mytteion I. II, IK 50. 51 (Vienna 1996).

84 Most recently F. Pirson a. O. (note 28).

85 Most recently Pirson 2013, 107–109 and M. Zimmermann in: Pirson 2013, 117–123.

86 This year's work under the local direction of Eric Laufer lasted from September 2nd to October 3rd, 2014. For information about the employees, see page 177.

87 str. 13, 1, 68.

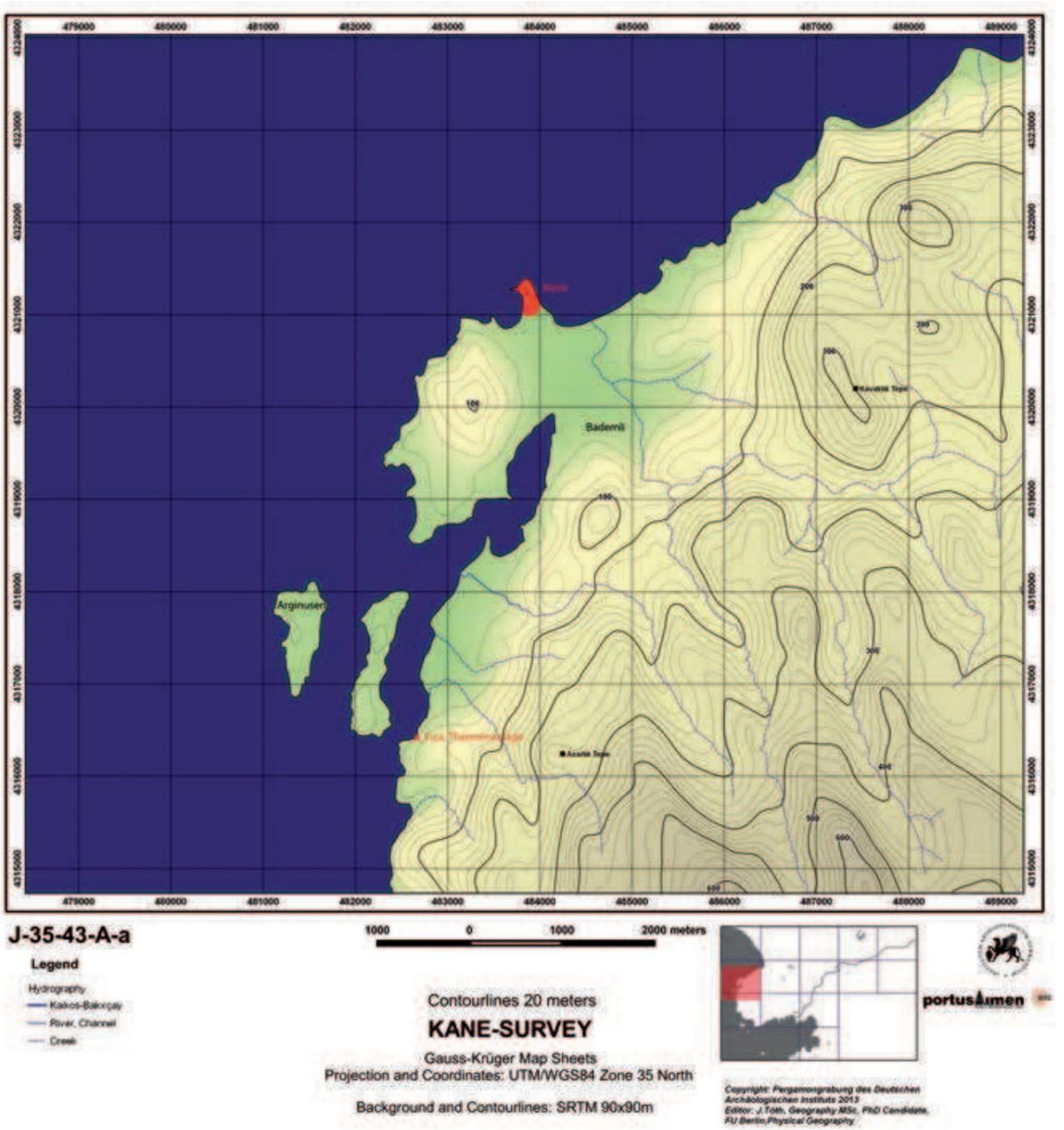


Fig. 67 Kane, plan of the surrounding area

is flanked (Fig. 67–69. 73). With a length of around 400 m and 150 m width, it rises from south to north from around 1 m to 20 m above sea level. NN on. Its northern end slopes steeply towards the open sea; Here it can be assumed that there will be a constant loss of terrain due to erosion. The back of the peninsula and the area inland towards Bademli are now partly characterized by modern buildings and partly by agricultural use (particularly olive groves). The base of the headland is dominated by a conical, 30 m high hill (Kanlÿ Tepe). Given its dominant location, it was probably integrated into the ancient city structure in one form or another. However, modern construction and cultivation have erased any traces.

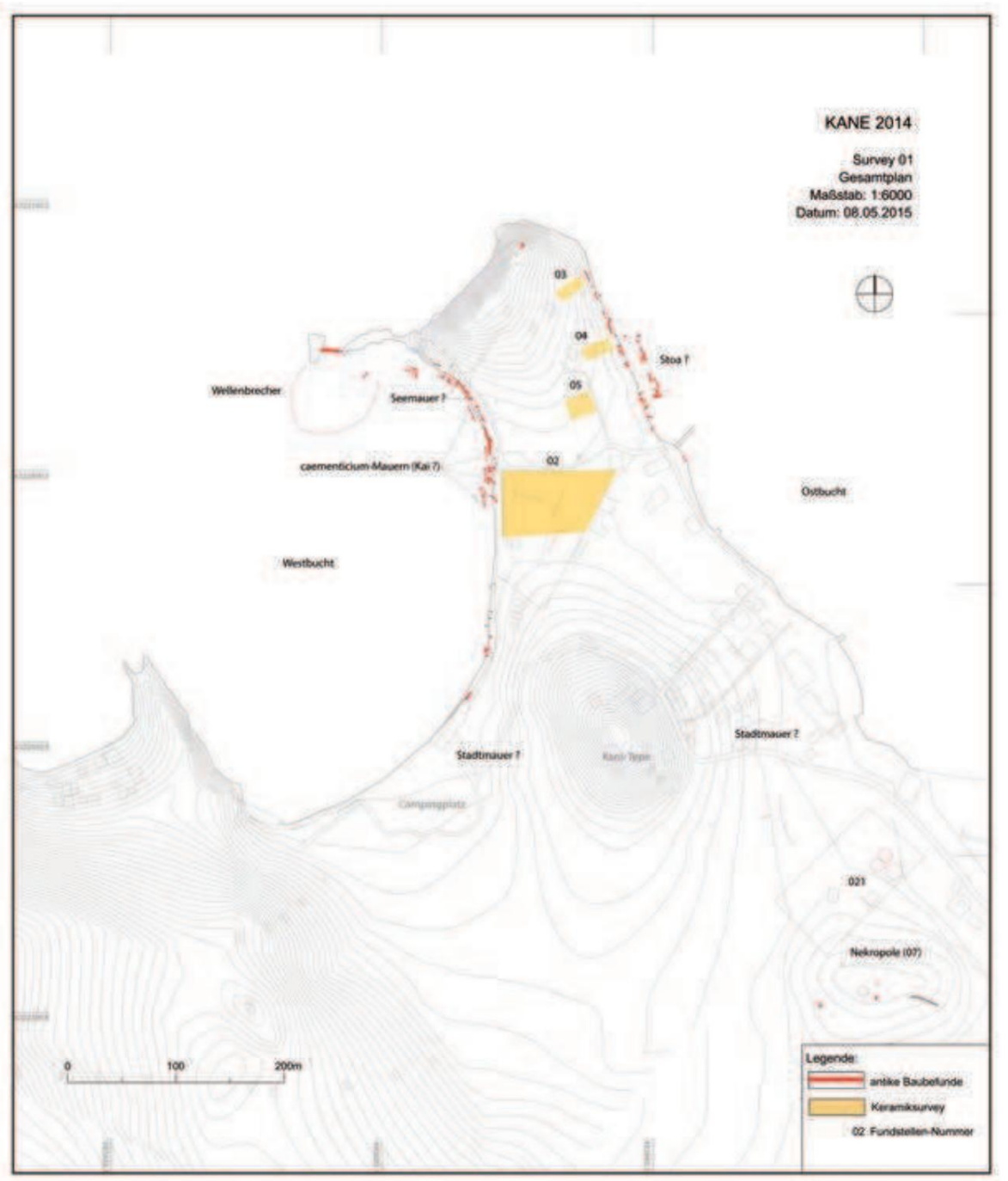


Fig. 68 Kane, city map with marking of the ceramic survey areas (M. 1: 6000)

Fig. 69 Kane, view from the southwest of the headland with the town

The back of the headland shows no certain ancient building remains above ground. Rather, such ones are located primarily on their eastern and western

The cliff edges have been preserved, where erosion has exposed numerous walls on the slope. The detection zone extends from the edges of the embankments over the narrow bank strips to the shallow water. Along the curved coastline of the western bay it extends over a length of around 400 m, on the straight one of the eastern bay it only extends over around 200 m. To the south of the last findings, areas of the coastline begin to be sealed by modern development, so that the findings from here onwards are unclear. As far as the built-up ancient city area

can then be developed, it covered a maximum of around 8 hectares.

There is a small necropolis on a hill about 300 m southeast of Kanlÿ Tepe or about 200 m inland from the beach in the eastern bay (site 07). The cover plates of the robbed simple rock graves, some of which consist of spolia, indicate a date that may have been late antique. Schuchhardt located another necropolis, which can no longer be verified due to today's buildings, to the south near Bademli88. The identification of the ancient remains on the peninsula with the city of Kane (or Kanai) by Schuchhardt was based on the localization information in the ancient sources89 .

Survey in the urban area

The investigations in Kane included an archaeological survey, the documentation of the visible building remains, the recording of the city plan, a ceramics survey, geophysical prospections on land and in the harbor bays as well as geoarchaeological investigations90. The results are included in the documentation and GIS of the Pergamon excavation.

An intensive survey was carried out onshore within a radius of approximately 600 m around the headland. Further site inspections were carried out within a larger radius of approx. 1.5 km. The picture obtained of the ancient structures is due to the greatly varying modern building density or

Type of use very unequal.

The building remains that are now under water reach a depth of around -0.70 m and could therefore still be documented in drawings. The banks and shallow water strips near the banks are characterized by stone rubble and sandy areas, under which further findings could have been washed away. Only the breakwater in the western bay (see below) is deeper, which was therefore only documented photographically and mapped using GPS and seismic measurements (see below). The deeper water zones in both bays were checked during snorkeling; No further building findings could be observed on the pure sandy soils here.

According to the findings in Elaia91, the water level in Kane in ancient times was probably around 1–2 m lower than today. The geoarchaeological drilling probes planned for 2015 should provide more information.

The majority of the small-scale building findings recorded on the two bank strips point to house contexts: mostly short wall sections and corners, usually perpendicular or parallel to the edge of the embankment and bank line. Rooms or groups of rooms can only be accessed in a few cases. In addition to the house walls, there are also several paviments, e.g. B. from brick chippings or paved floors (Fig. 70). In some places, several phases of house development (Fig. 71) could be documented in the natural profile of the embankment edge. The house findings are at levels between around -0.70 m and +2.00 m high. The building remains show one or

88 Schuchhardt a. O. (note 82) 1209.
89 see note 83.

90 About the geoarchaeological
Work at the University of Cologne
Management by Helmut Brückner
and Martin Seeliger will be reported in
the preliminary report for the 2015 campaign.

91 M. Seeliger – D. Brill – S. Feuser et al., The Purpose and Age of Under-water Walls in the Bay of Elaia of Western Turkey: A Multidisciplinary Approach, Geoarchaeology: An International Journal 29, 2014, 150: Wasserspiegel in hellenisti -shear time at -1.67 m.

70

71

Kane, East Bay

Fig. 70 remains of house buildings and slab paving, site 08 no. 033.042–044

Fig. 71 Slope profile with multi-phase house development, location 08 no. 016

Double-shell dry masonry: partly pure andesite or limestone walls, often both types of stone mixed. According to selective relative chronological evidence, some of the pure andesite walls could go back at least to Classical times. The limestone walls and the walls in mixed

construction technology cannot be clearly identified as phases. The typology of wall techniques in Pergamon92 developed by Ulrike Wulf can only be used to a limited extent for the findings in Kane, since here mostly only wall crowns and profiles - hardly any visible sides with more than one layer of stone -
are to be assessed. The state of preservation of the walls in the slope profile suggests that the houses were usually built from a stone base with a mud brick structure. What is striking is the lack of construction techniques such as lime mortar bonding and Pergamene 'hand ashlar masonry', according to which the majority of the findings could belong to the pre-Roman period. Some walls, on the other hand, indicate a late antique-early Byzantine settlement horizon due to the noticeably higher level of the embankment profiles and poorer construction technology. Several weights of oil or wine presses provide evidence of agricultural production in the area of residential settlement.

In general, intensive stone theft has occurred in the urban area since ancient times. Only a few work blocks and column drums can still be found scattered all the way to Bademli. Only a few remains of buildings still indicate public monuments. The first thing that should be highlighted here is the west bay

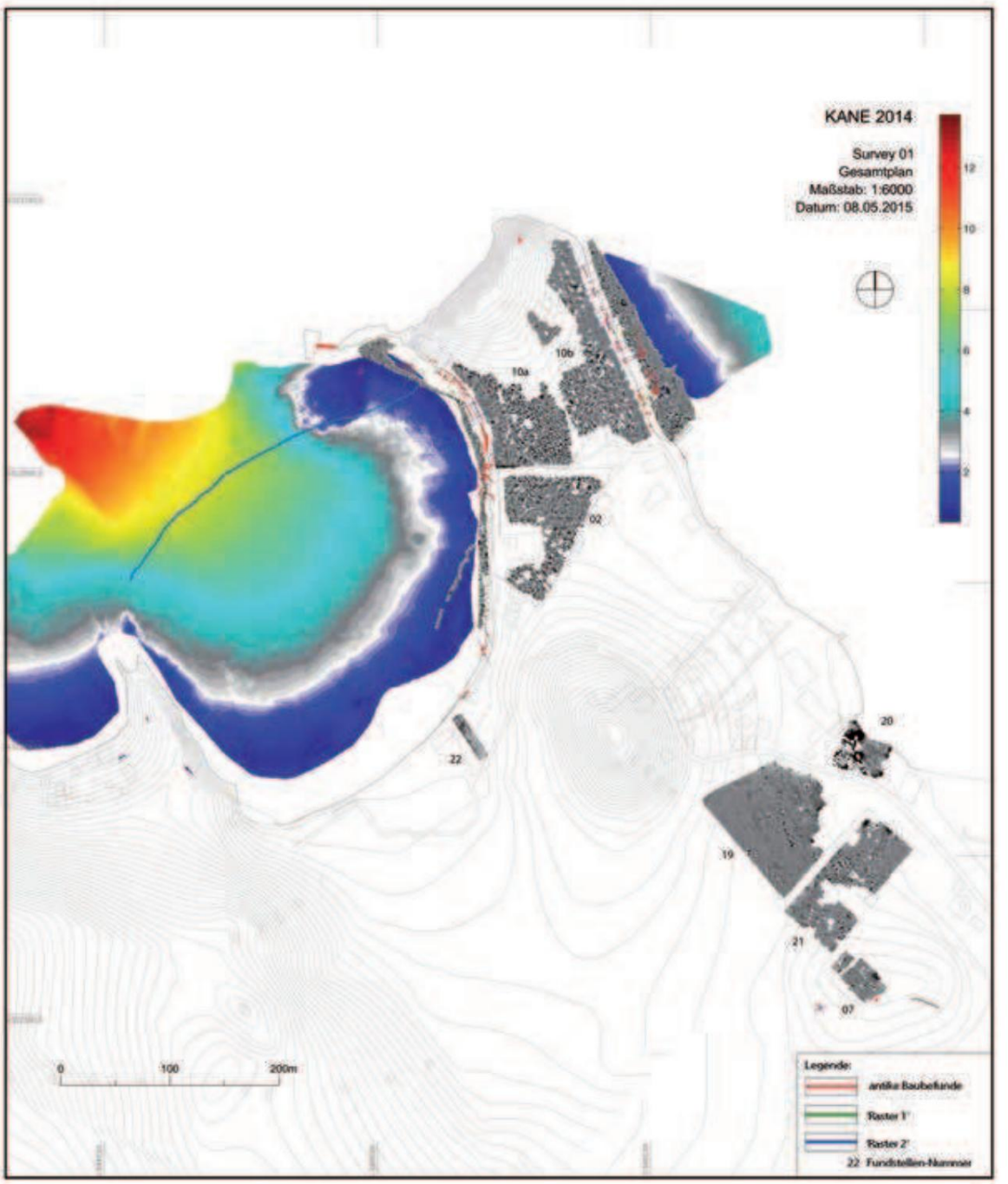
the traces of a wall parallel to the bank made of very careful red andesite blocks (finding location 01 no. 031), which, according to the construction technology, probably belongs to the late classical Hellenistic period93. Only two short sections with only one wall shell visible on the slope have been preserved in situ. In the extension there are sections of changing, mostly simpler construction technology on both sides; This coastal development line has apparently been redesigned several times. It can therefore only be assumed with caution that the preserved block section could be the remains of a sea wall (Fig. 68). Although it can be assumed that a city wall once existed, its course is completely unclear. A 'land wall' probably sealed off the peninsula, perhaps at the level of Kanlÿ Tepe (Fig. 68); This question will be examined again in 2015.

