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Pergamon, Türkiye

Pergamon and its Micro-Region

The Activities in the 2022 Campaign

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ABSTRACT

The 2022 campaign focused on activities in Pergamon and the surrounding area as part of the research program »The Transformation of the Pergamon Micro-Region between Hellenism and Roman Imperial Period« (TransPergMikro). This included, among others investigations at the Great Gymnasium of Pergamon and excavations in a late antique peristyle building east of the Red Hall. The extension of the micro-regional survey to the east of the city hill of Pergamon led to the discovery of an astonishingly dense rural settlement as well as rock sanctuaries, necropolises, and two extensive quarries. Conservation, presentation of the ruins at Pergamon, and training of the labour force were further foci of activities.

KEYWORDS

Pergamon, microregion, transformation, late antiquity, mosaics, workshops, settlement history, Gymnasium, thermal baths, temple, rural settlement, quarries, necropolises, rock sanctuaries, ceramic production, geography, clay mining, preservation of architectural monuments

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ZUSAMMENFASSUNG

Die Kampagne 2022 konzentrierte sich auf Aktivitäten in Pergamon und seiner Umgebung im Rahmen des Forschungsprogramms »Die Transformation der Mikroregion Pergamon zwischen Hellenismus und römischer Kaiserzeit« (TransPergMikro). Dazu gehörten unter anderem Untersuchungen am Großen Gymnasion von Pergamon und Ausgrabungen in einem spätantiken Peristylgebäude östlich der Roten Halle. Die Ausweitung des archäologischen Surveys auf das Gebiet östlich von Pergamon führte zur Entdeckung einer erstaunlich dichten ländlichen Besiedlung sowie von Felsheiligtümern, Nekropolen und zwei ausgedehnte Steinbrüchen. Konservierung, Präsentation der Ruinen in Pergamon und die Ausbildung von Arbeitskräften waren weitere Schwerpunkte der diesjährigen Aktivitäten.

SCHLAGWÖRTER

Pergamon, Mikroregion, Transformation, Spätantike, Mosaik, Werkstätten, Siedlungsgeschichte, Gymnasium, Thermalbäder, Thermen, Tempel, ländliche Besiedlung, Steinbrüche, Nekropolen, Felsheiligtümer, Keramikherstellung, Geographie, Tonabbau, Baudenkmalpflege

Introduction

1 The archaeological research in [Pergamon](#) in 2022 formed part of a twelve-year project investigating the transformation of the Pergamon Micro-region with a focus on the Hellenistic and Roman imperial periods¹. The following short report is divided into two parts: Part I deals with building research, prospection,

1 Direction of the project »The Transformation of the Micro-region Pergamon between Hellenism and the Roman Imperial Period« by Felix Pirson (Classical Archaeology; DAI Istanbul) together with Brigitta Schütt (Physical Geography; FU Berlin) and Thekla Schulz-Brize (Building Archaeology; TU Berlin) as well as Güler Ateş (Classical Archaeology; CBU Manisa) and Ulrich Mania (Classical Archaeology; DAI Istanbul). Funded as a long-term project by the Deutsche Forschungsgemeinschaft. The work in Pergamon and the surrounding area took place from 18 April to 21 October 2022. Our special thanks go to the international team of the Pergamon excavation, especially the deputy excavation directors Güler Ateş and Mete Aksan (Sinop). We would also like to thank the government representatives Ufuk Çetinkaya, Tuğba Çavuşoğlu and Yüksel Keskin from the İzmir Müze Müdürlüğü, the director of the Bergama Museum Nilgün Ustura and the General Directorate of Cultural Assets and Museums for their support of our work.

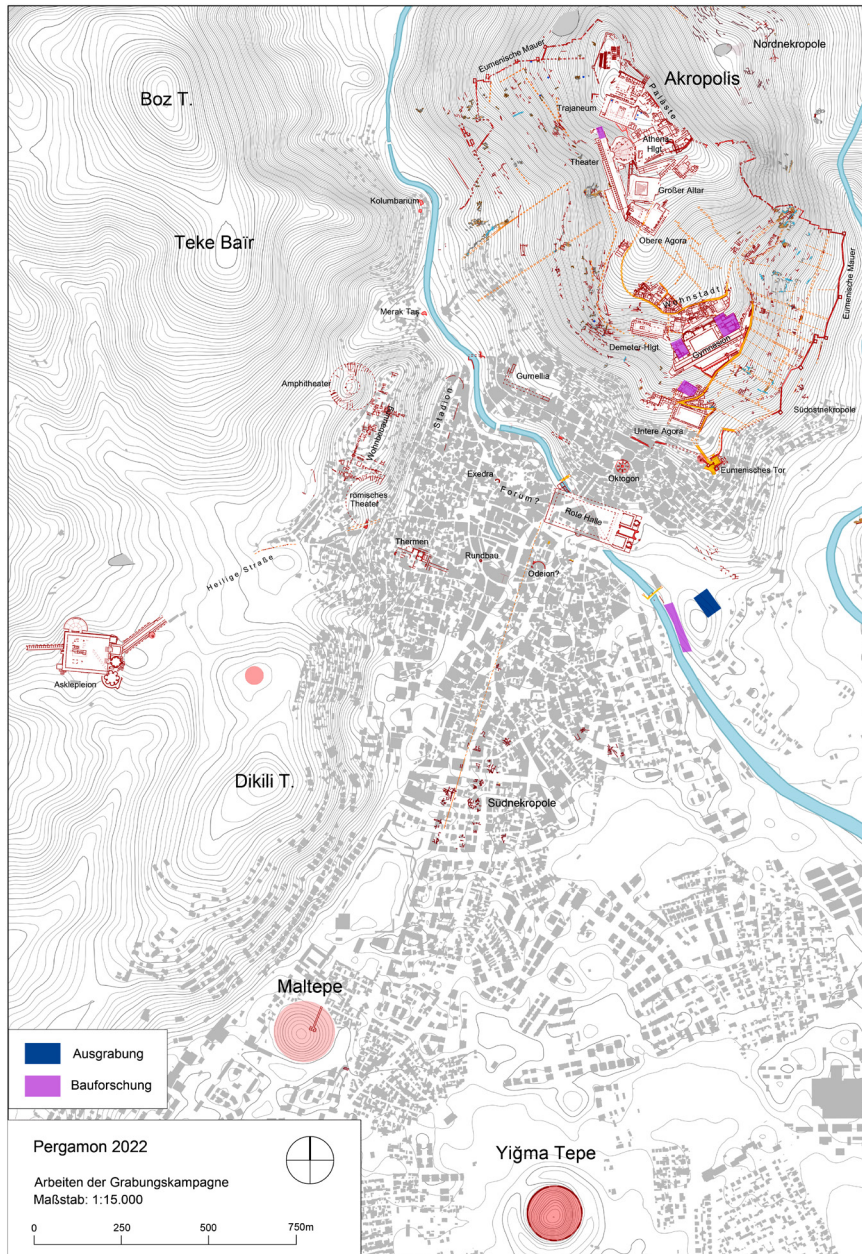


Fig. 1: Pergamon. Working areas (excavation and building research) 2022

excavation and conservation in the urban area of Pergamon and its immediate surroundings. Part II deals with the archaeological survey and physical geography work in the countryside around Pergamon².

Part I: Pergamon

² In Pergamon itself, the project is focussing in particular on researching the urban layout and its spatial surroundings, the settlement history and individual buildings from the Roman imperial period. Activities in 2022 focussed on the baths in the Pergamon Gymnasium and the Late Antique to early Byzantine occupation east of the Red Hall (Fig. 1). From a technological point of view, we were able to break new ground by using LiDAR for the first time in archaeological surveying and prospection in Pergamon (Fig. 2). The 3D model of the city hill offers a hitherto unique level of detail in the visualisation of the surface down to individual walls. However, it also shows that the conventional methods of archaeological surveys can by no means be replaced by LiDAR. Only a selection of the various activities in 2022 can be presented in the following.

Building Archaeology in Gymnasium, Temple of Dionysos, and Theatre (Viran Kapsı) of the Lower Town

³ One of the most impressive architectural complexes on the city hill of Pergamon is the Hellenistic gymnasium, which extends over three terraces on the southern slope (Fig. 3). While the Hellenistic foundation phase was the centre of interest recently, attention is now focussed on the expansion of the complex into a so-called bath gymnasium (»Thermengymnasium«) in Roman times. This expansion appears to have taken place in several stages, in which first the smaller western baths and then the larger eastern baths were built. The former are dated

² The short report presented here is based in part on the reports of members of the Pergamon Excavation team. A detailed report on all the activities of the Pergamon excavation in 2022 with contributions from numerous co-authors is published in the second volume of the *Archäologischer Anzeiger* 2023 (Pirson et al. 2023). For current information, see also <https://www.dainst.blog/transpergmikro> (23.11.2023).

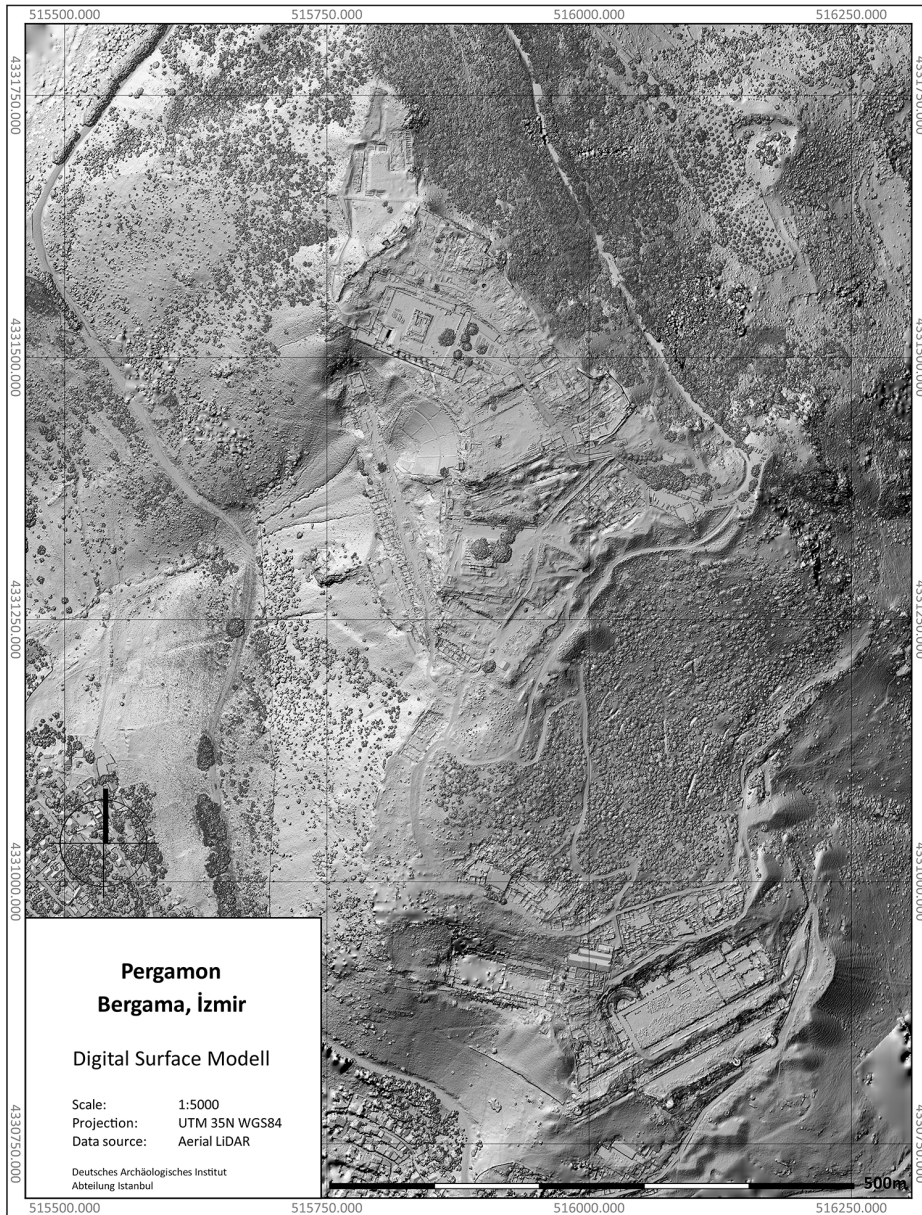


Fig. 2: Pergamon, City hill. Digital surface model based on new LiDAR data

to the 1st century BC³, but could have been built later, too. The latter are associated with the expansion of the Palaestra from the late 1st century AD⁴. Together with the well-preserved room with marble basins on the western side of the palaestra from the Hellenistic period, the western and eastern baths document the development of public urban bathing culture in Anatolia over four centuries.

4 The study of the architectural history of both baths is planned for three campaigns and is to be realised as part of a dissertation project, as well as two master's theses based at the Technical University Berlin⁵. They will also serve as a basis for conservation work, particularly in the Eastern Baths, which is due to begin in 2023.