In the eastern bay, a wall line parallel to the shore over a length of 56 m is preserved in patches in the shallow water, which extends 90° inland in the south (discovery site 08 no. 018; Fig. 68). Only the top (level at approx. -0.30 m) of a layer of large, carefully placed stones is visible in the surrounding sandy soil

92 Wulf a. O. (note 24) 6–11.
93 Perhaps identical to von Schuchhardt a. O. (note 82) mentioned “remains of the quay wall made of large trachyte blocks”.

Fig. 72 Kane, West Bay. sole of the stone fill. Location 01 no. 051

Fig. 73 Kane, city plan with the geo-physical prospecting areas and representation of the water depth for the west and east bays in meters (the blue line in the west bay corresponds to the course of the example seismic profile Fig. 74) (M. 1: 6000)



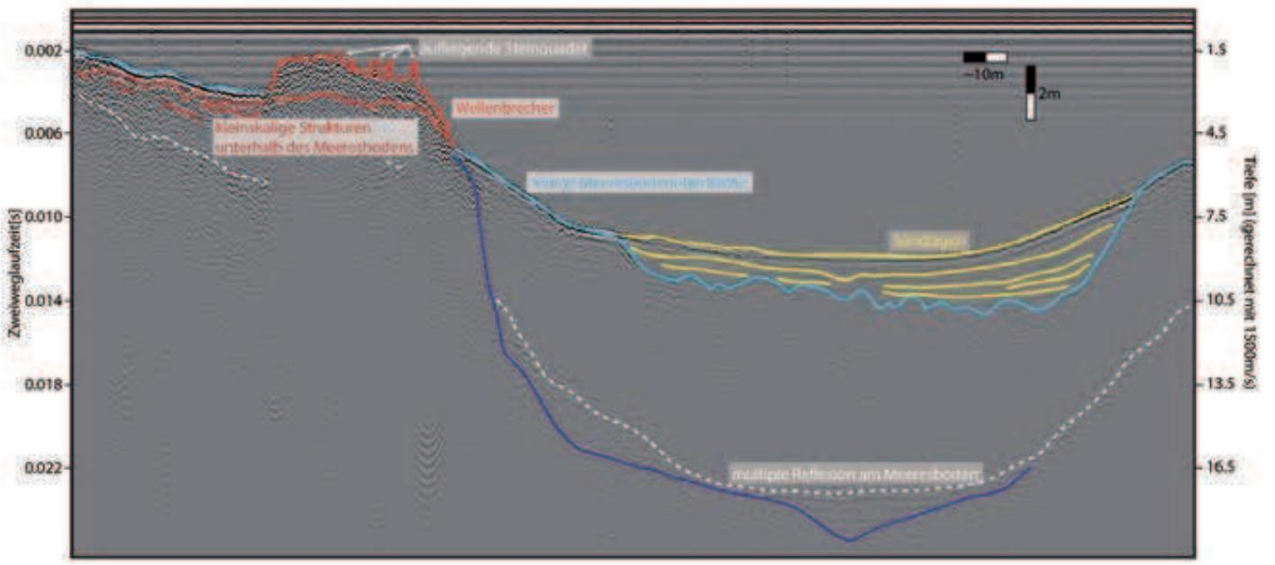


Fig. 74 Kane, West Bay. Exemplary seismic profile with gradient from the Shallow water area and the presumed breakwater into deeper water. Various seismic layer boundaries and structures are highlighted

Andesite blocks, which only form a wall shell facing the lake, from which individual deep trusses reach into the ground at the back. Rather than a fortification, this could be the foundation of a stoa - probably Hellenistic in terms of construction technology. The ancient shoreline can be assumed to be a few meters further seaward.

Apart from the structures mentioned, no other public buildings can be identified in the city area; Geomagnetic investigations (see below) provide further information.

A number of findings point to orthogonal planning principles in the city plan. Some buildings on the east and west bays follow an orientation of approx. 64° to the northeast (›grid 1‹). A second, different grid is rotated approximately 24° to the northeast and is obviously developed based on the natural topography: The southeast-northwest orientation corresponds to the long axis of the peninsula and the course of the coastline of the eastern bay. The presumed Stoicism also fits into this grid. The reconstruction of modular grids is

Based on these indications, this is only possible very hypothetically, as there are no clear road findings. On the west bay, the buildings, which here are also mostly oriented parallel or 90° to the shoreline, mostly follow the more curved coastline in a fan-shaped manner.

Port construction and port use

Based on the topography, it can be assumed that the city and its port operations were oriented towards both bays. The most striking finding in the west bay is a massive embankment of stone - undoubtedly ancient - that extends along the northern edge of the bay (finding site 01 no. 051; Fig. 68. 72–74; initially roughly marked in a rounded outline on the plan).

Its bottom on the sea side is up to approx. -6 m, the top towards the shore is relatively flat at <-2 m. Based on the construction technology, it is probably a breakwater94. The structural findings, level conditions and relation to the neighboring building structures on the bank must be checked again in 2015 in order to clarify the alignment with regard to a possible harbor basin or a landing zone. The evaluations of the seismic measurement data (see below) will provide further information on this.

The second notable building finding in the West Bay is a series of

94 DJ Blackman, Ancient Harbors 2, IntJNautA 11, 1982, 196 f. Compare, for example, the findings in Kyme: J.schläger – H. Schäfer, On the sea side of Kyme in the Aeolis, AA 1962, 48–58.

Fig. 75 ÿlÿca, Roman wall remains of the thermal baths. Location 06 no. 001

Opus caementicium wall remains, which extend roughly in a line in the shallow water area (at approx. -0.50 m) about 7–11 m from the shore (location 01 no. 07. 13. 14. 21. 27. 29; Fig . 68). The irregular outline of the preserved parts suggests that these are cast cores whose former veneer (made of ashlar shells?) was robbed. This line apparently largely represented the end of urban development towards the sea; For the time being, it is therefore obvious to interpret it as the remains of a quay.

Inland, on the bank, there are a few similarly oriented dry stone walls and the first house findings.

No comparable port buildings can be observed in the East Bay. The wide, flat sandy beaches in the western half of the West Bay and in the elongated East Bay, where ships could be landed, probably also served the requirements of daily port operations.

On the banks of the inlet south of the city no ancient structures have been observed. We hope that the geoarchaeological investigations to be continued in 2015 will provide information about its suitability as a possible additional port site.

Working in the outskirts of the city

The search for significant spolia in the area around the city yielded only a few relevant finds. The only ancient inscription known from Kane-Bademli95 can no longer be found today. The findings in the wider area of the city include the observation of a post-antique farmstead on the 123 m high summit of the peninsula to the southwest of the city area.

In parallel to the work in Kane, the documentation of one was carried out in 2014 The ancient building complex began about 4 km south, on the east bank of the inlet leading up to Bademli. Under the place name ÿlÿca, on the bank strip next to a modern thermal bathing houses are the remains of a large imperial period complex that probably had the same function (discovery 06; Fig. 67. 75. 76)96 .

Ceramic Survey97

The conditions of the findings on the surface are local due to the partial modern development and the changing intensive agricultural activity

95 Stauber a. O. (Note 83) II IK 51 56 Cat. 47.

96 The facility has only been briefly mentioned so far: Schuchhardt a. O. (note 82) 118; Stauber a. O. (Note 83) I IK 50 283 f.

97 The following statements are based on the report by Madlen Ernst (Bochum).

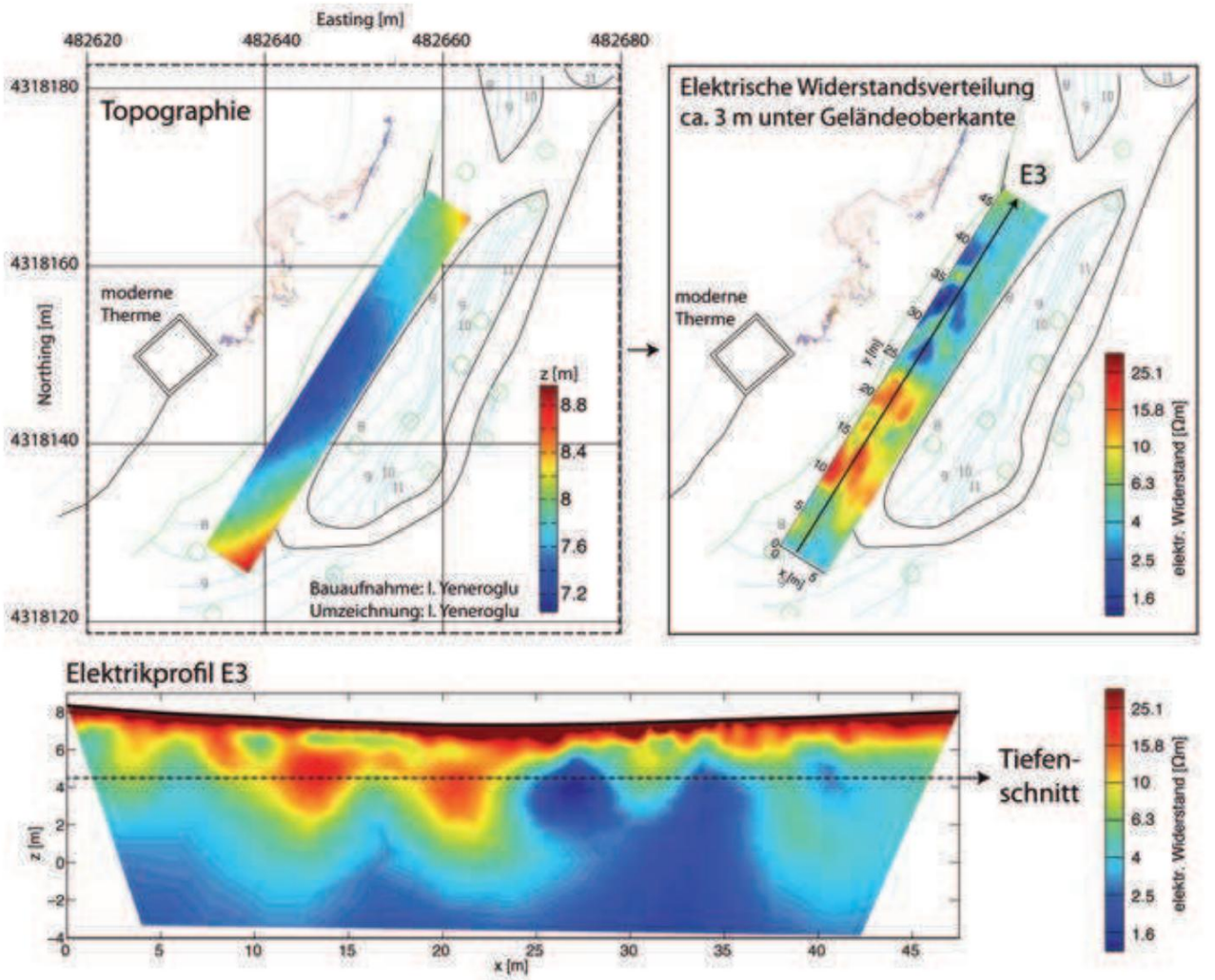


Fig. 76 ÿlÿca, topography of the measuring area southeast of the modern thermal baths (left), a depth section of the electrical resistance distribution approx. 3 m below the top edge of the ground (right) and an exemplary electrical profile (below)

Usage very uneven. A total of four particularly rich - irregularly distributed - areas (Fig. 68) were selected for the statistical investigation: site 02 (a plowed field) and the smaller sites 03–05 on the back of the peninsula in the area of one

plowed olive grove. Other areas within and around the presumed ancient city area were only examined to determine the density and range of finds to be able to roughly estimate. At one point in the eastern bay (site 08 no. 016; Fig. 71), ceramic material was stratigraphically recovered from the slope edge created by erosion and correlated with the layers of residential buildings preserved here. The out-of-context individual finds from the city area include a crater fragment of the so-called Westab-hang ware and a palmette antefix, probably from the Hellenistic period.

Due to the regulations for archaeological surveys that have been in force since 2013, the find material could only be processed on site and then remained on site. The associated problems with processing and documentation therefore only allow a limited overview of the ceramic spectrum in Kane.

At site 02, three grid squares measuring 1 m × 1 m were created at randomly selected locations in order to determine the density of finds for the entire area; two each at locations 03–05. They were counted

each edge and foot profiles, handles, walls and brick fragments.
The entire area was walked in serpentines, based on the recording methodology of the survey work in Elaia; The material recorded here is limited to edge and foot profiles as well as handles.

Site 02 (5268 m2) is the largest and richest of the four investigation areas. 880 handles and 466 diagnostic fragments were recorded here. These are divided into utility ceramics (263 fragments), coating ware (199 fragments) as well as glaze (2 fragments) and cooking ceramics (2 fragments). Particularly noteworthy are fragments of so-called Hellenistic fish plates from the 4th/3rd century. Jhs. v. BC (12 fragments) and LRC ware (62 fragments, especially Hayes Form 3 and 10). Two glazed ceramic fragments from the Byzantine period were also found. Both fish plates and Late Roman C ware do not appear at the other sites.

Site 03 (267 m2) has a very small amount of ceramics.
7 diagnostic shards and 5 handle fragments (4 amphora handles, 1 jug handle) were included. Worth mentioning is the fragment of a jug base from the Byzantine period with green glaze. The remaining fragments are exclusively those without any recognizable coating. Beyond this is a fragment of the foot of a Hellenistic unguentarium

remarkable.

Site 04 (323 m2) has a slightly higher amount of ceramics than 03.
19 diagnostic fragments were included (utility ceramics with 17 and coated goods with 2 fragments) as well as a total of 20 handles (exclusively amphora handles) and 2 fragments of lamps. What should be highlighted here are the edge fragments of two plates, whose counterparts in Pergamon date back to the 3rd – 2nd centuries. century B.C. Be dated. According to appropriate parallels, the edge of a bowl can also be dated to the Hellenistic period.

At site 05 (470 m2) there is again a higher amount of ceramics than at 03 and 04. 38 handle fragments were included, including 5 jug handles and 5 drinking vessel handles. The diagnostic material includes 54 fragments. Edge fragments of amphorae, most of which appear in Hellenistic and Imperial times, are common; a fine-dating could not be carried out. The fragment of a drinking vessel base has an approximate correspondence with a form attested in Pergamum, which dates back to the late 4th/early 3rd century BC. dated; two further drinking vessel fragments can also be classified as Hellenistic. There are also plate and bowl fragments with covers from the Hellenistic period.

Terrestrial geophysics

On the peninsula, a total of seven areas were examined using geomagnetics, including site 022 using georadar (Fig. 73)98, some of which were also used for the ceramic survey. These include central urban areas (finding sites 02. 10 a. b) as well as those presumably on the outskirts (finding sites 19. 20. 22) or belonging to the necropolis (finding sites 07. 21). Due to the diverse modern usage activities and the nature of the subsoil, the investigations revealed only a few clear indications of ancient structures (Fig. 68. 73). At site 02, wall formations can be observed that point to larger buildings and would partly fit well into the 'grid 1' (see above). At site 19, a linear (wall) finding is very clearly apparent, the interpretation of which remains questionable for the time being due to the lack of contextual evidence. In the area of the necropolis already mentioned above (finding sites 07. 21), several suspected tumuli with a diameter of approx. 3-12 m can be identified based on the findings.

98 The work was carried out by two teams from the University of Kiel and the University of Southampton/British School at Rome.