5 In both baths, 3D terrain models were used to create floor plans and sections that show how the two later complexes fit into the terrain and the older Hellenistic structures. Even at first glance, it is clear that these are two fundamentally different types of baths, which may have been built a long time apart. In the case of the western baths, for example, it is not even certain whether they had heating facilities. These and other questions are to be clarified in 2023 with the help of further building investigations and stratigraphic sondages.

6 The Temple of Dionysus at Pergamon has been the subject of a project of building research for several campaigns⁶. The building is a further important testimony to the transformation of the Hellenistic royal city in the Roman imperial period. Important steps of the project were completed during this campaign. The mapping and inventorying of over 340 building components and their documentation using Structure from Motion was largely completed. In addition to numerous observations on the construction process and the rebuilding of the temple after a catastrophic fire under the emperor Hadrian, a third construction phase is now emerging, although its date has yet to be clarified.

7 Another focus of the work in recent years has been the Imperial period ensemble of amphitheatre, theatre and stadium on the slopes and at the foot of the

3 Radt 2016, 131.

4 See Radt 2016, 132. For the dating of the extension of the palaestra to the Flavian period, see Stročka 2012, 204–218.

5 Master theses (Western Bath): Neele Menter and Hüseyin Çınarlık. Doctoral thesis (Eastern Bath): Léa Geisler.

6 Doctoral thesis by Annika Zeitler (Regensburg).



Fig. 3: Pergamon, Great Gymnasium. Aerial photograph



Fig. 4: Pergamon, Surroundings of the Asklepieion. 3D visualisation based on geophysical prospection

Musalla Mezarlığı hill. Based on the final evaluation of the documentation of the preserved remains of the theatre, its enormous dimensions, which are particularly well expressed in the 3D visualisation (Fig. 4), could now be reliably determined for the first time⁷: with a diameter of 154.32 m, the theatre in the lower city of Pergamon is the largest known ancient theatre in Asia Minor compared to the theatres in Smyrna (150 m), Ephesus (140 m), Miletus (125 m), Side (119 m), Aizanoi (103 m) and Aspendos (95 m). In particular, the surpassing of the theatres in Smyrna and Ephesus can be seen as an expression of the competition between cities in the province of Asia during the Roman Empire.

Asklepieion: Geophysical Prospection and 3D-Visualization

⁸ In 2019, 2021 and 2022, geophysical surveys were carried out with the aim of clarifying the built structures around the Asklepieion and the transition between the suburban sanctuary and urban development⁸. Together with new observations on the architecture of the Colonnaded Street and Via Tecta – which connected the Asklepieion with the lower city of Pergamon – they have now been combined in a new 3D visualisation that shows the particularly important section in terms of urban planning and settlement history (Fig. 4)⁹. It makes it clear that the idea of a spatially isolated and clearly defined sanctuary at the gates of the city is not correct. Rather, behind the porticoes of the Sacred Way, directly in front of the entrance to the sacred precinct, there was a development that included peristyle buildings and a Roman bath. This ensemble of apparently free-standing individual buildings differs structurally from a closed urban development and thus emphasises its affiliation to the sanctuary and not to the city, which was separated from the northeastern surroundings of the sanctuary by a ridge in the terrain. The new findings from the geophysics and their visualisation contribute significantly to our knowledge of the functions of the imperial Asklepieion, which, in addition to its sacred function, had to fulfil a variety of other tasks, such as accommodating the numerous visitors and housing the personnel of the sanctuary.

⁷ Subproject directed by Thekla Schulz-Brize (Berlin).

⁸ Subproject directed by Ulrich Mania (Istanbul). Geophysical prospections (under direction of Wolfgang Rabbel) by Kiel University in cooperation with Kocaeli University (İsmail Kaplanvural).

⁹ 3D-Visualization by Technical University Cottbus-Senftenberg (Dominik Lengyel).



Fig. 5: Pergamon, Lower city. ›Mosaic Building‹. Plan after completion of the excavations in 2022



Fig. 6: Pergamon, Lower city. ›Mosaic Building‹. Clay pilgrim's ampoule from Sondage 02, late antique-early Byzantine. On the left St Polycarp (?) with two lions, on the right St George with the dragon

Late Antique Pergamon: Mosaic Building and Workshops along the Selinus

9 Entirely new insights into the settlement history of Pergamon could be gained by the continuation of the investigation of the mosaic building to the east of the Red Hall and the bank development of Bergama Çayı (see Fig. 1). This concerns both the question of the extent of the built-up area to the north-east and the dating of the two complexes, which are only separated from each other by the flat hill Türbe Mezarlık.

10 Following the discovery and partial uncovering of a building decorated with mosaics in an emergency excavation by the Bergama Museum in preparation for construction and its subsequent investigation by the Pergamon excavation in 2021, the aim in 2022 was to determine the extent, structure and, if possible, the function of the building through several stratigraphic trenches (Fig. 5). The axially symmetrical house with a central peristyle courtyard was built into the slope to the south-west and opened into the plain at the foot of the city hill of Pergamon with two risalits to the north-east. The peristyle courtyard with stone slabs is surrounded at least on three sides by a portico decorated with a white mosaic floor framed with black bands. It is adjoined by a series of rooms decorated with ornamental mosaics. The building appears to have been extended to the northwest by a service wing, and to the southeast by a small bath. Such rooms speak in favour of the interpretation of the complex as an urban residence with domestic functions. The pottery from stratigraphical contexts of the construction period dates back to at least the 4th century AD, which would be the first evidence of a large residential building from Late Antiquity in Pergamon¹⁰.

11 An early Byzantine pilgrim ampulla from the building's debris, which depicts St George and probably St Polycarp, Bishop of Smyrna, gives an impression of the religious practices of the time (Fig. 6)¹¹.

12 As part of the large-scale infrastructural project to renovate the embankments of Bergama Çayı (Selinus), the section of the riverbank south-west of the

10 According to the preliminary evaluation by Anneke Keweloh-Kaletta (Leipzig).

11 I am indebted to Sabine Ladstätter (Vienna) for the provisional identification of one of the two figures as St Polycarp.