Marine Geophysics and Geophysical Prospecting in ÿlica99

The Institute of Geosciences, Geophysics Department at the Christian Albrechts University in Kiel carried out mainly marine measurements in the 2014 campaign in Kane. On the one hand, a high-resolution marine reflection seismic system consisting of a pinger that emits acoustic signals and two hydrophones that record the reflected signals was used. The signals are partly reflected on the seabed, but also penetrate into the ground and are reflected there on layer boundaries and objects. An initial evaluation produced a plan of the water depth over the entire west bay (up to a depth of approx. 12 m) and in the area near the shore of the east bay (up to a depth of approx. 5 m) (Fig. 73). A local elevation is clearly visible in the east of the western bay, which is also characterized by a particularly rough signature caused by large boulders on the seabed surface. These stone blocks can be clearly seen in profile (Fig. 74), where they rest on the slight elevation.

The internal structure of the elevation also shows more chaotic reflections than the other area just below the sea floor, which indicates a composition of individual stones/rocks. The elevation is therefore being discussed as a possible breakwater because of the steep drop into the bay. In the middle of the bay there are several layers of natural sand on top of the otherwise rocky seabed material. In contrast, in the area near the shore there are indications of small-scale structures directly below the seabed.

On the other hand, marine magnetic measurements were carried out in the shallow water area near the shore (Fig. 73). For this purpose, four fluxgate magnetometers were used, which can be easily lowered into the water in order to reduce the distance to the seabed and obtain a stronger signal from the subsurface. The results of these measurements are dominated by strong dipole-shaped, randomly arranged anomalies caused by the magnetic stones lying on the surface. Any underlying archaeological findings made from presumably the same materials cannot be clearly identified.

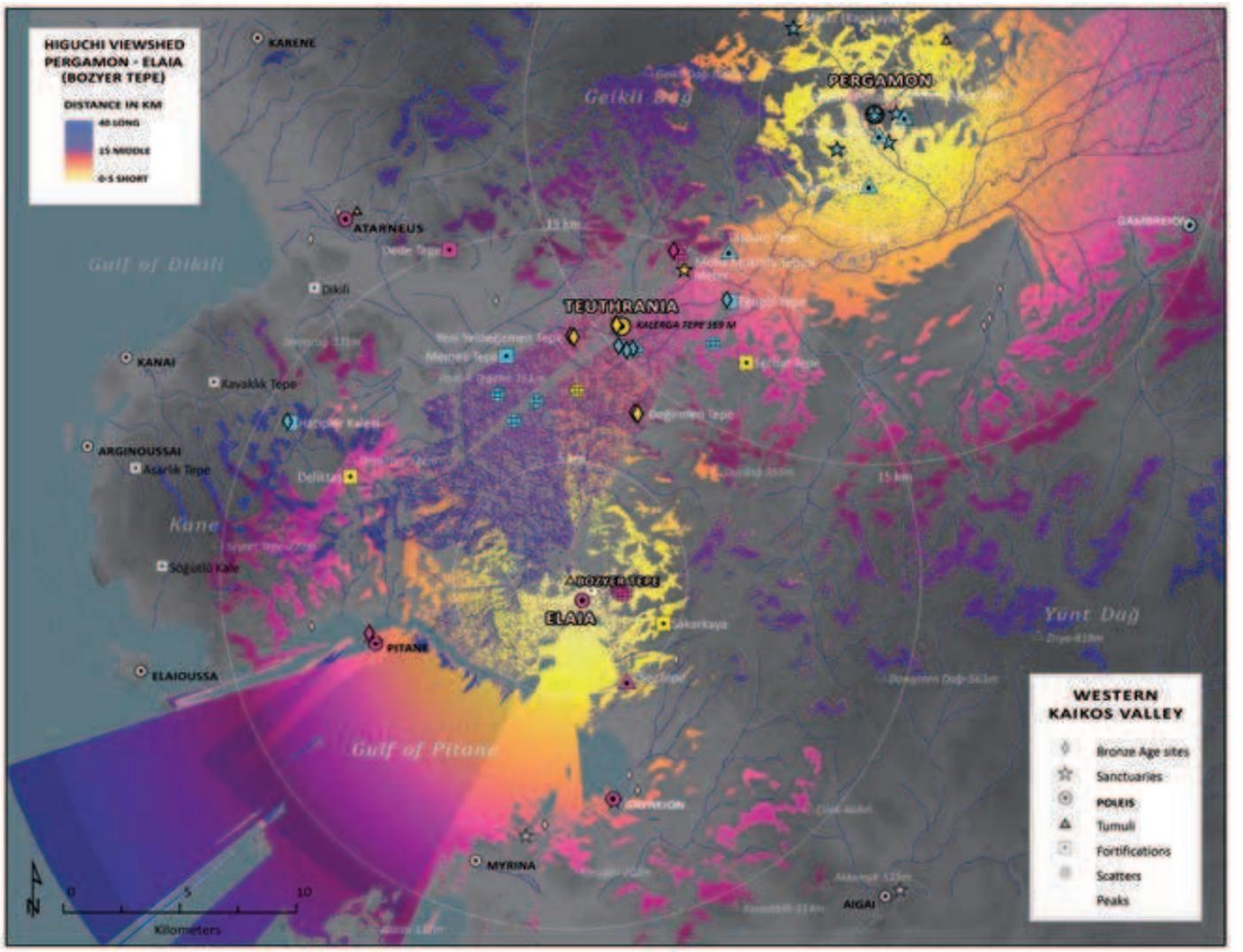
In ÿlÿca, geophysical measurements were carried out above the Roman thermal baths (Fig. 67. 75) in order to locate possible building remains hidden in the cliffs. Since the electrical resistance at this location was relatively low, the geo-radar did not provide any penetration. Geoelectric measurements were carried out parallel to the shore on seven profiles with a profile spacing of 1 m. All profiles show evidence of a landward extension of the modern bath - which is presumably based on ancient structures - as an area of increased electrical resistance (Fig. 76), which extends to around 4-5 m below the surface of the ground and can indicate possible remains of buildings.

outlook

The sparse ancient written sources, epigraphic and numismatic evidence for Kane100 paint the picture of a modest port city for the Greek era, which had perhaps already reached the peak of its development in the late classical-Hellenistic period. The findings obtained so far from archaeological investigations confirm this picture. The economic possibilities of the small polis are likely to have been exhausted by the income from the Chora and a presumably more local sea trade.

According to Pliny, the city would no longer have existed by his time101 - A statement that can at least be put into perspective based on the construction findings

99 The following section is based on the report by Ercan Erkul, Annika Fediuk, Dennis Wilken and Tina Wunderlich (Kiel).
100 Discussion of the sources on the city by Stauber a. O. (note 83).
101 Plin. nat. 5, 122, 1.



is. An early Byzantine settlement horizon is then more clearly visible than the imperial period. This preliminary picture of the Kane settlement genesis must be supplemented by follow-up investigations in 2015. The work will then continue in 2015, focusing on other locations on the Kane coast, including the thermal baths near ÿlÿca and in Pitane (Candarlı).

Fig. 77 Pergamon, surrounding area. visual relationships, cumulative 'higuchi viewsheds', of Pergamon (Temple of Athena) and the Bozyer-Tepe tumulus with viewing areas. Blue symbols: visibility of Pergamum; magenta symbols: visibility of Bozyer Tepe; yellow symbols: visibility from both points

EL

visual relationships in the western valley of the Kaikos

An archaeological-ancient historical study examines the role that visual relationships and their staging played in the formation of the Pergamene territory based on the data on the western Kaiko Valley, which have been obtained over the past few years from various surveys as well as research on the rock sanctuaries and the necropolises have102. The investigations are based on both visibility area analyzes (Fig. 77) and on-site visibility monitoring. During this campaign, numerous points were checked and new coordinates were taken both in the Kaiko Valley and on the Kane Peninsula. The results will be incorporated into the publications of the projects on the various surveys, on the rock sanctuaries and the necropolises or tumuli.

102 Project by Christina Williamson (Providence – Groningen) with support from the Netherlands Organization for Scientific Research (NWO).

As an example, Figure 77 illustrates the combination of the 'Higuchi viewsheds' from Pergamon (Temple of Athena) and the tumulus on the Bozyer Tepe west of Elaia, which, according to our interpretation, served as a cenotaph and support for a monument103 . Places marked in blue are only visible from Pergamon, points in magenta only from Bozyer Tepe. Yellow dots indicate places that are visible from both positions. It is revealing that Teuthrania is the mythical predecessor of Pergamon, but also the rock sanctuary on the Molla Mustafa Tepe and the fortress on the Serhat Tepe fall within the medium visibility range (15 km) of both starting points.

individual studies and processing

This year, the investigations into individual material types and older excavation findings were continued. Although they do not take place as part of the current research program on the Hellenistic residential city and its surrounding area, they are also one of the core tasks for a long-term undertaking such as the Pergamon excavation.

Old excavations and architecture

The project to process old excavations and finds on the ancient necropolises of Pergamon was completed by reviewing and supplementing work from previous years104. The in-depth study of grave goods from Hellenistic tumuli such as the Seç Tepe near Elaia, the Tumulus III from Pergamon or the so-called Tomb Y next to Tumulus II is now taking place as part of the new project on the funeral culture of the Aiolis105. Further individual investigations focused on the use of fired bricks in imperial Asia Minor106 and the temple of Dionysus on the theater terrace107. Column shafts and drums, bases and capitals were documented as part of a study of polygonal columns, which are more common nowhere in the Old World than in Pergamum .

Found material

The archaeometric study of pottery from Pergamon and its surrounding area continued with the collection of 28 additional samples for XRF analysis109. The focus was again on cooking and kitchen ceramics as well as some fragments of thin-walled ware. At the same time, around 60 samples were taken as part of a project by the Center national de la recherche scientifique, which is dedicated to researching the origins and technologies of Byzantine and early Ottoman ceramics in western Anatolia110 . The processing of the jewelry and costume components from Pergamon concentrated on the material groups “pendants” and “varia”111 .

epigraphy

The focus of this year's epigraphic research was the further documentation of the inscription discovered at the end of the 2013 campaign in one of the Roman sewers on the lower western slope112. Due to the very

103 S. Feuser – A. Sarÿoÿlu in: Pirson 2010, 202–208; Pirson 2010, 220.

104 Project by Ute Kelp (Berlin) in cooperation with the Archaeological Institute of the University of Cologne (Michael Heinzelmann) and funded by the German Research Foundation.
see most recently Pirson 2014, 147 with note 92 and U. Kelp, Pergamon Nekropolleri. The Necropolis of Pergamon, in: Pirson-Scholl 2014, 354-375.

105 see note 66.

106 dissertation project by Julia C. Martin (Berlin).

107 dissertation projects from Anika Zeitler (Regensburg).

108 dissertation projects from Tess Paulson (Stockholm).

109 Project by Sarah Japp (Berlin) in cooperation with Gerwulf Schneider (Free University of Berlin) and Güler Ateÿ (Heidelberg) for the ceramics from Elaia and the surrounding area of Pergamon.

110 Project by S. Yona Waksman and Jacques Burlot (Lyon).

111 dissertation project by Andrea Pirson (Istanbul).

112 Pirson 2014, 115 f. Fig. 22. The investigations were carried out by Victor Walser and Helmut Müller (Munich) as part of the research of the Commission for Ancient History and Epigraphy of the DAI on the inscriptions from Pergamon. The following statements are based on the report by V. Walser.

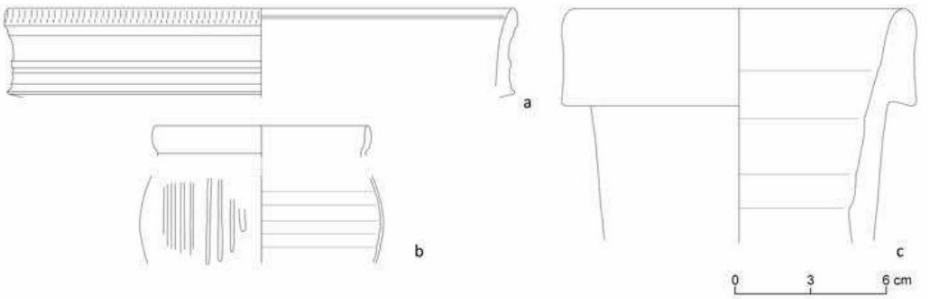


Fig. 78 Pergamon, Italian imports from the Sondages on the eastern slope. a: steep edge plate with fine chatter marks from construction T (Pe07 so 22); b: thin-walled cup from the crossing probe on the upper eastern slope (Pe07 so 18); c: Amphora of type Dressel 1c from building U (Pe08 so 07) (M. 1 : 3)

difficult working conditions in the narrow and e.g. In the partially buried canal, the reading had to be carried out primarily directly on the stone, which was successful in all visible areas. It has been confirmed that the text is two different but probably related documents. The document, which is almost completely legible, is a decision by Gerousia of Pergamon, probably from the 1st century BC. The text provides insights into private financial and asset management, illuminates the role of the Gerousia and at the same time provides information about the economic effects of the political crises and wars of the 1st century. v. BC

Another epigraphic study dealt with artist signatures in Pergamon[113] .

FP

Current research into the processing of finds: Italian imports in the Pergamene ceramic repertoire

The Imperial period form repertoire of the Eastern Sigillata C (ESC) produced in the Pergamon region shows a number of arretina-like types [114]. According to Kathleen Warner Slane, such an imitation or adaptation of Italic forms leaves a presence of imported Italic models in Pergamon assume, especially since the pargamene tableware also »other evidence of dependence on Italian prototypes from the Augustan period into the 2nd century« show[115] . This includes, for example, thin-walled ceramics. This model will be examined below based on current research. On the one hand, the quantity of Italian imports must be asked, and on the other hand, the processes of imitation or adaptation of Italian types must be discussed.

Contrary to Slane's thesis, only a small number of Italian imports were identified in the material found from the excavations on the eastern slope from 2007 to 2010[116] . This is a steep-edged plate with fine chatter marks (Conspectus 20) from the uppermost lintel of Building T (Fig. 78 a). A thin-walled cup from the second level of the crossing probe on the upper eastern slope has a comparable product, for which an Italian provenance should at least be considered (Fig. 78 b).
In addition, some amphorae indicate contact with the Italian region. An amphora of the Dressel 1C type, the make of which can be classified as Campanian, was found in the top lintel of building U (Fig. 78 c)[117] . An amphora from the grotto sanctuary on the eastern slope and another from the survey carried out on the Kane Peninsula in 2014 can also be assigned to this product. A comparable product is also shown on a Pompeian Red Plate from the old excavations on the Musalla Mezarlÿk. The exact attribution of three further amphorae

113 Project by Sebastian Prignitz (Berlin).

114 On the definition of Eastern Sigillata C s. B. Engels – S. Japp – A. Keweloh in: Pirson 2011, 251–255; S. Japp, Sigillata of Pergamon - Eastern Sigillata C. Problems of Classification and Chronology, in: H. Meyza, Late Hellenistic to Medieval Fine Wares of the Aegean Coast of Anatolia (Warsaw 2014) 11–21. Regarding the arretina-like types: C. Meyer-Schlichtmann, The Pergamene Sigillata from the city excavation of Pergamon. Mid-2nd century B.C. BC – mid-2nd century AD, PF 6 (Berlin 1988) 191–194.

115 KW Slane, reviewer on Meyer-Schlichtmann a. O. (note 114), Gnomon 63, 1991, 152. In this regard, she refers to three potentially unrecognized Italian imports: Meyer-Schlichtmann a. O. (Note 114) 231 Cat. 233; 239 cat. 332; 244 Cat. 384.

116 The complex of the grotto sanctuary and its found material, which was uncovered in 2010, were worked on by Benjamin Engels as part of his dissertation at the Free University of Berlin (for the archaeological context see Pirson 2011, 110–120; Pirson et al. O. [Note 12] 289-294). The material found from the probes in building T (see Pirson 2008, 91-93; Pirson 2009, 139-147), building U (see Pirson 2009, 147-150) and the crossing probe on the upper eastern slope (see Pirson 2008, 89-91) are analyzed by Anneke Keweloh in her dissertation at the Humboldt University in Berlin.

117 For the type Dressel 1C see. T. Bezeczky, The Amphorae of Roman Ephesus, FiE 15, 1 (Vienna 2013) 106–110.

manufactured products whose Italian provenance should be considered based on comparisons still needs to be checked118 .