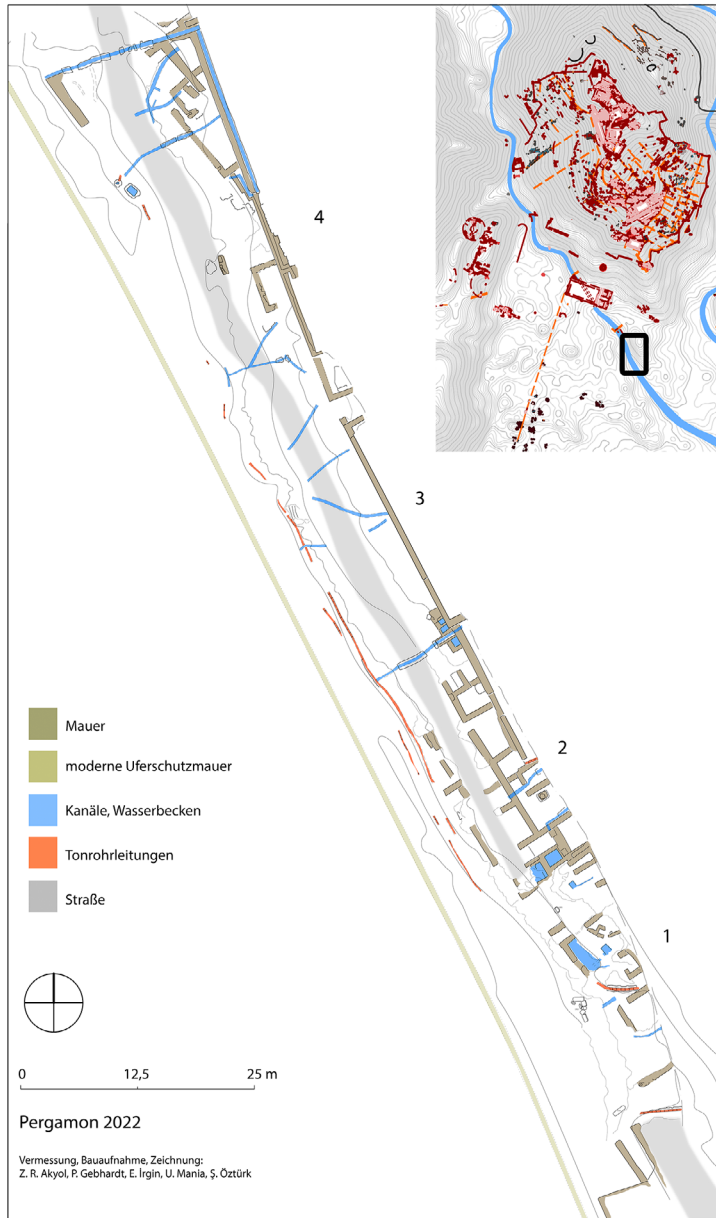


Fig. 7: Pergamon, Lower city. Northern bank of the Selinus. Plan

Red Hall, where several commercial buildings from the early 20th century are located, was extensively excavated under the supervision of the Bergama Museum (see Fig. 1). This brought to light several simple rooms along a road carved into the rock, which, judging by their fittings, including canals and basins, were most likely to have served as workshops (Fig. 7). Pottery fragments indicate that the structures were built and used from the 4th century AD at the latest¹². It is conceivable that tanneries were already located here in Late Antiquity – as later in the early 20th century – which disposed of their waste water in the Selinus. Together with the mosaic building on the northern side of the Türbe Mezarlık and the adjoining Red Hall to the west, which was converted into Pergamon's episcopal church in the 5th century, this ensemble represents a fundamental enrichment of our knowledge of Late Antique Pergamon, which was previously only known to us in isolated findings.

Conservation

¹³ The conservation work in 2022 was again aimed at securing acutely threatened buildings or parts of buildings such as the Lower Round Building in the Asklepieion or sections of the Theatre Terrace and protecting them from further loss of substance. This work in the Asklepieion has now been completed for the time being. By consolidating the area in front of the eastern wall of the Gymnasium, along which the visitor path runs, an important contribution has also been made to increasing the attractiveness of the ruins for tourists (Fig. 8).

¹⁴ A team from Hacı Veli Bayram Üniversitesi Ankara also completed the conservation of Hellenistic incrustation-style wall decorations from the main room of the banqueting house. A particular logistical challenge was the transport of the large and heavy panels from the workshops in the excavation house to the steep northern, eastern slope of the city hill of Pergamon. Thanks to the highly experienced and diligent local workforce at the Pergamon excavation, the wall decoration was returned to its original location without any damage, where it was reinstalled in its original position (Fig. 9).

¹⁵ After research into the so-called Kleopatra Güzellik Ilıca, a rural thermal bath from the Roman Imperial period with Ottoman to modern phases of use, was

¹² See note 10.



Fig. 8: Monument conservation, Great Gymnasium. The restored east wall after consolidation of the area in front of it



Fig. 9: Conservation, ›Banqueting House‹. View of the north-east corner of the main room of the ›Banqueting House‹ with the wall stucco attached in its original position



Fig. 10: Monument conservation, Martin Bachmann workshop. View of the newly equipped workshop with journeymen's pieces from the stonemasonry training programme of recent years

completed last year, the ruins were secured in 2022. It is located on the southern outskirts of Bergama in the immediate neighbourhood of a leisure facility of the Bergama municipality. This was another reason why care was taken to ensure that the culturally and historically interesting site was prepared for opening to visitors.

16 A former garage in the immediate neighbourhood of the excavation house was converted into a stonemason's workshop (Fig. 10) so that the conservation work and the associated training of stonemasons could continue during the winter months. It bears the name of the architect, building researcher and monument conservator Martin Bachmann, who sadly passed away in 2016 and played a key role in shaping the Pergamon ruins site over the last few decades, also making an outstanding contribution to the training and further education of local labourers.

17 A new [tourist map](#) with different routes for visiting the UNESCO World Heritage Site of Pergamon-Bergama, which can be [accessed online](#) and has also been set up at several locations in Bergama, serves to better communicate the historical, archaeological and cultural heritage of the site. It was created on the basis of the new [archaeological map of Pergamon](#).

Part II: The Micro-region

18 The new survey in the districts of Bergama and Kınık, which began in 2022, is scheduled to run for six years. It aims to use the methods of extensive and intensive surveys to investigate settlement structure and land use, with a focus on the Hellenistic and Roman Imperial periods. Different geographical zones will be analysed: The lower eastern river plain of the Bakırçay, the neighbouring mountain ranges, river valleys and plateaus, as well as the Kozak Mountains and its plateaus. In view of the dimensions of this area, it goes without saying that it is not possible to cover the entire area, but that only individual selected sub-areas with exemplary informative value can be investigated. Within these survey areas, individual sites are targeted on the one hand, while coherent corridors are intensively surveyed on the other.