Among the dating ceramic finds from the so-called building with the podium hall in the city excavation, only one Italian import came to light, the edge of a steep-edged plate with fine chatter marks119. In the material found in the so-called Building Z in the city excavation, the number of imports was also very small120: an edge piece of a steep-rimmed bowl with chatter decoration and applied spiral (similar to Conspectus 23.2.1), the wall fragment of another steep-rimmed bowl with chatter decoration, the foot fragment of a sigillata -plate (Dragendorff 17A) and possibly the foot of a thin-walled jug and the edge of an amphora Dressel 1C. Even among the clay vessels from the bath complex west of the so-called Heroon for Diodoros Pasparos, a preliminary examination shows that only very few Italian representatives can be identified among the thin-walled ceramic

Overall, Italian imports are limited to steep-rimmed plates/bowls and a few other sigillata shapes121 as well as thin-walled ceramics, a unique Pompeian red plate and amphorae of the Dressel 1C type.

Even if the number of ceramic imports from Italy in Pergamon is small122, influences on local production can still be seen. These primarily include those in the first half of the 1st century. AD popular steep-rimmed bowls/plates (Conspectus 17–23) and the collar bowls (Conspectus 34). These pieces also attracted great interest in Pergamon, although a slightly different spectrum of forms can be observed there. The majority of steep-edged plates and bowls are representatives with a straight or slightly curved edge zone and a rather reserved profile123. In addition, there are a number of examples with a clearly concave curvature of the edge zone124, which can also be structured by grooves. On the other hand, the concisely profiled pieces with grooves, fine chatter marks and applied motifs only appear rarely125. The same applies to the collar bowls, in which neither internal profiles of the wall molding nor other decorative motifs appear126 .

Carsten Meyer-Schlichtmann assumed that the arretina-like steep edge shapes in Pergamon were already in the 2nd half or the last quarter of the 1st century. v. 127 BC. This dating would exclude an Italic impulse, as the earliest types there only begin in the early 1st century AD. Meyer-Schlichtmann therefore consistently concluded that there was a transfer from east to west. In Italy received the forms

118 These are products that are comparable to the product described by Bezeczky as Italian Fabric P2, for which he assumes a northern Italian or Dalmatian provenance (Bezeczky loc. cit. [Note 117] 117 f. Sample No. 273, 274, 278, 279 plate 75).

119 S. Japp, dating ceramics the podium hall building, in: H. Schwar-zer, The building with the podium hall in the city excavation of Pergamon, AvP 15, 4 (Berlin 2008) 283 K 185.

120 The finds from Building Z and the bathing complex are presented by Sarah Japp.

121 A selective import of Italic sigillata can also be observed at other sites in the eastern Mediterranean. An example of this

M. Archer, Italian Sigillata in the East. Two Different Models of Supply (Olympia and Ephesus), in: J. Lund – D. Malfitana – J. Poblome, Old Pottery in a New Century. Innovating Perspectives on Roman Pottery Studies. Atti del Convengo Internazionale di Studi Catania 22-24 April 2004 (Catania 2006) 175-188.

122 Among the samples of tableware and thin-walled goods declared as imports of unknown provenance None identified as Italian using XRF by G. Schneider (Berlin).

123 Meyer-Schlichtmann a. O. (Note 114) Plate 13 N 39; Plate 19 T 31. 33; Yep a. O. (Note 119) 307 K 196 f.

124 D. Pinkwart – W. Stammnitz, peristyle houses west of the Lower Agora, AvP 14 (Berlin 1984) plate 38 K195; Meyer Schlichtmann a. O. (Note 114) Plate 13 N 40; Plate 19 T 35.

125 Meyer-Schlichtmann a. O. (Note 114) Plate 13 N 39c; Plate 19 T 34.

126 Meyer-Schlichtmann a. O. (Note 114) 107–109 Plate 13 (Type N 33).

127 Meyer-Schlichtmann a. O. (Note 114) 191–194.

Fig. 79 Pergamon, thin-walled ceramics imported from Phokaia from the Sondagen on the eastern slope. a. b: ovoid cup with a high, convexly curved funnel rim from the grotto sanctuary (Pe10 Ar 05); c: Cup with a steep, slightly curved funnel edge from building U (Pe08 so 07) (M. 1 : 3)

then their standard form, which in turn had an impact on the East. However, based on the new research, these forms cannot be classified so early and the thesis is therefore not confirmed. Regardless of this, it remains striking how quickly the transfer and takeover or transformation took place in the case of the collar bowls, for example.

Thin-walled ceramics include hard-fired clay vessels whose characteristic feature is the very thin wall (less than 1 to approx. 4 mm) and which are clearly defined by make and repertoire of shapes128. This genus, which began in the late 2nd century B.C. B.C. spread throughout the Mediterranean region, applies to the period up to the middle of the 1st century. v. BC often as an indicator of a "strong Italian influence"129 .

In Pergamon, however, it is hardly possible to identify Italian imports in the Hellenistic findings, such as those in Ephesus that precede the increased appearance of thin-walled ceramics from the late Hellenistic and especially Augustan period onwards130. The only provenance of thin-walled imports that has been proven so far is Phokaia. The Phocaean imports are limited to ovoid cups with a high, convexly curved funnel rim (Atlante type I/20 I/362, Marabini VII)131 (Fig. 79 a. b) and cups with a steep, slightly curved funnel rim (Marabini LXXV, Japp type Y) (Fig. 79 c). The last-mentioned form also occurs in factories in the Pergamene region, which means that it was quickly integrated into the local repertoire.

Overall, a strong form selection can also be observed with thin-walled ceramics. The local repertoire is largely limited to ovoid cups with an accentuated shoulder and a curved edge (Japp type Y) (Fig. 80 b), an intermediate type with an outwardly curving edge without a shoulder step (Japp intermediate type, Atlante type 1/363) (Fig. 80 c) and

128 MT Marabini Moevs, The Novel Thin Walled Pottery from Cosa (1948–1954), MemAmAc 32 (Rome 1973) 36–43; A. Ricci, Ceramica a pareti sottili, in: Atlante delle Forme Ceramiche 2. Cera-mica fine Romana nel Bacino Mediter-raneo (Rome 1985) 241 f. On thin-walled ceramics in Pergamon: S. Japp, Early Roman thin-walled hardware from Pergamon, IstMitt 49, 1999, 301–331.

129 KW Slane, The Fine Wares, in: SC Herbert (ed.), Tel Anafa 2, 1 (Ann Arbor 1997) 349; K. Roth-Rubi, Thin-walled ceramics (ceramica di pareti sottili) of the early imperial period as an indicator of Romanization in West and in the East, in: Lund et al. O. (Note 121) 57–64.

130 J. Struber-Ilhan, fine ware (thin-walled ceramics) in the Eastern Mediterranean region. A comparison of the range of forms from Ephesus with sites in Greece and Asia Minor, in: C. Reinholdt – W. Wohl-mayr (ed.), files from the 13th Austrian Archaeological Day in Salzburg from 25th to 27th February 2010 (Vienna 2012) 175.

131 According to Andreina Ricci, this one is Type since the beginning of the 1st century. v. BC Produced in the central Italian region from the middle of the 1st century. v. BC but also in other places (Ricci op. cit. [note 128] 248 plates 79, 1–8).

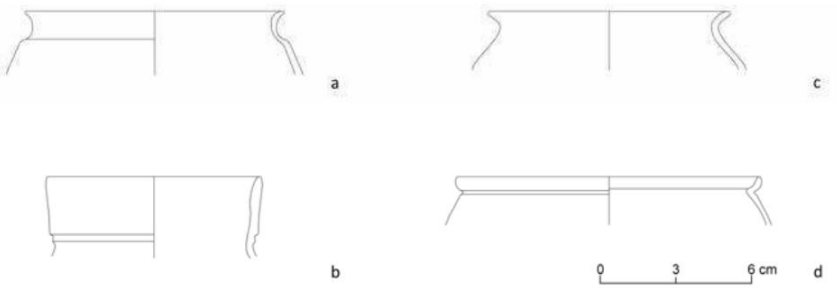


Fig. 80 Pergamon, type repertoire of thin-walled ceramics from the sondages in Bau T osthang (Pe07 so 22/Pe08 so 04).
a: Cup with accentuated shoulder and scalloped rim; b: Beaker with steep, slightly curved funnel edge; c: Cup with outwardly curving rim without shoulder heel; d: Cup with a short, clearly curved edge (M. 1: 3)

Beaker with a short, clearly curved rim (Japp type Y, Atlante type I/42, Mayet IV) (Fig. 80 d). The first two types mentioned as well as the ovoid cups with a high, convexly curved funnel rim were widespread in the eastern Mediterranean. Despite analogies to the Republican-Augustian form repertoire in the Italian region, according to Johanna Struber-Ilhan, the question of an independent form development of thin-walled ceramics in the East must be raised, since the sometimes very bulbous body shape with the largest diameter in the lower third is a characteristic here132. The locally produced thin-walled ceramics are therefore not a direct imitation of Italian types, but rather the adaptation of individual shapes and elements. The impetus was probably not Italian originals, but rather imports from Phocaia. Struber-Ilhan also notes that thin-walled ceramics were produced not only in Italy, but also elsewhere in the Roman provinces, and therefore comes to the conclusion: "It is therefore not a direct adoption of Roman drinking vessels, in the sense of exclusively Italy imported goods into its own table service, but rather a general phenomenon, and therefore a fashion trend«133 .

The number of Italic imports in Pergamon is also shown to be extremely low in the new evaluations of find complexes. Nevertheless, an influence of Italic forms on local production in the early 1st century AD can be noted. However, this does not seem to have resulted in a direct copy of Italian models, but rather as an impulse for his own creations. In addition, he often reached Pergamon not directly, but indirectly through regionally produced copies of Italian models.

SJ – AK – BE

The found coins

The systematic processing of the found coins has been resumed since the 2008 campaign after a break of more than ten years. The identification of the newly acquired material from Pergamon in the period 1997–2014 included almost 430 coins, but further extensive ensembles of coins found from older excavations still require a complete recording or publication. These include the approximately 700 ancient coins found from the later city excavation campaigns (1982–1998), which were identified by Hans Voegtli and Markus Peter up to 1997 and are not accessible for research134 . Also the approximately 300 ancient coins from the Traianeum have so far only been documented in the form of handwritten index cards. mentioned. Finally, many scattered finds remain that have been around since the 1960s

132 Struber-Ilhan a. O. (note 130) 178.

133 Struber-Ilhan a. O. (note 130) 175.

134 The monograph by H. Voegtli, The found coins from the city excavation of Pergamon, PF 8 (Berlin 1993) includes the material from the campaigns 1973 to 1981.

are still to be determined.
All the pre-processed material was re-recorded between 2009 and 2011, and a significant part of the stray finds (220 coins) was identified. As of the current processing status, the approximately 700 ancient coins found from the city excavation (1982–1998) are recorded as a digital catalog in a database of the Coin Cabinet of the State Museums in Berlin; The online use of the database is still in preparation. Of great interest for questions of coin circulation are the coin finds that were discovered during the surveys in Atarneus (53 coins) and in the city of Elaia (15). In addition, a lot of 130 coins (donation from the Afÿÿn family to the Bergama Museum) from the urban area of Elaia were collected in 2013. In preparation for a corpus of the coinage of the city of Elaia in the Hellenistic and Roman times, all coins found in the Aeolian polis from previous campaigns were viewed and photographed in the same year.

When processing the new and old find material, particular attention was paid to the archaeological context of the find, the degree of use and the origin of the coins. The bronze coins minted in Pergamon, which make up the highest proportion of the coin finds, can only be classified into broad minting periods for the Hellenistic period and can only be used to a limited extent as a dating indicator. But using coin hoards or coin finds from known find contexts, one could

Relative and absolute chronology of the bronze coins minted in Hellenistic Pergamon are to be worked out135. The distribution of these bronze coins outside of Pergamon shows a very differentiated picture: the coins of the Attalids circulated throughout the empire, the temple coins on Athena Nikephoros and Asklepios Soter spread as far as Greece and inland Asia Minor (Phrygia), while the urban bronze coins coins for exclusive circulation in the polis or on its territory

were determined.

The question of the presence of non-Pergamene coins among the finds in Pergamon was also comprehensively addressed. Although different sources are often difficult to compare with one another, it seemed to be of great interest to confront the composition of the foreign coins of the Hellenistic period with the statements of the inscriptions that document the presence of foreigners in Pergamum136. Coin finds and inscriptions shed particular light on the international relations of the metropolis under the Attalids and afterwards.

The work of the 2014 campaign yielded 53 coins, of which 49 were ancient (4th century BC to 4th century AD) and 4 were Ottoman coins. The majority of these coins probably came into the ground through loss - a loss that, given the low value of these AES denominations, could certainly have been absorbed by the money users. There is therefore no need for a long explanation that individual finds mainly consist of bronze denominations, but only rarely of silver or gold coinage, which were also in circulation in every large polis. Individual finds therefore do not provide a faithful representation of the coins that were in use in ancient Pergamon, but only of the small change that was traded in everyda

Of the 49 individual finds of ancient coins, only a few come from defined find contexts. In area 1 (rock sanctuary 4; see above), significant ceramic finds and four Hellenistic bronze coins from Pergamon came to light from layer 41 in the northern area, the time spectra of which are

135 J. Chameroy, Chronology and distribution of the Hellenistic bronze coinage from Pergamon: the contribution of the found coins, Chiron 42, 2012, 131–181.
136 J. Chameroy – I. Savalli-Lestrade, Pergame, cité et capitale dynastique, au miroir de la prosopographie intern et des trouvailles monétaires, Topoi 20, 2015 (in press).

81

82

Pergamon, found coins

Fig. 81 Municipal bronze coin from Pergamon, approx. 40–60 AD. (Type rPc I, No. 2373; Pe14 KFn 413; M. 2 : 1)

Fig. 82 Municipal bronze coin from Pergamon on Trajan, 98–117 AD. (BMc greek coins, Mysia, no. 260. 261; Pe 14 KFn 412; M. 2 : 1)

agree with each other. The ceramic fragments point to a period beginning in the 2nd or 1st century BC. BC, while the oldest coin dates back to the last third of the 2nd century, the three others to the 1st century BC. 137 BC .

In contrast to the lost finds, the majority of the coins from the southeast necropolis (see above) were deliberately deposited. Two coins were found as offerings from grave 21 (cremation); A third lay under grave 21 in layer 112, so that its belonging to grave 21 is not certain.

In any case, these are coins of the same type that the city of Pergamon minted in honor of the Senate or Roma (ÿÿON CYNKÿHTON / ÿÿAN PÿMHN) around the middle 1st century AD138 . The first coin shows advanced signs of circulation, while the other two were added with hardly any wear (Fig. 81). The backfill (layer 110) of body burial 22 yielded, among other things, a coin of the same type (PE14 KFN 414) that had not yet been restored at the time of the report. The date of minting and the (usually minor) wear and tear of the coins discussed suggest that graves 21–22 date from the second half of the 1st century. AD to date.

The inhumation 29 dates back to the beginning of the 2nd century at the earliest, as evidenced by the finds of a late Hellenistic139 and a slightly worn bronze coin from the Trajan period from Pergamon (Fig. 82). The addition of a Hellenistic coin in a grave that was probably from the Imperial period is also attested by grave building 7, in which an unidentifiable Hellenistic bronze coin (PE14 KFN 409) lay on the bottom of the grave. We do not know whether the addition of a Hellenistic coin had any special significance in Roman times.

The five municipal bronze coins from graves 21, 22, 29 (PE14 KFN 407, 410, 412–414) represent the first documented monetary offerings in imperial graves in Pergamon. All five pieces with Senate/
Roma and Trajan/Zeus Philios also form the smallest denominations that the city issued in the imperial period140 . They thus give us insight into the ancient rite of coin sacrifice, according to which the sacrificed coins were not selected at random, but were usually selected from among the smallest Aes pieces available. For another six coins from area 2, there is no connection to the uncovered graves. It can no longer be decided with absolute certainty whether they should be viewed as monetary offerings from destroyed graves or as lost finds.

Finally, among the 30 individual finds that were determined to be Hellenistic or Imperial, the small proportion of foreign coins - five pieces - should be underlined141. It is not surprising that Elaea, as a nearby city or one with close economic ties to Pergamon, provides three of the five foreign characteristics. Those in the 1st century B.C. Bronze coins of the type Demeter head/torch in a wreath (PE14 KFN 401, probably also) minted in Elaia in the 1st century BC

137 PE14 KFN 13: a bronze coin head of Asclepius/ snake staff (BMC Greek Coins, Mysia, no. 154–157), approx. 130 – beginning of the 1st century B.C. BC; KFN 14 and 16: two bronze coins with the head of Athena/Nike (BMC Greek Coins, Mysia, No. 135–138 or 141), 1st century BC. BC; all four coins were minted in Pergamum.