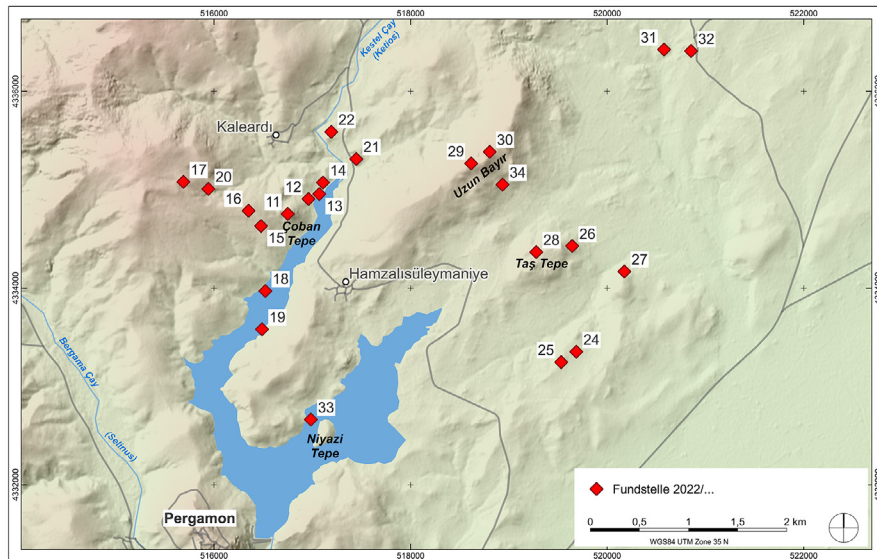


Fig. 11: Pergamon environs, Ketios Valley and south-eastern foothills of the Kozak Mountains. Overview of the sites discovered during the 2022 campaign

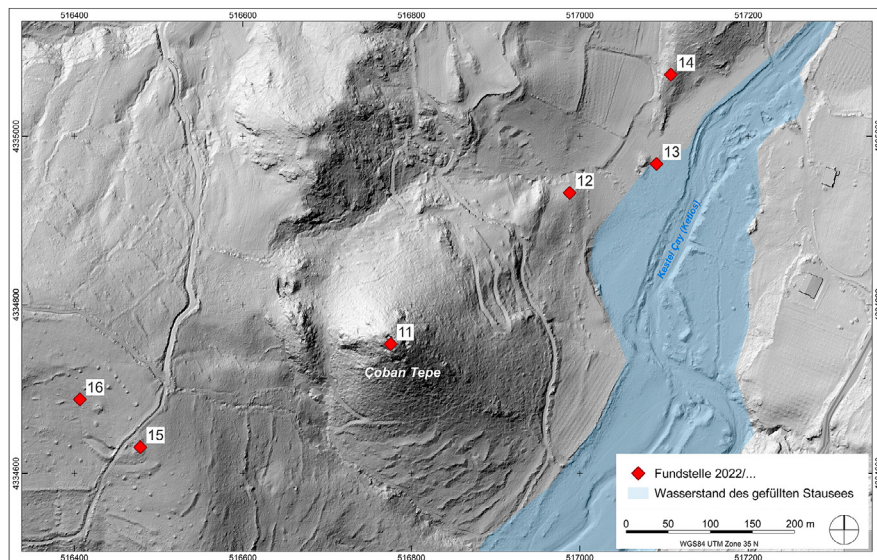


Fig. 12: Pergamon environs, Ketios valley. Çoban Tepe and surroundings based on new LiDAR data

19 In 2022, the archaeological work was divided into two sub-projects. The first two-week survey focussed on the question of pottery manufacture at the western foothills of the Yüntdağ (Aspordenon), where evidence of extensive pottery production, particularly from Late Antiquity and the early-middle Byzantine period, had already been found in previous years in the area of two presumed Roman villas or richly furnished rural settlements.

20 The second, six-week survey was the first systematic investigation of the upper Kestel Valley (Ketios) and the neighbouring foothills of the Kozak Mountains (Pindasos) to obtain information about the ancient settlement structure and land use (Fig. 11). Despite its proximity to Pergamon, the area around the present-day villages of Kaleardı and Hamzalı Süleymaniye has hardly been explored to date and is virtually a blank spot on the archaeological map. This picture has been fundamentally revised by the survey team's fieldwork. This was followed by one-week geophysical surveys by the universities of Kiel and Kocaeli¹³. The programme of the 2022 campaign was completed by a three-week campaign by the physical geography team from Berlin and İzmir, which was divided into work in the field and in the laboratory of the excavation house¹⁴. Only a selection of the 34 archaeological sites surveyed can be presented below.

21 Large parts of this year's survey area in the Ketios Valley were recorded with LiDAR before the start of the campaign¹⁵ so the basis now exists for a very detailed terrain model that also shows archaeologically relevant structures. As examples, I would like to point out the Çoban Tepe settlement mound with illicit excavations in the summit area, a large rock tomb in the immediate vicinity and several modern circular heaps of stones, some of which apparently originate from small ancient burial mounds (Fig. 12). The systematic analysis of all the images is expected to yield numerous other findings. On this basis, we will decide whether the costly method should also be used in other survey areas.

13 The Geophysics working group was directed by Wolfgang Rabbel (Kiel) in cooperation with İsmail Kaplanvural (Kocaeli).

14 The Physical Geography working group was directed by Brigitta Schütt (Berlin) in cooperation with Mehmet Doğan (İzmir).