138 PE14 KFN 407 and 413 (1st or 3rd coin): Type RPC I No. 2373; KFN 410 (2nd coin): RPC I No. 2375.

139 PE14 KFN 411: a bronze coin with Athena's head/owl on a palm branch, minted around 80 - around 10 BC. BC in Pergamum (BMC Greek Coins, Mysia, No. 193–204).

140 RPC I, 402 (17 mm, 3.47 g from 18 copies); B. Weisser, The imperial coinage of Pergamon (Diss. Ludwig-Maximilians-Universität München 1995) 36 f.

141 Z. Çizmeli-Ögün – M.-C. Marcel-lesi, Réseaux d'échanges régionaux en Asia Mineurs occidentale: l'apport des monnaies de fouilles, in T. Faucher – M.-C. Marcellesi – O. Picard (ed.), Nomisma. La circulation monétaire dans le monde greek antique. Actes du colloque international Athènes 14–17 avril 2010, BCH Suppl. 53 (Athens 2011) 309.

KFN 801) are among the most frequently found foreign coins in the Mysian polis. Their regular occurrence in Pergamon raises the question of whether these pieces were allowed to circulate there as small change in order to simplify the circulation of coins or trade between the port city and the metropolis142 .

In contrast to the coins from Elaea, bronze coins from other cities only occur irregularly and in very small numbers143 . This indicates that foreign bronze money could not function as a means of payment in Pergamum. Worth mentioning in this context is the bronze coin from the city of Maroneia, which came to light during the 2014 campaign (PE14 KFN 603): It is the fifth coin from the Thracian city that has been found in Pergamon since the first coin find list created by Kurt Regling in 1913 was registered144. In Maroneia itself, excavations to date have yielded four Attalid bronze coins that were not recognized as a means of payment in Thrace145. Intensive contacts between the two cities have not yet been proven. Nevertheless, the bronze money of the Thracian city or the Attalids must have been distributed via traders or travelers who carried it with them and exchanged it for local money in the respective city. It should come as no surprise that bronze coins brought by strangers kept getting lost during their stay in Maroneia or Pergamon. Coins also occasionally fall out of the pockets of modern tourists visiting the Acropolis - including a 10 cent piece minted in Hong Kong in 1989 that was found during the 2008 excavation campaign146 .

J.Ch.

The anthropological-palaeopathological investigations 2014

In the course of the anthropological-palaeopathological investigations of the human skeletal remains from Pergamon in 2014, the human remains excavated in the current campaign from the southeast necropolis (1st - 4th century AD; see above)147 as well as the Skeletal remains from the Byzantine graves on the Lower Agora (see above) processed.

In addition to the human finds from Pergamum, the Hellenistic burials from Elaia excavated in 2008 were also examined148. The ÿzmir Museum requested an assessment of the few human and animal skeletal remains from a monumental burial mound near Kyme (Aliaÿa)149 that was excavated in 2014 .

As in previous years, morphological and metric characteristics were used to determine gender and age. The epigenetic characteristics and traces of pathological changes were recorded according to relevant work150 .

Skeletal remains from the 2014 excavation in the southeast necropolis During the final excavations in the southeast necropolis, a total of 27 graves were uncovered (see above). In addition, the remains of a dog burial were discovered on the northern edge of the burial ground. An examination of all human skeletal remains recovered in 2014 was not possible due to time constraints and must be continued in the next campaign.

In the grave shaft of grave building 7 (Fig. 35) there were remains of at least ten individuals. From the most recent burial there were only a few remains in an anatomical context. Due to seven

142 Chameroy – Savalli-Lestrade a. O. (Note 135): 138 Hellenistic coins from Elaea among 457 individual finds of foreign Hellenistic coins on the Stadtberg (as of October 2013); For Priene, Bernhard Weisser also considered that coins from neighboring cities were accepted as money (B. Weisser, The found coins from the rock sanctuary East in Priene, in: K. Dörtlük - O. Tekin - R. Boyraz Seyhan (ed.), Proceedings of the 1st International Congress of the Anatolian Monetary History and Numismatics. Antalya 25–28 February 2013 (Antalya 2014) 667.

143 Chameroy – Savalli-Lestrade a. O. (Note 136): for the Hellenistic period, 75% of the foreign minting authorities (cities, kings, dynasts) represented in Pergamon are attested by four or fewer coins.

144 In addition to the individual find from this year's campaign (KFN 603), four other specimens are known: K. Reg-ling, AvP 1, 2 (Berlin 1913) 356; Voegtli a. O. (note 134) No. 456; Pergamon 2010: KFN 25, Sun 6/004; Pergamon 2013: KFN 9, Säu 1,003 sieve find.

145 S. Psoma – C. Karadima – D. Terzo-poulou, The Coins from Maroneia and the Classical City at Molyvoti, MEÿETHMATA 62 (Athens 2008) 111.

146 Annual Report of the German Archaeological Institute 2009, AA 2010/1 Supplement, 259 Fig. 5.

147 Funding for this work by the Gerda Henkel Foundation; see note 38.

148 S. Feuser – A. Sanoÿlu in: Pirson 2009, 191–194.

149 A short report was published During the campaign we handed it over to the local excavation manager Mr. Erdal Korkmaz, whom we would like to thank for the good cooperation. Radiocarbon dating from the University of Groningen is available and isotope analyses are in progress at the University of Reading.

150 Cf. those in W.-R. Teegen in: Pirson 2014, 152 note 124 cited literature.

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Pergamum, Anthropology

Fig. 83 Frontal bone fragment of a younger woman (Pe14 Ar02, 084) with remains of an epidural hematoma in a state of organization on the inside of the skull, detail

Fig. 84 adult (Pe14 Ar02, 066) with vascular impressions on the left tibia, presumably as a result of varicose veins

Fig. 85 newborn from grave building 7 (Pe14 Ar02, 072_osten) with a peg next to the right head joint, detail

Fig. 86 adult from grave building 7 (Pe14 Ar02, 072) with fusion of the middle phalanx and the distal phalanx of the little toe (so-called symphalangism)

left thigh bone (femora), a minimum number of individuals can be assumed to be seven adults. Three cheekbones on the same side occupy the same number of newborns. Individual bones and smaller parts of bones were each measured three-dimensionally in order to reconstruct the position of the dead.

During the 2014 investigation campaign, the following traces of pathological changes were detected: tartar, caries, periodontal pathologies, abscesses, intravital tooth loss, inflammation of the paranasal sinuses, inflammation of the venous cerebral blood vessels, epidural hematoma, degenerative changes in the large and small body joints and the spine, a few Fractures of the ribs and phalanges, vascular diseases; non-specific stress markers such as enamel and root hypoplasia, interruptions in growth of the long bones (Harris lines) and mild cases of *cribra orbitalia.* Overall, the various clinical pictures tend to have milder manifestations. Therefore, the state of health of the Roman people from the southeast necropolis can be described as comparatively good. This corresponds to the observations made so far in this necropolis151 .

During the processing of the skeletal remains, some special cases were identified: The frontal bone of a younger woman (PE14 Ar 02, 084) is noteworthy, which has remnants of an epidural hematoma in a state of organization on the inside (Fig. 83). Only skull remains were found from this woman. It remains to be seen whether it is an intentional (partial) deposit or the remains of a destroyed grave.

The left tibia of the adult individual PE14 Ar02, 066 shows lateral vascular impressions and a slight layer of newly formed bone (Fig. 84). These are so-called lacerations, probably the result of varicose veins152. Varicose veins are well known from contemporary sources, as evidenced by the well-known votive gift from the Athenian Asclepieion153 .

Among the anatomical variants, two unusual features were observed in grave building 7. In the mature fetus or newborn PE14 Ar02, 072_Osten there is a peg on the right lateral section of the occipital bone next to the right nodule joint (Fig. 85). It is probably an accessory joint to the first cervical vertebra.

An adult individual from grave 7 (PE14 Ar02, 072) shows ossification between the middle and the distal phalanx of the little toe (Fig. 86; so-called symphalangism). This can occur on any toe, but is most common on the little toe. Due to the generally poor state of preservation of the toe bones, frequencies of this feature can only rarely be determined in archaeological skeletal finds154. Sympha-langism is considered a microevolutionary trait because the lateral toes

151 W.-R. Teegen in: Pirson 2012, 255–258; W.-R. Teegen in: Pirson 2013, 138–143; W.-R. Teegen in: Pirson 2014, 152–156.

152 Cf. W.-R. Teegen in: Pirson 2014, 153 Fig. 61.

153 A. Körte, District of a Healing God, AM 18, 1893, 231–256 Plate 11.

154 W.-R. Teegen – M. Schultz, Symphalangism of the Fifth Toe in the Early Medieval Slavic Population from Starigard/Oldenburg (Northern Germany), Homo 50, 1999, 244–248.

have lost much of their function over the course of human development. In recent Europeans and North Americans they occur with a frequency of around 30–46%, and in Japanese with a frequency of around 84 %155 .

Human skeletal remains separated from animal bones from the 2011 and 2014 excavations in the southeast necropolis

The animal bones found during the 2011 and 2014 excavations in the southeast necropolis were examined for human bones. A number of individual human bones were discovered and subsequently processed. Among the animal bones, the farm animals domestic cattle, domestic sheep/goats, domestic pigs, domestic dogs and domestic poultry were observed, as well as occasional fish remains. The animal bones were separated and will be available for archaeozoological examination in the following years.

Byzantine burials from the Lower Agora

As part of the new research on the Lower Agora, several stone slab graves were discovered during cleaning work in 2013/2014 and included in the stone plan156. In 2014, several of these graves were examined (see above). Some of them still contained skeletal remains in situ (such as PE14 So01, 004_Gr2 or PE14 So 01, 013_Gr3) or as bone deposits (PE14 Säu01, 003_Gr4). In others, individual bones were still present; some of these were read from the animal bones. All human remains were then examined.

Elaiah

A total of 12 of 15 processed findings from the necropolis excavation in Elaia 2008157 contained human skeletal remains. The remaining findings only contained animal bones. The domestic mammals identified were cattle, sheep/goats, pigs and dogs. Six findings contained only burnt corpses, one finding (EL08 Ar01, 003) contained both burned and unburned bones from two individuals. In addition to these, there are also two other double burials (EL08 Ar01, 008; EL08 Ar01, 023).

The preservation of the unburned bone remains was usually poor.

Among the dental and jaw diseases of the people from Elaia, periodontitis, abscess formation and intravital tooth loss were found. The fragment of a sphenoid sinus shows small new bone formations that can be seen as signs of inflammation. New bone formation in a lumbar vertebra of the adult individual EL08 Ar01, 008 demonstrates age- and overload-related degenerative changes.

The cadaver of adult EL08 Ar01, 013 contained the healed fracture of the spinous process of a lumbar vertebra. Such fractures are rare and can be caused by an accident or by mistreatment. The adult individual EL08 Ar01, 004 also shows a healed fracture on a rib fragment.

Various observations of the corpse fire provide information about the combustion technology: parabolic heat cracks and deformations of the bones, like the white color of the skeletal remains, indicate temperatures of more than 800°C during the combustion process158. A black core of otherwise calcined cadaver fragments is called primary carbon staining. This indicates rapid but incomplete combustion of the relevant body part159 .

Anatomical variants can also be observed in corpse burns. The Individual EL08 Ar01, 008 shows a double vascular and nerve opening

155 DT Case – J. Heilman, Pedal Symphalangism in Modern American and Japanese Skeletons, Homo 55, 2005, 251–262.

156 B. Emme – A. Öztürk in: Pirson 2014, 122-131.

157 see note 148.

158 B. Large head, corpse burn. Biological and cultural-historical source material for the reconstruction of prehistoric and early historical populations and their funeral practices (Diss. University of Leipzig 2004).

159 Großkopf a. O. (note 158).

Fig. 87 Elaia, Anthropology. 12-16 (18) Year-old individual (el08 Ar01, 019) with remains of at least five sheep/goat talons (M. 1 : 1)

(Foramen nutritium) on the shinbone. Normally this opening only occurs once in the shin area in question.

Five talus legs (astragals) of the small domestic ruminant were found between the few bone remains of a gender-undetermined 12-16 (18) year old individual (EL08 Ar01, 019) (Fig. 87). They are probably play equipment (cubes). Such finds are characteristic additions in the graves of children and young people in the Greek cultural area160. An astragalus was also discovered among the skeletal remains of another young individual.

First results on the southeast necropolis

If you look at the age determinations, the skeletal remains of adults are predominantly present. Subadults are severely underrepresented with six newborns and children and one adolescent. Overall, there would have to be significantly more newborns and small children because their risk of death is the highest. This was recently shown for the Byzantine Kyme161. The other skeletal remains from the southeast necropolis that have been examined so far also indicate a deficit of small children. However, this does not mean that infant mortality in Pergamum was low. It is possible that it is an artifact of the burial method of small children.

Perhaps special cemetery areas were reserved for them or they were buried in other places. Bone preservation may also play a certain role. In any case, there is still a great need for further research here.

The fact that infancy and childhood were threatened by numerous health risks is demonstrated by the regularly detected growth disorders of the tooth enamel: the so-called enamel hypoplasia could be observed in numerous individuals162 .

Radiocarbon dating and isotope analysis

In order to more precisely determine the beginning of the occupation of the southeast necropolis and to clarify the occupation sequences in grave buildings, skeletal remains of selected graves should be radiocarbon dated. There were ten in total

160 See B. Engels, Early Greek children's graves in Asia Minor (unprinted master's thesis Free University of Berlin 2011). I would like to thank Mr. Benjamin Engels for letting me do the work.

161 W.-R. Teegen, La necropoli bizan-tina sull'agora di Kyme – studi antropo-logici e paleopatologici. Campagna 2013 (unpublished); W.-R. Teegen, Pergamon - Kyme - Priene: Health and Disease from the Roman to the Late Byzantine Period in Different Locations of Asia Minor, in: R. Brandt (ed.), Life and Death in Ancient Society - Asia Minor in the Hellenistic, Roman , and Byzantine Times (Oslo 2013) 8–9.

162 Cf. from previous years: W.-R. Teegen in: Pirson 2012, 257 Fig. 91; W.-R. Teegen in: Pirson 2013, 139 Fig. 62.

GrA	sample	B.P	±	ÿ13C	ÿ15N	Femoral circumference	Gender
62665	PE07-So4-014-1	1975	30	-18.57	9.10		
62666	PE07-So4-017-1	1870	30	-18.60	10.49		
62667	PE14-Ar02-072-4-Kn69 2005		30	-18.80	9.41		F>M
62668	PE14-Ar02-072-4-Kn80 1905		30	-18.69	9.11	75	F
62669	PE14-Ar02-072-4-Kn86 1870		30	-18.65	10.11	95	M
62670	PE14-Ar02-072-4-Kn99 1880		30	-18.13	10.28	99	M
62671	PE14-Ar02-072-4-Kn133 1910		30	-17.96	10.14	80.5	F
62677	PE14-Ar02-072-4-Kn169 1990		30	-18.66	10.03	95	M
62678	PE14-Ar02-072-4-Kn200 1860		30	-18.30	10.33	92	M
63021	PE07-Su-04-018-1	1855	30				

Table 2

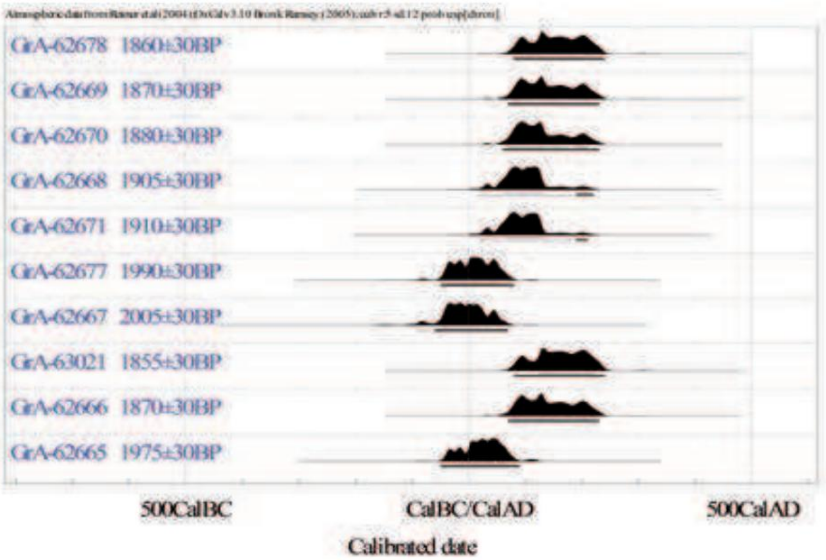


Fig. 88 Pergamon, Anthropology. Calibrated radiocarbon dating of the southeast necropolis (data basis: van der Plicht 2015)

Bone samples (from nine inhumations and one cremation) were examined at the Center for Isotope Research at the Reich University of Groningen163. They were calibrated using the program OxCal 3.10 (Bronk Ramsey 2005) and displayed together graphically (Table 2 and Fig. 88).