15 The company Solvotek (Istanbul) was commissioned with the LiDAR scan.

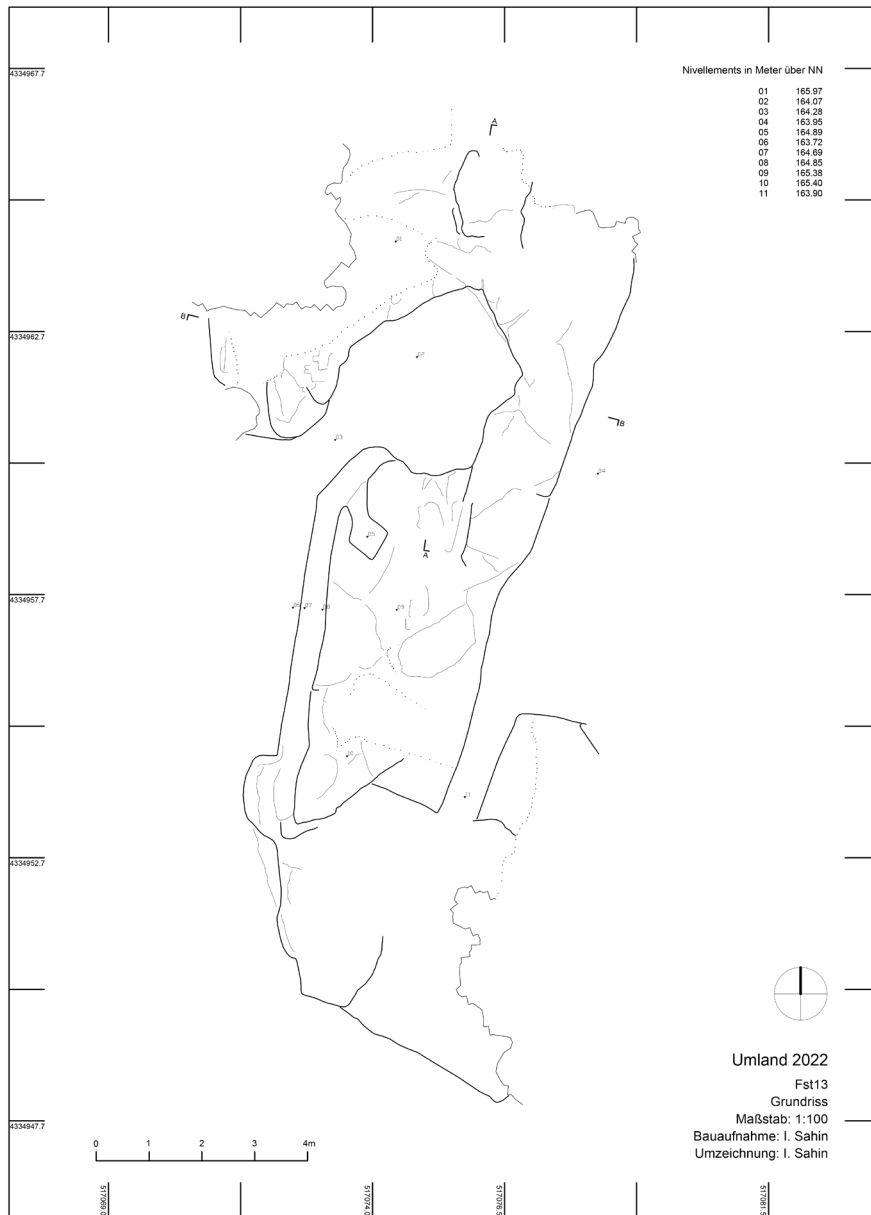


Fig.13: Pergamon environs, Ketios valley. Ground plan of a presumed rock-cut tomb

›Ceramic Region‹ Pergamon

22 The investigation of ceramic production in the Pergamon Micro-region promises to provide new information on economic cycles from the extraction of raw materials to the distribution and consumption of finished products. The ancient pottery workshops of Çandarlı (Pitane) had been investigated in detail in previous years as part of an intensive survey. Additionally, a large production site primarily for amphorae from the Late Antique to Byzantine periods was discovered in the western lower level of the Bakırçay in 2021. Now the expansion of the production sites in the vicinity of the presumed Roman villa of Bozköy was to be investigated. The focus here was on the documentation of ceramic slag, misfires and ceramic production tools. From these finds, it is already possible to reconstruct the production of so-called »globular amphorae« from Late Antiquity to the Middle Byzantine period, which shows great similarities to the production in Sazlık.

Ketios (Kestel Çayı) Valley

23 Çoban Tepe (see Fig. 12), which is very prominently located on the banks of the River Ketios, was already interpreted by Carl Schuchhardt in the late 19th century as the site of a fortified ancient settlement¹⁶. The features described at the time have now been largely destroyed by looting and erosion. All still visible features have been documented; they confirm the image of a small settlement with a fortified centre, which can be dated to the 5th to 4th century BC on the basis of the pottery finds. The end of its use in the Hellenistic period can be explained by the increased attractiveness of Pergamon as a settlement centre. It is also conceivable that the Attalids did not tolerate fortified sites in the immediate vicinity of the ruler's seat where potential enemies could have established themselves.

24 Numerous other sites have been found in the immediate vicinity of Çoban Tepe, which bears witness to the intensive agricultural use of the area by small farmsteads until the Roman imperial period and was not affected by the abandonment of the settlement on Çoban Tepe. An elaborate burial complex with a dromos and chamber, which may have been designed as a tumulus, belongs to the Çoban Tepe period itself (Fig. 13). It is conceivable that this was the burial

16 Conze 1912, 128–129.

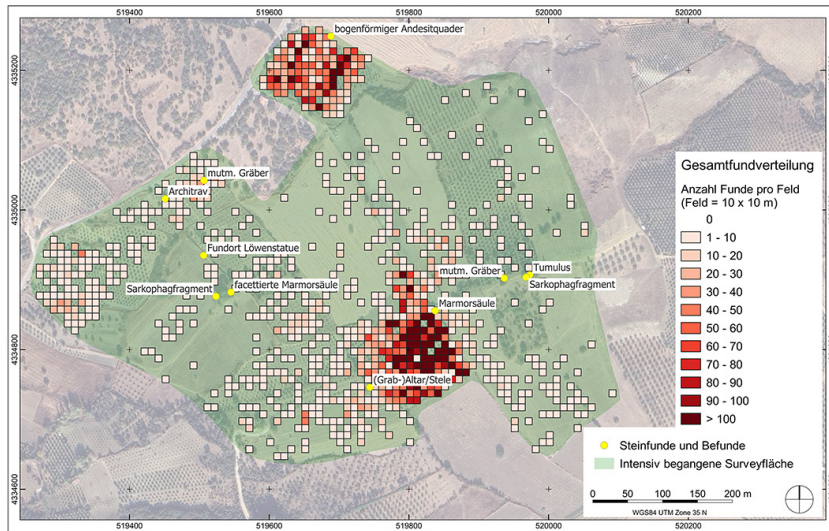


Fig. 14: Pergamon environs, site 26: Overall distribution of finds, stone artefacts and architectural features

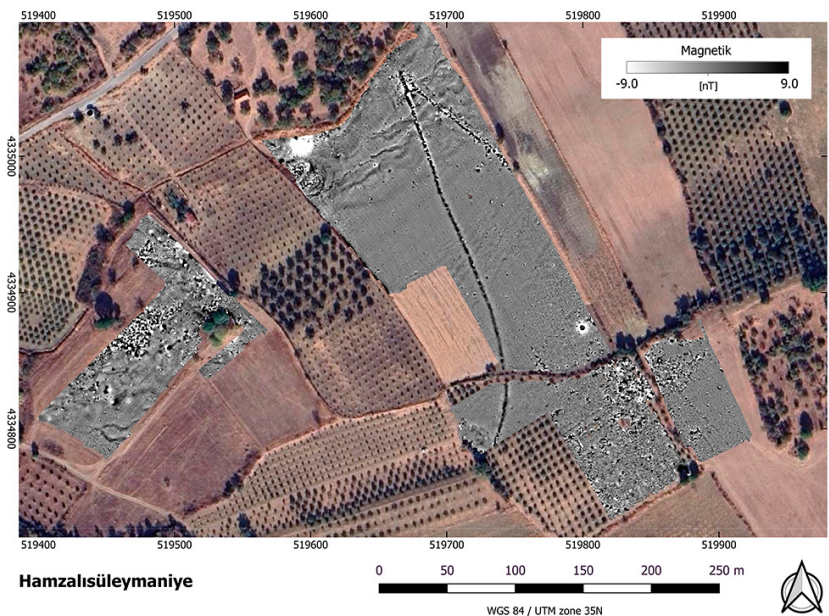


Fig. 15: Pergamon environs, site 26. results of the 2022 geomagnetic prospection

place of the local dynasts, who we can imagine as the lords of Çoban Tepe in pre-Hellenistic times.

25 A closer look at the distribution of other sites in the Ketios valley shows that we are dealing with a part of the micro-region that was unusually densely populated and intensively used for agriculture from the Hellenistic period to Late Antiquity. Several sites can be identified as agricultural facilities on the basis of presses and mills. Within the chora – i. e. the rural territory – of an ancient city, areas that could be reached on foot in a relatively short time were particularly attractive, as fresh produce could be transported from there to the city markets on a daily basis. This was evidently also the case in the immediate vicinity of Pergamon.

Traces of Ancient Settlements in the Foothills of the Pindasos (Kozak) Mountains North-East of Pergamon

26 In addition to the work in the Ketios valley, the foothills of the Kozak Mountains to the north-east of Pergamon were also investigated (Fig. 14). The approximately 25 ha area between the hills of Taş Tepe and Uzun Bayır proved to be particularly revealing. Rural settlements or country estates, as well as numerous remains of ancient burial sites from different eras, were found here, which can be recognised as individual finds or concentrations of finds in the terrain. A Hellenistic lion sculpture exhibited in the Bergama Museum also comes from here, testifying to the quality of the funerary monuments. Pottery from the Classical to the late Byzantine period testifies to the almost two thousand years of utilisation of the area.

27 Due to the special potential of the large contiguous area with several different types of features, we decided to carry out large-scale geomagnetic prospections (Fig. 15). They reflect the distribution of the surface finds: the density of finds in the necropolis area is significantly lower than in the area of the presumed settlement. However, the prospections have also led to the discovery of further features, such as a presumed ancient water pipe. They are to be further intensified in the following year.



Fig. 16: Pergamon environs, Taş Tepe. Wedge holes (left) and v-shaped channels (right) for stone extraction

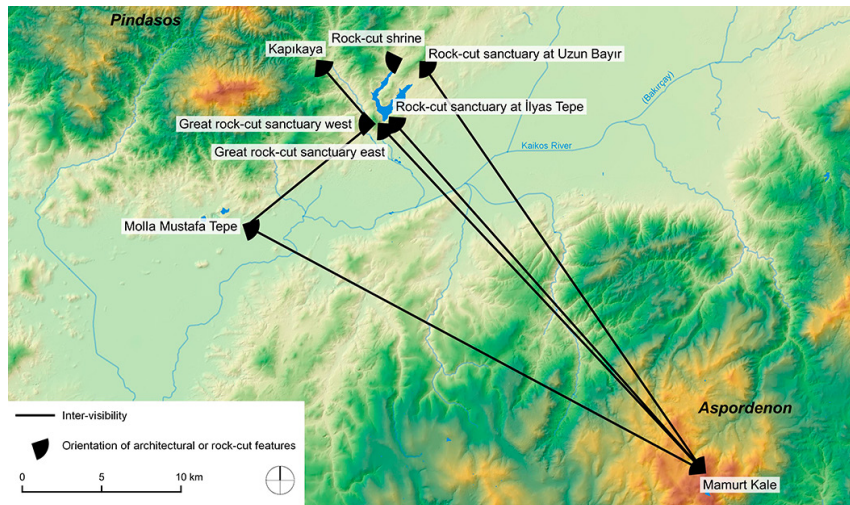


Fig. 17: Pergamon environs, Rock sanctuaries. Visual network of urban and extra-urban rock sanctuaries, some with a view of the Meter sanctuary of Mamurt Kale. The two newly discovered rock sanctuaries on the top right

Quarries

28 In addition to agricultural use, there is also evidence of large-scale ancient stone quarrying in the 2022 survey area. Studies on the extraction and utilisation of stone as a resource are an important part of the TransPergMikro project. With the discovery of two further quarries on Uzun Bayır and Taş Tepe, which can be identified by large quarrying areas, small-scale traces of quarrying and rubble heaps, we now know of two further main sources of andesite, which was the favoured building material in Pergamon (Fig. 16). They are located only 5 km from the city hill of Pergamon, to which they were connected via a side valley of the Ketios. This logistically advantageous location further emphasises the importance of the two quarries for the supply of Pergamon.

Rock-cut Sanctuaries

29 The exploration of rock sanctuaries in Pergamon and the surrounding area has been one of the focal points of research into the area around Pergamon for years, providing important information on human-environment interaction on a religious level. However, the eastern lower level of the Bakırçay was previously a blank area on the mapping of cult sites.

30 This has changed with the new discovery of two further shrines in the Ketios Valley and on the eastern flank of Uzun Bayır (Fig. 17): While the former site occupies a dominant position in its immediate surroundings but is not integrated into the network of other sanctuaries of Meter in the micro-region, the latter site again exhibits a characteristic visual connection with the main sanctuary of the regional cult of Meter in Mamurt Kale. This observation suggests that the lower eastern level of the Bakırçay (Kaikos) was also integrated into the »visual region« of Pergamon in a similar way to the lower western level. Simple natural or rock sanctuaries, which primarily had a local function, thus contributed to the symbolic configuration of the landscape within the micro-region.