To date the adults from grave monument 7, seven left femurs were sampled. The 14C ages range from 1870 to 2005 years before present (BP), with a standard deviation of 30 years for each. This gives a calibrated age range of 40 BC. to 215 AD. The most important question for dating the seven adults was the intervals at which they were buried. A simultaneous burial could already be ruled out based on the excavation findings (see above). The results of radiocarbon dating were surprising (Table 2 and Fig. 88).

Looking at the calibrated data (GrA-62667-78), three groups emerge: the oldest around the birth of Christ, the second around 100 AD and the third in the 2nd/early 3rd century AD. The distance between them is 80 or 35 radiocarbon years. Within these groups the time interval is 5, 15 and 10 radiocarbon years, respectively.

The femora of the two oldest burials PE14 Ar02, 072_Kn69 = GrA-62667 and PE14 Ar02, 072_Kn169 = GrA-62677 were found in the bone pile at the eastern end of the grave shaft. If femur 169 lies almost on the bottom of the grave, the other fragment 69 lies comparatively

163 J. van der Plicht, CIO/433-2015/ PWL, unpublished report (Groningen 2015).

close to the surface. The other femora sampled are also in stratigraphically inconsistent positions. This finding proves the strong displacements that probably took place in the course of the multiple burials.

The individual PE07 So4, 014 (GrA-62665), which is one of the oldest burials in stratigraphic terms, probably dates back to the first half of the 1st century with a radiocarbon age of 1975 years ago. AD (Table 2 and Fig. 88). This makes it somewhat younger than the oldest two burials from grave monument 7 (see above).

The inhumation PE07 So4, 017 (GrA-62666) with a radiocarbon age of 1870 years and the cremation burial PE07 So04, 018-1 (GrA-63021) with a radiocarbon age of 1855 years are significantly younger. The 2-sigma range (95.4% probability) is from 80-215 AD, with the greatest probability in the first half of the 2nd century. is to be assumed.

Together with the two oldest burials from grave building 7, the beginning of burial activity in the area of the southeast necropolis can probably be dated to the (early to middle) Augustan period.

Furthermore, samples were taken from all individuals examined who had not yet been sampled to determine the stable carbon (13C), nitrogen (15N) and sulfur (37S) isotopes . This is intended, on the one hand, to reconstruct the diet and, on the other hand, to provide determinations indications of possible problems164. The of the stable carbon strangers and nitrogen isotopes can be compared well with the results already available165 . They demonstrate a diet that was primarily plant based with some meat component.

W.-RT

Preservation

Conservation work in Pergamon in 2014

Introduction

With the two restoration focuses on the Stadtberg and in the Roman lower town, the Pergamon excavation in 2014 also set decisive accents for the preservation of the ruins of the ancient metropolis166. In the Red Hall, the architectural sample with the reconstructed supporting figure of Sekhmet was expanded to include the fountain surrounds of the courtyard pavement. The project for the exemplary restoration of the marble furnishings of the large Roman building has thus been successfully completed. With the terrace above the vaults in the southeast corner of the temenos, an essential section in the multi-year program to consolidate the ruins was completed167. The endangered southeast corner of the huge Temenos - covering an area of 200 m by 90 m - is now firmly together again with its structurally important substructural vault. And the next phase of preserving the large retaining wall on the banks of the Selinus has already been started.

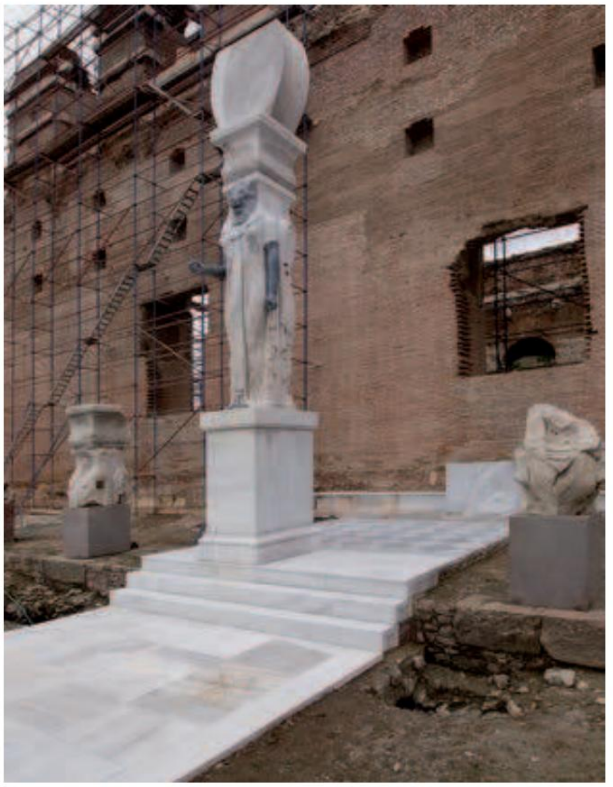
A logistical milestone was reached in the gymnasium with the construction of a reversible construction road that leads to the palace. For the first time in the history of this building, the upper terrace with the palaestra is now accessible to light construction vehicles, a step that will also make all future measures in the gymnasium area much easier. The priority was to secure the Odeon, one for the Roman remodeling

164 See J. Propstmeier – G. Grupe – O. Nehlich – MP Richards – G. Müldner – W.-R. Teegen, Diet in Roman Pergamon Using Stable Isotopes (C, N, S), Osteo-Archaeological and Historical Data - Preliminary Results, in: R. Brandt (ed.), Life and Death in Ancient Society - Asia Minor in the Hellenistic, Roman, and Byzantine Times (Oslo 2013) 10.

165 Cf. Propstmeier et al. O. (note 164).

166 The work in the high school is supported by the Kaplan Fund (New York) and the Studiosus Foundation (Munich) generously supported, for which we would like to express our sincere thanks at this point. We received further funding from the Federal Foreign Office's cultural preservation program. In this context, we would particularly like to thank the cultural department of the German Embassy in Ankara.

167 See M. Bachmann in: Pirson 2014, 159–161.



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of the Pergamon Gymnasium, an important auditorium whose semicircle was built into the steep slope north of the palace. Under technically extreme conditions, endangered parts of the surrounding walls, which are up to 19 m high above the palace, were secured and restored. For the anastylosis measure in the palace, the conceptual and static plans were further developed and brought to readiness for construction. A steel framework gantry crane was built on the Palaestra and is guided on rails. This means that the logistical and technical requirements for this important sub-project have been created. In addition, the pile of rubble from the old excavations on the ancient main street was further reduced and work on the preservation of the Hellenistic, vaulted eastern staircase was continued.

Pergamon, red hall

Fig. 89 The supporting figure of Sekhmet after completion of the work on the test strip of the polychrome marble coverings of the Roman court architecture

Fig. 90 Detail of the southern section of the architectural sample with the abstracted pool surrounds

Final work on the supporting figure in the side courtyard of the Red Hall

The test strip of marble architecture in which the reconstruction of the Sekhmet is embedded was completed in 2013, except for the southern section of the courtyard area (Fig. 89). This also includes the eastern end of the elongated water basin, which, together with a southern counterpart, spanned and accentuated the courtyard area. The water basins are undoubtedly an important element in the structural ensemble of the southern courtyard, as they increase the Egyptianizing effect of the supporting figures in the sense of an associatively conceived, artificial Nile landscape168. In 2014, this final phase of the reconstruction was started. Since the original edge settings of the basins, which were possibly profiled, cannot be proven in the archaeological evidence, a simple, abstract shape was chosen that only accentuates the striking geometric shapes of the basins (Fig. 90). The 35 mm upstand ensures a

168 U. Mania, The Red Hall in Pergamon. Equipment and function, PF 15 (Mainz 2011) 72 f.

decidedly cast shadows without giving the edge its own physicality. The 25 cm wide edge frames are surrounded by the courtyard paving, which has been reconstructed using original parts and consists of strong, 8 cm thick slabs of Proconnesian marble. The eastern end of the pool, which is approximately 2.50 m wide in the shell, consists of a double apse, into which the edges are slightly recessed. This crookedness is reflected in the reconstructed 10 cm high edge, which also runs evenly around the apses. At the foot of the approximately 1.22 m deep pool, the two half-moon-shaped, original marble slabs of the pool floor that filled the apses are still preserved. They were also included in the reconstruction, as were three original rectangular plates further along the pool floor, between which there is now space for a new section of two strips of plates.

The pool walls were also reconstructed in the area of the architectural sample. They consist of thinner, approximately 20 mm thick panels that approximate the curvature of the apses, which only have a diameter of 84 cm, in narrow polygonal strips. While all other surfaces of the added marble were reworked with dental iron, the basin walls were ground and polished in order to indicate the water-filled basin in this dematerialized effect. The function of the circular shaft, which is located east of the end of the pool, is not entirely clear. Its walls were never covered with incrustation and a technical function in connection with water features could be assumed. The 1.60 m diameter socket gives the powerful shape of this shaft a precise effect. All edges of the test strip were designed as if additional components were intended to be connected here. This didactic concept is intended to suggest to the observer the partial nature of the reconstruction.

Southeast corner of the Temenos

The vaulted cellar under the southeast corner of the Temenos, together with the large retaining wall on the Selinus and the two barrel tubes, served to cope with the difficult river topography, which must have posed some difficulties when creating the 200 m by 90 m building terrace. The main focus of the extensive security measures that began in 2011169 was to secure its southeast corner, which had given way outwards under the horizontal thrust of the vaults and was torn down on both sides. For this purpose, an anchoring made of vertically installed, strong round bars was provided, which, with the help of the appropriately reinforced concrete slab, used the entire 120 m2 area of the visitor terrace to support the corner. For additional stabilization, the rising parts of the round iron, which rose above the terrace at parapet height, should be connected with a ring anchor and thus held in position. The task now was to conceal this ring anchor with a parapet wall, which serves as lost formwork during its construction, at the same time indicating the original course of the cellar's surrounding wall, which continued far upwards, and finally of the new terrace above the vault provides a secure parapet. This required the production of more than 20 m3 of natural stone masonry, in which the stones were prepared by hand and placed in lime mortar (Fig. 91). Once this work was completed, the ring anchor could be cast. No cover plates, which would have simulated an ancient condition, were placed on the surfaces of the parapet walls. Instead, the wall filling here was made from Opus caementicium with lime mortar and tees

169 See M. Bachmann in: Pirson 2012, 261–266.

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suggested as if the wall had been dissected horizontally here. This didactic concept illustrates the Roman wall structure and at the same time indicates the further course of the wall.

The first section of the river-side retaining wall of the Temenos in the cellar area had already been preserved in 2006, as the southern end of the new depot building was connected here170. The concept of the pictogram-like border of the new wall surfaces in the structure of the Roman hand-ashlar wall shell with basalt stone was developed. This method was subsequently used consistently in the restoration of the basement's surrounding walls, which was completed in 2014. In the 2014 campaign, the extensive task of restoring the section of the retaining wall with the two large flying buttresses to the west, which was still over 10 m high, could now be tackled. Since the robbed parts of the Roman wall shell continue below the level of the washed-up river sediment, excavations had to be carried out here on a larger scale. A probe about 1.20 m wide and over 1 m deep was created over a length of about 12 m. At the same time, the eastern of the two flying buttresses was also freed from the surrounding embankments. The results of these excavations are informative for the construction development of the Red Hall and for the original shape of the entire complex on the river side. A distinct construction seam can be seen between the eastern section with the vaulted cellar, while in the further up area - above the terrace area - the two structures are interlocked (Fig. 92). In the exposed area, the high, western retaining wall section even forms a veritable corner structure with strong, bearing-like blocks, which protrude about 15 cm forward compared to the hand-built block wall shell. It is noteworthy that this cuboid layer steps down in two steps to the west and then continues in a band that may have structured the building horizontally as a cornice. The actual wall surface with the small-scale hand ashlar masonry was probably separated from a zone with larger stone formats at the base of the wall, which suggested the base of a building. This architectural one

Pergamon, red hall

Fig. 91 The vaulted cellar in the southeast corner of the Temenos with the renewed and raised surrounding walls

Fig. 92 Construction seam between the western section of the retaining wall (left) and the area of the vaulted cellar on the right

Picture

170 See M. Bachmann in: Pirson 2007, 64 f.

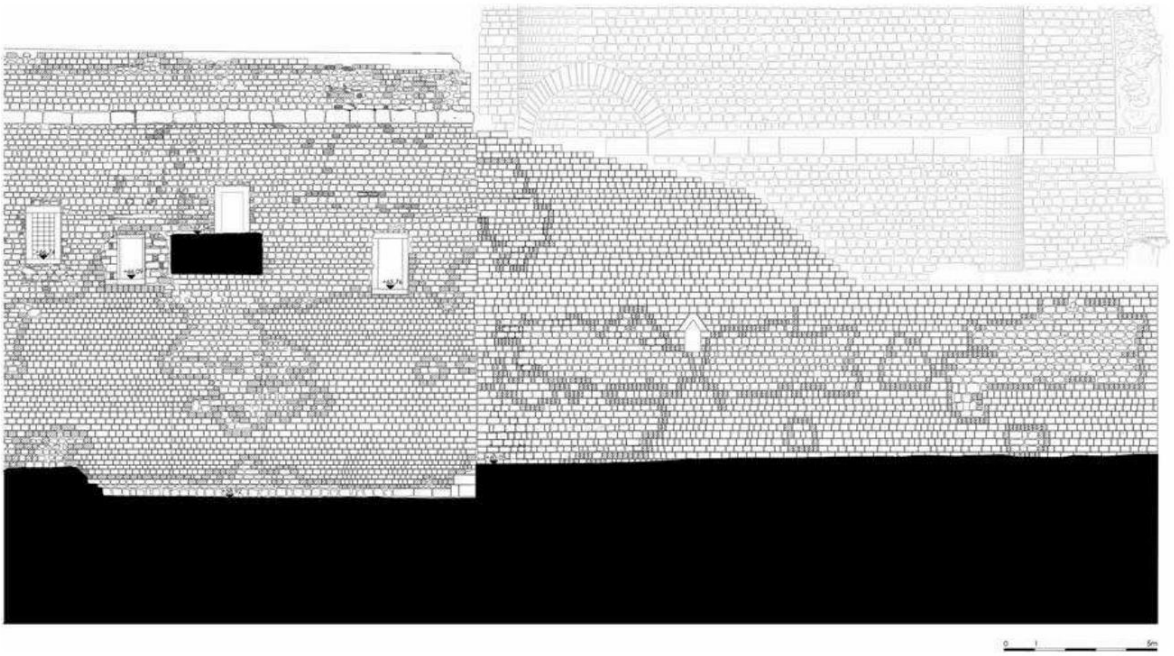

Fig. 93 Pergamon, red hall. Restoration project for the large retaining wall of the Temenos, on the right the wall shells that have already been added, on the left the planned closing areas of the masonry (M. 1: 250)

The structure appears to have been repeated based on the findings of the exposed pier base on the eastern buttress, which has the protruding, rusticated cornice at the corresponding height. This makes it clear that the functional version of the Temenos of the Red Hall towards the Selinus, developed according to engineering principles, was not without architectural demands. However, it is also clear from the break between the construction phases of the wall that there were breaks and changes in planning during the construction of the large cult complex. Apparently the construction of the vaulted cellar and thus the shaping of the southeast corner of the temenos had not been started initially, so that the construction found its provisional conclusion to the east with the east hall of the southern side courtyard. This could explain the irregular floor plan of the two round towers, which is cropped in the west, as well as the partially heterogeneous structure of the vaulted cellar. The finding, which is not insignificant for the construction history of the Red Hall, was documented in detail before the restoration work continued.

The missing wall shell was then supplemented with bearing hand blocks (Fig. 93). First, the demarcation from the existing building was ensured with the dark basalt material before the stone layers were placed. During the course of the campaign, a total of eleven stone layers with a total height of over 2 m were placed over a section of around 8 m in length. This means that a third of the missing wall shells in the current restoration section have been replaced. In the wider areas, the interventions from the late 19th and early 20th centuries - such as the window opening of the oil mill installed here - should also be carefully preserved as part of the long history of use of the ancient building.