Aqueduct of the Madra Dağ Canal

31 The new investigation area northeast of Pergamon is still largely unexplored archaeologically and therefore promises many new discoveries, which



Fig. 18: Pergamon environs, Gökçeyurt. Clay pipe stamp and clay pipe of the ancient water channel *in situ*

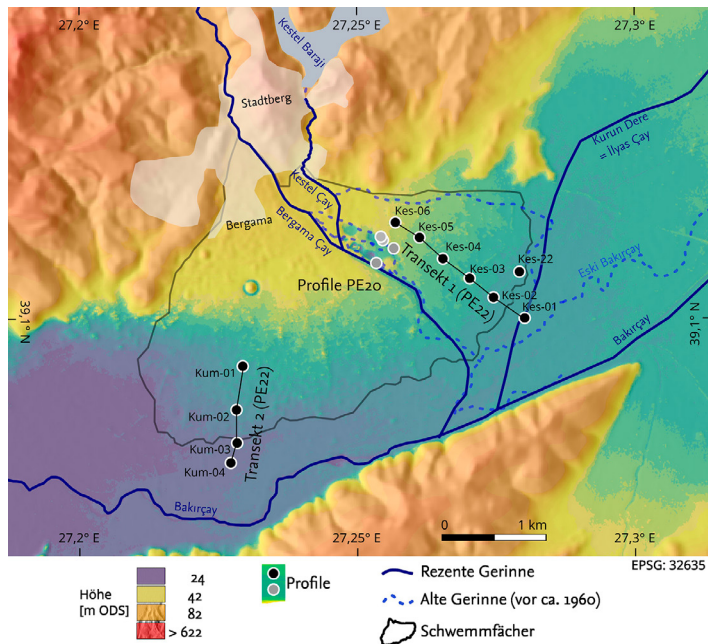


Fig. 19: Pergamon environs. Physical Geography. Location of the core samples on the alluvial fan of the Bergama Çay (Selinus) and the Kestel Çay (Ketios) water channel *in situ*

have been impressively confirmed this year. One exception is the various Hellenistic and Roman imperial long-distance water channels, which were published in 2001 in the monumental study by Günther Garbrecht¹⁷. But even the water pipes still offer surprises: Near the village of Gökçeyurt, for example, the survey team came across the remains of an ancient aqueduct and its associated water pipe on a recently constructed forest path (Fig. 18). The aqueduct led over a saddle and was used to bridge a cut between two mountains. The construction of the forest track has severely damaged the ancient structure. In the continuation of the aqueduct, the water pipe could be traced for about 150 m in a south-easterly direction, partly through *in situ* clay pipes. Based on the location, it can be assumed that this is part of the ›Madradağ pipeline‹ (approximately 180–160 BC)¹⁸.

Physical Geography¹⁹

32 The archaeological surveys have provided completely new information on the settlement structure, agricultural use, the extraction of resources and the symbolic occupation of the landscape in the area of the Kestel Valley (Ketios) and the foothills of the Kozak (Aspordenon). In the future, they are to be combined with historical landscape scenarios and the reconstruction of dynamic natural space through natural factors or human influence. In the TransPergMikro project, this information is provided by Physical Geography, which worked on the Bergama alluvial fan in two areas in 2022 (Fig. 19): In the eastern area of the alluvial fan around Kestel Çay and in the western area of the alluvial fan.

33 In addition, a joint project was initiated with archaeological ceramic research to investigate the connections between clay deposits and ceramic production in the Pergamon Micro-region.

34 Seven cores were drilled along the Kestel Çay. The sediments were photographically documented, described and sampled. Charcoal samples were taken for radiocarbon dating; the results are still pending. The samples were processed and analysed in the Pergamon excavation house in parallel with the fieldwork. The aim

17 See below note 18.

18 Radt 2002, 149–150; Garbrecht 2004, 89–131 Beilage 7.

19 The following paragraph is based on a report by Fabian Becker, Robert Busch, Moritz Nykamp, Brigitta Schütt (Berlin) and Mehmet Doğan (Izmir).

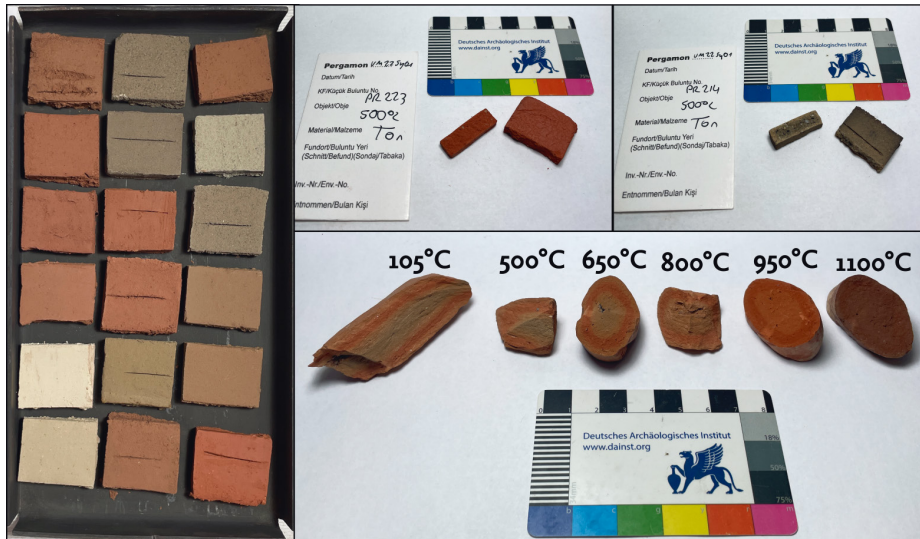


Fig. 20: Pergamon environs, Physical Geography. Illustration of the test bricks before firing, after firing, and the over-firing process of original ceramic samples

of the work was to reconstruct the sediment dynamics on the alluvial fan and to reconstruct the palaeoenvironmental conditions. The lowest drilling shows typical alluvial sediments of the Bakırçay plain. In the next higher drillings, there was an alternation between floodplain and alluvial fan sediments. Individual layers are typical of high-energy flood events.

35 Sediments of the Bakırçay floodplain were also found in the area of the western alluvial fan in the deepest drillings. Sediments from an oxbow lake were drilled in the transition area between the alluvial fan and the Bakırçay floodplain. This indicates that the Bakırçay shifted its course here in the past. Typical alluvial fan sediments were drilled in the other two cores. The highest drilling in the west of the alluvial fan yielded mainly sands; the name of the location – Kumluca – already indicates sandy soils at this point.

36 Together with archaeological ceramic research, an attempt was made to determine the origin of the clay used in the Bozköy and Sazlık pottery production sites. For this purpose, a total of 37 clay samples were taken within a 2 km radius of the two production sites. The samples were prepared and analysed in the laboratory at the excavation house in Bergama. The sampled material was analysed for its suitability for the production of ceramics. ›Sample bricks‹, each weighing 100 g, were fired at several temperature levels between 500 and 1100°C (Fig. 20). The fired sections were documented photographically and analysed for their elemental composition and changes at different temperatures using portable X-ray fluorescence spectroscopy. The results of the experiment will be incorporated into the evaluation of suitable sediments for ceramic production and the assessment of the site factors around Bozköy and Sazlık. In this way, the results of the archaeological survey on pottery production will be combined with physical geography research on the availability of resources in the micro-region.

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