The restoration work on the south wall of the basilica

The conservation of the south wall of the large brick building is being carried out by Müdürlüÿü in Izmir in cooperation with the German Archaeological Institute. This year the work was almost completed, and expansion to the other construction areas is planned

ÿl Kültür

planned for the coming years. The eastern section of the wall, with the full-height upper floor and its blind windows, presented particular challenges to the restoration team. In particular, it was necessary to support a huge marble block in the wall structure that was in danger of falling with a support structure that had been developed by Josef Steiner. This was covered with a half-vault so as not to impair the appearance of the wall structure. The documentation work, which had already covered the western section of the wall last year, was continued in the eastern area. In particular, the elements of the ancient marble prefabricated system with which the building was clad were documented photographically. Several remarkable graffiti in Hebrew could also be observed, which had been applied to the inner walls of the staircase inside the south wall using a scratching technique.

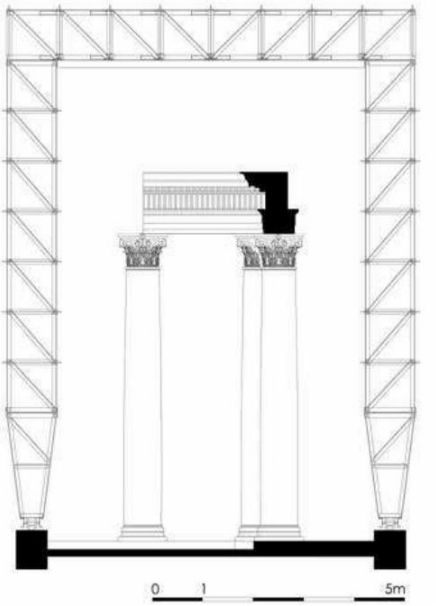

Fig. 94 Pergamon, gymnasion. Gantry crane, drawing (M. 1 : 150)

Restoration work in the gymnasium – logistical requirements

The urgently needed rounding of the disorganized, huge lapidaria that had been left behind by the old excavation in the palaestra and in the basement stadium, as well as the implementation of the sub-projects in these two areas, made the construction of a route to the palaestra essential. In order to guide this through the ruin area as gently and reversibly as possible, the use of the ancient traffic zones and modeling using earth embankments were chosen. The first hurdle in the form of the huge pile of rubble on the ancient road had already been cleared, but the hairpin bend to the festival gate then had to be reshaped into a softer curve by embankment. The route continues over the ancient access line to the basement stadium, at the eastern entrance of which a room has been preserved with geotextile covers and high embankments. The area was also used in the basement stadium corridor

slightly raised for protection after the entire stone bed had been relocated to the northern half of the corridor. Shortly before the western hall of the Palaestra, the route leaves the basement stadium and turns south onto a rubble track.

Hill of the old excavation in order to reach the level of the palace in a wide, ramp-like curve. Here, too, extensive rearrangements were necessary in the area of the west hall in order to be able to lead the new route to the northeast corner of the large terrace.

Despite this new logistical possibility of being able to reach the palaestra with motorized vehicles for the first time in the history of the gymnasium, the use of heavy construction vehicles should be avoided in order to protect the sensitive floor areas of the ancient building and the earth's surface.

not to place undue burden on distributions. For the anastylosis measure in the northeast corner of the palace, it was therefore necessary to set up a gantry crane in order to be able to lift the huge loads of up to 6 tons. This was developed in collaboration with Josef Steiner171 as a demountable, rail-guided steel skeleton structure, which was divided into two expansion stages in order to be able to raise the crane for the assembly of the upper floor zone (Fig. 94). The ground floor variant was completely built in 2014. First, the two 20 m long rail lines were laid on concrete strip foundations. During the concreting work, a barrier layer was created to prevent contamination of the subsoil with cement milk. The crane's wheels and their guides were developed and manufactured specifically for this crane. Since all elements of the truss structure were screwed together,

171 The crane was designed by Josef Steiner (Karlsruhe) and Martin Bachmann (Istabul); the work planning was developed by Duygu Göcmen (Istanbul).

Fig. 95 Pergamon, gymnasion. The fully assembled gantry crane in the northeast corner the palaestra

Dismantling the crane will be just as easy as setting it up, which took about two weeks. The trolley and chain hoist have not yet been installed; this will be done at the beginning of the next work season. With the construction of the route and the construction of the crane, the necessary logistical conditions were created for the start of anastylosis in 2015 (Fig. 95).

Working in the Odeon of the Gymnasium

The importance of the Odeion as a core element of the Roman redesign of the gymnasium has already been pointed out above. The complex is one of the most affected parts of the ruin due to extensive erosion measures in the cavea, the deformation and detachment of the retaining walls on the extremely steep slope topography and the heavily developed, destructive vegetation. The creation of a path along the edge of the dilapidated retaining walls also created a significant danger for visitors to the complex, which the Turkish cultural authorities urged to be eliminated. First, the careful removal of the rubble and vegetation began. In the cavea area alone, around 20 m3 of soil had to be cleared in order to restore the condition of the excavation before the First World War. Stones and debris contained in the cleared material were separated so that they could be used for restoration work. After the cleaning work was completed, the findings were carefully documented, as there were many questions about the original structural design of the building

Odeon, the structural design of its extensive coverage and its construction phases are still open. What is highly remarkable in terms of construction history is the formation of a peristasis, which accompanied the semicircular surrounding wall of the cavea and protected it against the slope water. This is a characteristic phenomenon of Hellenistic building technology

This consequence has never been encountered in any large Roman building in Pergamon and underlines an epistemic continuity right into the Roman imperial period. In addition to the detailed photographic documer

Fig. 96 Pergamon, gymnasion. Octocopter photograph of the Cavea des Odeons, which has been cleared of rubble and cleaned, showing the large areas of damage before the start of the restoration work

In addition to the building findings, an overall photograph of the cleaned building was also taken with the quadrocopter (Fig. 96). Finally, based on a high-resolution laser scan, a very precise three-dimensional model of the system was created, which serves as a basis for further observations and also the Odeion depicts the neighboring building complex of the gymnasium172 .

The project to conserve the Odeion is divided into two sections. In 2014, the particularly virulent western section of the surrounding walls with the endangered visitor path should be tackled, followed in 2015 by the eastern half of the semicircle. Accordingly, the western part of the Cavea rear wall was first raised to a uniform level in order to form a construction platform for the scaffolding with which the higher parts of the retaining wall were to be reached. With the help of the scaffolding, which was erected in three layers, all problematic areas could actually be covered. However, the main focus was on the huge gaps in the retaining walls, reaching depths of up to 1.80 m, which - set back slightly - were completely filled. Anchoring was largely eliminated because the walls were placed directly in front of the rock and this does not exert any thrust on the structure. A total of around 15 **m3** of natural stone material **was used here until all the larger defects were closed again. Only after this stabilization were the upper layers of stone, which were heavily interspersed with roots and deformed, preserved. Several layers of the cuboids had to be removed and repositioned after the roots, some of which were as thick as an arm, had been completely removed. The wall shells were not completely supplemented in order to preserve the heterogeneous image of the walls, which come from very different phases and were built using very different techniques**

not to affect the walls (Fig. 97). Rather, outside of the secured wall findings, quarry stone techniques were chosen that visually match the partially preserved wall fillings and at the same time underpin and secure the existing parts and also the visitor path. In this way, despite the significant interventions, the continued existence of the building findings has been ensured and the ruins have not been trivialized. Through the addition

172 The laser scan was made by the company Ertan Ilter (Ankara).

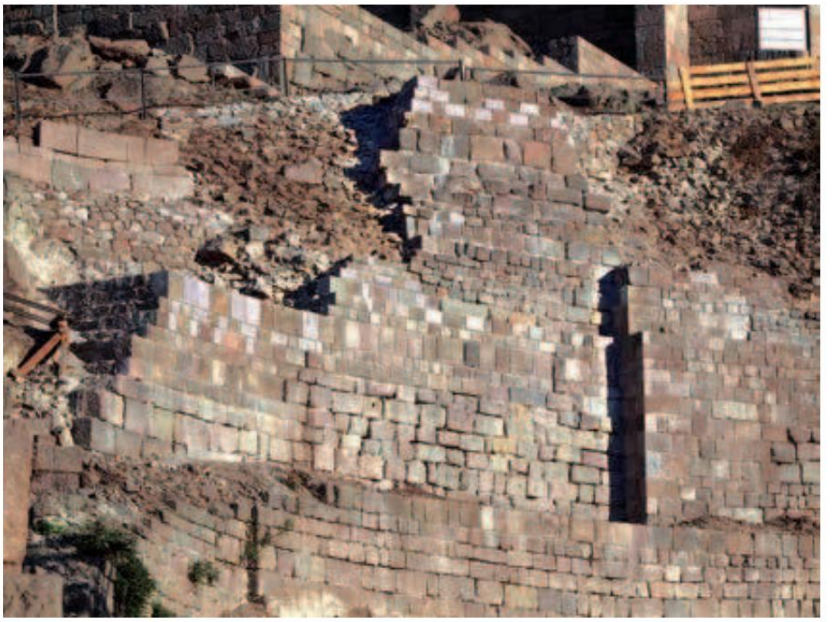

Fig. 97 Pergamon, gymnasion. The restored and secured retaining walls in the western area of the odeion
Completion of the measures in 2014

At the same time, the circular walls emphasize the sculptural shape of the expressive semicircle and bring it into the visitors' field of vision. In 2015, the remaining eastern parts of the Odeon are to be conserved accordingly.

Preparation of the anastylosis in the northwest corner of the gymnasium palace

As early as 2012, in order to plan and prepare for the didactic partial reconstruction in the palace, three-dimensional digital models of the architectural parts that were to be included in this project were created using the light line scanner. On this basis, initial considerations were made about the form of anastylosis. The reasons for the complex measure are briefly explained here again. The focus is on conservation, didactic and, not least, conceptual considerations in the sense of an overarching new visitor planning for Pergamon. From a conservation perspective, the inclusion of significant examples of late Flavian representative architecture from Asia Minor means - in particular

the impressive heart-shaped corner capital with its precise ornamentation - a significant improvement in its preservation conditions. The pieces are removed from immediate access and thus potential vandalism; they are no longer exposed to the physical disadvantages of a
exposed to storage close to the ground and their meaning is accentuated by the contextual presentation. The intensive work in the context of scientific reconstruction also leads to new ideas
Orders and assignments, two previously unknown small fragments that were stored in the palaestra could be identified and assigned to the corner capital.

The didactic arguments must also be given strong weight. Wilhelm Dörpfeld had already carried out an anastylosis measure on the palace by placing many of the column stumps on the preserved rows of stylobates and crowning them with capitals. However, it is only half of the two-part shafts, so that a greatly shortened and distorted image is created, which gives no idea of the original

Height development conveyed. This image needs to be corrected in order to provide a realistic idea of the original vertical development of the marble architecture and the volume of the gymnasium. The north-west corner of the palace is particularly suitable for this, as the architectural sample is subordinate to the steep slope in terms of landscape and reflects the much better preservation situation on the mountain side in the internal grading173 .

Finally, strategic arguments can be put forward that are related to a new visitor concept for the Stadtberg. The Gymnasium occupies a key position in connecting the Acropolis as a traditional tourist focus with the ancient ruins of the lower city and the traditional Ottoman old town as the intended destination of a holistic sightseeing concept that spans time layers. The Anastylosis, together with the restored Odeion and Building Z, will form an architecturally significant ensemble in the heart of the complex, which will serve as a landmark that will attract visitors to the palaestra. The partial reconstruction thus effectively supports the completely new conception of the visit to Pergamon as a *multi-layered cultural landscape174.* Strategically, the anastylosis is also attractive for third-party donors, which will have a positive impact on further restoration phases in the gymnasium. In 2014, the project was further fleshed out and prepared.

The three-dimensional fragments that were recorded in 2012 were supplemented and merged into a virtual arrangement.
The basis of the reconstruction, which has been secured in every detail, is Paul Schazmann's considerations, which only had to be slightly corrected in a few individual cases on the basis of new investigations175 .
The total height of the ground floor columns was set at 6.10 m. A static concept was also developed for this arrangement in order to achieve the greatest possible stability of the arrangement176 .
A maximum of around 20% of the reconstruction must be made from new Proconnesian marble, but the majority of the original material is used. This proportion could still increase, as further, associated fragments can still be expected to be discovered. In particular, the entablature zone with the architraves and the pipe frieze must be almost completely rebuilt. This is not only due to the lack of original fragments, but also to the inscription on the front of the preserved pieces, which does not allow assignment to the reconstructed section, but nevertheless provides very precise guidelines. In order to further check the arrangement according to aesthetic criteria, a diagram was created in which the anastylosis was inserted as a virtual model into the point cloud model of the Odeon (Fig. 98). Here the interaction between the marble architecture and the ruins was still in its intricacies

Voted. Based on these now very concrete plans, a first construction phase was designed, which includes the architectural parts of the ground floor up to the architrave zone. The new one has already been developed for these areas
Marble was procured from Proconnesos and temporarily stored in the south courtyard of the Red Hall. By setting up the driveway, it is possible to maintain the setting up of a stonemason's workshop in the Red Hall, which is cheaper for logistical reasons, and then transport the finished workpieces to the Stadtberg for placement. Processing of the workpieces has already begun177; the templates for the various end profiles of the columns were made exactly according to the sometimes different specifications of the original columns.

173 This was designed in a similar way for the Trajaneum with the reconstruction only on the mountain side.
174 This is the title of Pergamon/Bergamas as a UNESCO World Heritage Site; so p. 91.
175 P. Schazmann, The Gymnasium. The temple area of Hera Basileia, AvP 6 (Berlin 1923) 49.
176 The thoughts on this come from Josef Steiner (Karlsruhe), who works on a voluntary basis in Pergamon.
177 This work is carried out by Selim and Rifat Baskÿn (Bergama).

Pergamon, gymnasium

Fig. 98 3D model of the planned partial reconstruction in the northwest corner of the palace, embedded in the scenario of the odeion obtained from the point cloud model

Fig. 99 General view of the large area of damage next to the east staircase after the excavation has been closed and work on the window opening has been completed

The eastern flank of the gymnasium with the rubble mound of the old excavation

The final work on the large wall breach west of the east staircase, which had been largely closed in previous years, concentrated entirely on the reconstruction and rounding out of the window, which was restored to its rough shape in 2013 (Fig. 99). The new shaft had to be provided with eleven 8 cm wide facets at the bottom in accordance with the specifications of the existing pier base

and thus complements the reconstructed Doric capital. The lintel above, built from machine-cut workpieces, was sharpened in all visible surfaces in order to better match the rough surfaces of the ancient structure. The year 2014 was clearly visible on the front in order to illustrate the entire measure as a modern ingredient, a Pergamene tradition that is found on the same section of the wall about 13 m further west with the year 1911178. Wilhelm Dörpfeld had a wall filling signed here over 100 years ago to secure the late antique wall shell. Above the fall was still

178 See also M. Bachmann, Ortaya Çÿkarmak ve Korumak: Pergamon'da 130 Yÿllÿk Restorasyon Tarihçesi. Excavation and Conservation: 130 Years of Restoration History at Pergamon, in: Pirson – Scholl 2014, 76–97.

Another layer of stone was added to visually integrate it more into the existing structure (Fig. 99).

The eastern continuation of the retaining wall beyond the eastern staircase, which was already exposed in 2013 when the large pile of rubble was removed, was further cleaned and secured. In particular, five needle anchors were installed, which penetrate the structure approximately 2 m deep and thus help prevent the wall shell from becoming further detached. The clearing of the rubble in the remaining areas continued, but an approximately 80 cm thick protective layer was left on the ancient road, as this will continue to be used as a construction site access in the coming years while the project is ongoing.

Further contributions to the site management of the ancient metropolis

Together with its Turkish partners, the Pergamon excavation sees itself as responsible for the entire ruins of the ancient metropolis, which includes not only the buildings on the city hill and the Red Hall, but also the Asklepieion, the Roman theater and the amphitheater as well as the large burial mounds in the Kaikos plain includes. The two restoration focal points in the Red Hall and the Gymnasium were deliberately chosen against the background of ongoing monitoring, comprehensive damage mapping and conceptual considerations, which are intended to result in an overall concept for dealing with the ancient building stock of the World Heritage Site will be further developed with the Turkish planning authorities. The damage mapping initially focused on the area of the Eumenian City, where excellent foundations for this work were created as part of the current Pergamon excavation research program with the georeferenced recording of the building findings and a 3D as-built model (see above). In 2014, the damage mapping was also extended to the area of the city excavation179. In this area, which was excavated around 30 years ago, no extensive structural damage can be observed, but there is gradual decay in some of the remains of the wall, for which the mapping provides the basis for remediation. The damage mapping of the Eumenian City is scheduled to be completed in 2015 so that a detailed catalog of measures can be developed for this important area of the city mountain. Together with the ÿl Kültür Müdürlüÿü in Izmir and the Bergama Museum, projects are being developed in other key areas of the ancient city area where an acute need for restoration was identified. This includes the area of Palace V on the upper castle with disordered stone deposits from the old excavation and an obscure ruin that requires didactic treatment. This project is being designed and developed by the DAI and will then be implemented by the Turkish partner.

The same applies to the section of the ancient road between the Heroon of Diodoros Pasparos and the Upper Agora. This relatively poorly preserved passage of Pergamon's original main artery is neither easy to read nor comfortable to walk through. However, since the ancient street is intended to become the backbone of a future, holistic visitor concept, an exemplary restoration concept is being developed for this section, which can later also be implemented for other areas of the ancient street.

In contrast to the Stadtberg, the ruins of the Asklepieion are largely consolidated. Serious damage to the ring barrel of the lower rotunda has been repaired in recent years180. There is only a greater need for restoration in the area of the columned street that leads to the sanctuary. The museum was here in the 1940s

179 The work was carried out by Tutku Topal (Regensburg) and Secil Tezer (Istanbul).

180 See M. Bachmann in: Pirson 2012, 269.

An architectural sample was set up in Bergama, which combined three Ionic columns of the portico with a reconstructed section of the rear wall of the hall behind it. At that time, the marble columns were connected to a modern architrave made of reinforced concrete. This shows serious structural damage, which was probably caused by incorrect workmanship. The inadequate coverage of the reinforcement has largely broken off, leaving the basket largely exposed. It has been corroded so excessively that the entire beam is expected to fail. Here, in collaboration with Josef Steiner, a renovation concept was developed that involves removing the concrete beam and replacing it with a marble architrave. One yoke can be spanned with an original piece, for the second a new architrave should be made. The concept developed by the Pergamon excavation is to be implemented by the Bergama Museum - an essential and forward-looking step in joint efforts to preserve the world cultural heritage.

MB

Summary

Felix Pirson, Pergamon - Report on the work in the 2014 campaign

The work on the Pergamon excavation in 2014 focused on researching the Hellenistic residential city and its surrounding area as part of the current research program. The city survey, which began in 2005, was completed with final inspections on the western slope and in the western suburban area. Another stairway and a fortified structure were built outside
City fortifications identified. The continuation and completion of the excavations in the rock sanctuary below the rock spur on the western slope were able to further support its interpretation.
The dating and composition of the find material show significant parallels to the rock shrines on the eastern slope. The investigation of another rock formation on the western slope revealed a simple cult site on the edge of a stairway. Continuing the investigations into the Lower Agora, we were able to date it to the late 1st century BC. BC - early 1st century AD. This is another important indication of the importance of the 1st century. v. BC in the urban development of Pergamum, which can best be explained by changes in the settlement structure of the microregion in the Hellenistic period. During the excavation of the main room of the so-called banquet house on the northern eastern slope in the middle of the zone of rock sanctuaries, a relatively well-preserved wall decoration in the Hellenistic masonry style was uncovered. The work in the southeast necropolis of Pergamum has been completed. Their extent and duration of occupancy could be verified. The discovery of numerous other burials, from grave buildings to vessel burials, gives us important new insights into the cult of the dead and living conditions in Roman Pergamon. The newly started survey project on the port network of the Kane Peninsula was able to provide essential insights into the development of settlements and ports in the city of Kane. In the Red Hall, the reconstruction of the marble decoration around the Sechmet statue was completed and the restoration of the southern wall of the Temenos continued. In the gymnasium, the focus of the conservation work was on the Odeion and the creation of the technical requirements for the anastylosis of a portico corner.

Tags
Pergamon • Road system • Rock sanctuaries • Lower agora • Southeast necropolis • Banquet house • Port network • Kane • Anthropology • Red Hall • Gymnasium

Abstract

Felix Pirson, Pergamon – report on the Projects of the 2014 campaign

The projects of the Pergamon Excavation in 2014 focused on the Hellenistic royal city and the surrounding area as part of the current research program. The city survey began in 2005 has been completed, with final surface surveys conducted on the west slope and in the western suburban area. In the process, another stepped lane and a forti-fication structure beyond the city walls were identified. Excavations, now concluded, in the rock sanctuary under the crag on the west slope have provided further support for its interpretation. In dating and composition, the find material exhibits significant parallels to the rock sanctuaries on the east slope. Investigation of another rock formation on the west slope has revealed a simple ritual site at the side of a stepped road. Continuation of the investigations at the Lower Agora further consolidated its dating to the late 1st cent. BC – early 1st cent. AD This represents further weighty evidence for the importance of the 1st cent. BC in Pergamon's urban development – a development that can most likely be explained by changes in the micro-region's settlement structure in Hellenistic times. Excavation in the main room of the so-called banquet house in the north section of the east slope, in the middle of the rock sanctuary zone, has brought to light a relatively well preserved wall decoration in Hellenistic masonry style. Work in the south-east necropolis of Pergamon has been completed. The necropolis's extent and length of use have been verified. The discovery of many further burials, from tombs to urn burials, has yielded important new insights into mortuary practice and living conditions in Roman Pergamon. The newly launched survey project on the harbor network of the Kane peninsula has generated substantial data on the growth of the settlement and harbors of the city of Kane. In the Red Hall, reconstruction of the marble decoration in the architectural setting of the Sekhmet statue has been completed and restoration of the south wall of the temenos continued. In the Gymnasium, conservation efforts concentrated on the Odeon and on technical measures preparatory to the anastylosis of a portico corner.

keywords
Pergamon • street system • rock sanctuaries • Lower Agora • South-east Necropolis • banquet house • harbor network • Kane • anthropology • Red Hall • high school

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This year, Mr. Mahir Atÿcÿ (Izmir Museum Directorate; Pergamon) and Ms. Tülay Kocaman (Manisa Museum Directorate; Surrounding Area) took part in the work as government representatives. We would like to thank them for their very collegial cooperation.

2014 campaign

This year's work lasted from August 4th to October 11th 2014. The Working staff consisted of: F. Pirson (overall management); M. Bachmann (Deputy Overall Management; Head of Conservation); G. Ateÿ (Turkish deputy general management – Kazÿ Baÿkanÿ Yardÿmcÿ); A. Wirsching (Assistance to the overall management); A. Pirson (Head of Budget and Administration); B. Emme – A. Öztürk (head of FTS project "Lower Agora"); B. Horejs (head of the ÖAW-OREA project "Prehistoric Surrounding Area Survey"); U. Kelp (DFG-ANR project "From the burial mounds of the rulers to the necropolises of the citizens"; GHS project "Southeast Necropolis"); E. Laufer, D. Wozniok, M. Ernst (ERC project Portus Limen/Kane Peninsula Survey); U. Klein, J. Kern, F. Ambs, F. Kißling, M. Meerländer (geodesy); Ch. Schöne, L. Bött-ger, F. Sliwka (Survey Pergamon); B. Ludwig, M. Meinecke, AJ Schwarz (editing director); BU Ertan (assistant editor); ER Wegmann, I. Yeneroÿlu, T. Topal (construction research); B. Ludwig; M. Lomp (excavation technology); W. Rabbel, E. Erkul, F. Wolf, R. Mecking, B. Driehaus, G. Druivenga, A. Fediuk, T. Wunderlich, Ph. Leineweber, C. Meyer, O. Rabbel, D. Wilken, F. Çiçek, AB Yücel, D. Pilz, S. Hay, HL Berry (geo-physics); H. Brückner, M. Seeliger, R. Keulertz, L. Linck, Ch. Morhange, N. Marriner, A. Pint, M. Schlöffel, S. Schneider (geoarchaeology); K. Berner, U. Herrmann, J. Steiner, S. Tezer (architectural preservation); F. Ostmann, P. Pavúk, B. Miliÿ (ÖAW-OREA project "Prehistoric Surrounding Area Survey"); S. Morgenroth, Ö. K. Baÿak, G. Günay, V. Kant, N. Bürkle (FTS project "Lower Agora"); G. Ateÿ, N. Immel, B. Engels, M. Ernst, S. Japp, A. Kewe-loh, O. Kostoudis, M. Açÿkyol, (processing of finds and archaeometry of ceramics); A. Weiser (photo documentation); E. Gökÿenoÿlu, BN Özcan, Ö. Özkaya M. Savaÿgan (conservation) – processing, material submission and individual studies: S. Japp (bathing complex city excavation); A. Wirsching (Musalla Mezarlik); A. Zeitler (Temple of Dionysus); J. Martin (brick buildings); T. Paulson (Polygonal Columns); Ch. Williamson (line of sight/ view shed analyses); H. Müller, V. Walser, S. Prignitz (epigraphics); W.-R. Teegen, S. Wunsch (anthropology and paleopathology); J. Chameroy (coins); A. Pirson (jewelry and costume components); SY Waksman, J. Burlot (archaeometry of Byzantine and Ottoman ceramics); L. Peloschek (appliqué ceramics).

New releases for Pergamon

The following list does not claim to be complete.

S. Agelidis, From the Palladion to the Nikephoros. The cult of Athena in the context of Legitimation of power in late classical and Hellenistic Pergamon, IstMitt 64, 2014, 75–128

M. Bachmann, The Red Hall as a key monument in a development plan for Bergama. Bergama'ya ait Geliÿim Planlarÿnda Anahtar Yapÿ olarak Kÿzÿl Avlu, in: M. Bachmann – Ç. Maner – S. Tezer – D. Göçmen (eds.), Heritage in Context: Conservation and Site Management in Natural, Urban and Social Spaces. Conservation and Site Management within Natural, Urban and Social Frameworks. Doÿal, kentsel and sosyal çerçevede koruma ve alan yönetimi. Report Colloquium Ankara 2012, Miras 2 (Istanbul 2014) 177–203

F. Coarelli, La gloria dei vinti: Pergamo, Atene (Rome 2014)

B. Horejs, The 2nd millennium BC in the Bakÿrcay (Kaykos) Valley. An Overview, in: N. Çÿnardalÿ-Karaaslan – A. Aykurt – N. Kolankaya-Bostancÿ – YH Erbil (ed.), Anadolu Kültürlerine Bir Bakÿÿ. Armaÿan Erkanal'a Armaÿan. Some Observations on Anatolian Cultures. Compiled in Honor of Armaÿan Erkanal (Ankara 2014) 257–274

S. Japp, Micaceous Waterjars in Pergamon: A Specific Variant of the Late Roman 3 Amphora, in: N. Poulou-Papadimitriou - E. Nodarou - V. Kilikoglou (eds.), Late Roman Coarse Wares, Cooking Wares and Amphorae in the Mediterranean: Comparison between Western and Eastern Mediterranean (Oxford 2014) 143–149

D. Knitter - H. Blum - B. Horejs - O. Nakoinz - B. Schütt - M. Meyer, Integrated Centrality Analysis: A Diachronic Comparison of Selected Western Anatolian Locations, Quaternary International 312, 2013, 45-56

M. Mathys, architectural foundations and honorary statues. Visual studies Representation of the upper class in late Hellenistic and Imperial Pergamon, PF 16 (Darmstadt 2014)

M. Mathys, Honorary Statues in the Shrine of Athena in Pergamon, in: J. Griesbach (ed.), Polis and Portrait: Statues as Media of Public Representation in the Hellenistic East. Report Colloquium Munich 4th – 6th December 2009, Studies on the Ancient City 13 (Wiesbaden 2014)

K. Nohlen, training of craftsmen in the partial reconstruction of the Trajan sanctuary in Pergamon. Bergama Traian Tapÿnaÿÿ'nÿn Kÿsmi Yeniden ÿnÿasÿnda Zanaatkârlarÿn Eÿitimi, in: M. Bachmann – Ç. Maner – S. Tezer – D. Göçmen (eds.), Heritage in Context: Conservation and Site Management in Natural, Urban and Social Spaces. Conservation and Site Management within Natural, Urban and Social Frameworks. Doÿal, kentsel and sosyal çerçevede koruma ve alan yönetimi. Report Colloquium Ankara 2012, Miras 2 (Istanbul 2014) 205–220

K. Nohlen, Axiality and Perspective - Approach and Access: The Path to the Shrine of the Emperors Traian and Hadrian in Pergamon, in: D. Kurapkat - Pl Schneider – U. Wulf-Rheidt (ed.), The Architecture of the Path: Designed Movement in Built Space. International colloquium in Berlin from 8th–11th February 2012, DiskAB 11 (Regensburg 2014) 133–146

F. Pirson, Elaia, the (maritime) satellite of Pergamon, in: S. Ladstätter - F. Pirson - Th. Schmidts (ed.), Ports and port cities in the eastern Mediterranean from antiquity to the Byzantine period. Colloquium Istanbul May 30 – June 1, 2011, Byzas 19 (Istanbul 2014) 339–356

F. Pirson, city and surrounding area of Pergamum. State of research and perspectives. Pergamon Kenti ve Çevresi. Artaÿtÿrmalarÿn Son Durumu ve Yeni Ufuklar, in: U. Yalçÿn – H.-D. Bienert (ed.), Anatolia - Bridge of Cultures. Report Collo-quium Bonn 2014, Kültürler Köprüsü Anadolu, Der Anschnitt. Beih. 27 (Bochum 2015) 289–310

F. Pirson – A. Scholl (ed.), Pergamon. Anadolu'da Bir Helenistik Dönem Baÿkenti. A Hellenistic Capital in Anatolia (Istanbul 2014) [The individual contributions are not listed separately here]

F. Pirson - G. Ateÿ - B. Engels, The newly discovered rock shrines on the eastern slope of Pergamon - an inner-city cult center for Meter-Cybele?, in: K. Sporn - M. Kerschner – S. Ladstätter (ed.), Nature – Cult – Space. Files from the international colloquium Paris-Lodron-University Salzburg 20-22. January 2012 (Vienna 2015) 281–301

E. Rathmayr, On the meaning of sculptures and in connection with them standing inscriptions in private spaces, shown on houses in Ephesus and Pergamon, in: W. Eck - P. Funke (ed.), Public - Monument - Text. Files of the XIV Congressus Internationalis Epigraphiae Graecae et Latinae 27–31. Augusti MMXII (Berlin 2014) 484–486

Th. Rehren – P. Conolly – N. Schibille – H. Schwarzer, Changes in Glass Consumption in Pergamon (Turkey) from Hellenistic to Late Byzantine and Islamic Times, JASc 55, 2015, 266–279

H. Schwarzer, Ancient wall paintings from Pergamon, in: N. Zimmermann (ed.), Antique painting between local style and contemporary style. Files of the XI. international colloquium of the AIPMA (Association Internationale pour la peinture murale antique) 13th–17th September 2010 in Ephesus, AF 23 (Vienna 2014) 165–176

V. Stappmanns, The Gymnasium of Pergamon: Access routes as a key to radio ational structure, in: D. Kurapkat - Pl Schneider - U. Wulf-Rheidt (ed.), The architecture of the path: Designed movement in built space. International colloquium in Berlin from February 8th to 11th, 2012, DiskAB 11 (Regensburg 2014) 121-132

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Abbreviations

Conze et al. 1912/1913•A. Conze – O. Berlet – A. Philippson – C. Schuchhardt –
F. Graves, city and landscape, AvP 1 (Berlin 1912/1913)
Pirson 2006•F. Pirson, Pergamon - The new research program and the work in the 2005 campaign,
AA 2006/2, 55–79
Pirson 2007•F. Pirson, Pergamon - Report on the work in the 2006 campaign, AA 2007/2, 13–69
Pirson 2008•F. Pirson, Pergamon - Report on the work in the 2007 campaign, AA 2008/2, 83-155
Pirson 2009•F. Pirson, Pergamon - Report on the work in the 2008 campaign, AA 2009/2, 129–213
Pirson 2010•F. Pirson, Pergamon - Report on the work in the 2009 campaign,
AA 2010/2, 139–236
Pirson 2011•F. Pirson, Pergamon - Report on the work in the 2010 campaign, AA 2011/2, 81-212
Pirson 2012•F. Pirson, Pergamon - Report on the work in the 2011 campaign, AA 2012/2, 175–274
Pirson 2013•F. Pirson, Pergamon - Report on the work in the 2012 campaign, AA 2013/2, 79–164
Pirson 2014•F. Pirson, Pergamon - Report on the work in the 2013 campaign, AA 2014/2, 101-176
Pirson – Scholl 2014•F. Pirson – A. Scholl (ed.), Pergamon. Anadolu'da Bir Helenistik Dönem
Baÿkenti. A Hellenistic Capital in Anatolia (Istanbul 2014)

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